



Florida Power

CORPORATION
Crystal River Unit 3
Docket No. 50-302

April 7, 1997
3F0497-05

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Subject: REVISED LOW TEMPERATURE OVERPRESSURIZATION
PROTECTION FEATURES AND REQUEST FOR EXEMPTION TO USE
ASME CODE CASE N-514

References: A) NRC to FPC letter, 3N0895-21, dated August 31, 1995
B) FPC to NRC letter, 3F0996-09, dated September 6, 1996
C) NRC to FPC letter, 3N0297-01, dated February 4, 1997

Dear Sir:

In Reference 'A', the NRC denied Florida Power Corporation's (FPC's) Technical Specification (TS) change request regarding Low Temperature Overpressure Protection (LTOP) features and requested that FPC submit a revised response to Generic Letter (GL) 88-11, "NRC Position on Radiation Embrittlement of Reactor Vessel Materials and its Impact on Plant Operations."

In Reference 'B', FPC responded to Reference 'A' and described FPC's justification for continuing to implement its LTOP features at Crystal River Unit 3 (CR-3) using administrative controls and provided an October 1997 schedule for submitting a revised LTOP Technical Specification change request and response to GL 88-11. At the time Reference 'B' was submitted, CR-3 was shut down for what was expected to be a short term outage to repair a leaking turbine lube oil pipe. It was expected that the plant would return to power and operate until the revised LTOP Technical Specification could be submitted, reviewed, and approved by the NRC. Contrary to this expectation, CR-3 has remained shut down. As such, the plant is in a condition where LTOP features are required and are being implemented.

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In Reference 'C' the NRC informed FPC that the proposed LTOP features were unacceptable because the LTOP administrative controls and setpoints were not based on the current pressure/temperature curves and requested that FPC submit a revised LTOP Technical Specification within 60 days of receipt of the letter. FPC received Reference 'C' on February 11, 1997.

This letter is in response to Reference 'C'. The proposed actions in this response have been discussed with the NRC Project Manager. FPC is providing, as Enclosure 1 to this letter, a Justification for Continued Operation (JCO) to continue implementing LTOP features through administrative controls until a TS change request for LTOP features is submitted and approved by the NRC. The features being implemented include: 1) a new Reactor Coolant System (RCS) maximum pressure limit of 100 psig and 2) a lower Pilot-Operated Relief Valve (PORV) setpoint of 454 psig. These features are based on the approved 15 effective full power year (EFPY) pressure-temperature (P/T) curves for CR-3, which were developed using American Society of Mechanical Engineers (ASME) Code, Section XI, Appendix G methodology. They provide for safe operation in Mode 5 with the reactor pressure vessel head fully tensioned and the RCS filled and vented. The new PORV setpoint will be implemented by May 23, 1997. These controls will remain in effect until revised LTOP Technical Specification features, which address the full range of RCS pressures, are completed. The TS change request will be submitted by September 18, 1997.

With these proposed LTOP features implemented, CR-3 cannot start reactor coolant pumps. This prevents a normal plant startup. Therefore, FPC is developing additional analyses to define LTOP features for the Technical Specifications which will allow plant startup. These analyses use the methodology described in ASME Code Case N-514, "Low Temperature Overpressure Protection," which has not yet been endorsed by the NRC. Pursuant to 10 CFR 50.12, "Specific Exemptions", FPC requests an exemption from 10 CFR 50.60 to allow the use Code Case N-514. The exemption request is detailed in Enclosure 2 of this letter.

Code Case N-514 was approved by ASME on February 12, 1992, and incorporated into the 1993 Addenda to the ASME Boiler and Pressure Vessel Code, Section XI, Appendix G. Code Case N-514 provides alternate guidance on developing LTOP features, when LTOP features must be in effect, and the maximum RCS pressures allowable for LTOP features.

Regulatory Guide 1.84, 1.85, and 1.147 list the ASME Code Cases that have been approved by the NRC. Code Case N-514 has not yet been added to those Regulatory Guides, although it has been approved for use at other facilities through

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the 10 CFR 50.12 exemption process. Code Case N-514 is also discussed in the attachment to SECY-94-267, Section 4.5.2, "Status of Low Temperature Overpressurization Protection Limits Issue." That discussion concludes with the statement "The content of Code Case N-514 has been incorporated into Appendix G of Section XI of the ASME Code and published in the 1993 Addenda to Section XI. The NRC Staff is currently developing a revision to 10 CFR 50.55a that will endorse the 1993 Addenda and Appendix G of Section XI in the regulations."

The enclosed exemption request is justified because it meets the requirements of 10 CFR 50.12 in that it is authorized by law, it will not present a risk to the public health and safety, it is consistent with the common defense and security, and special circumstances are present. Enclosure 2 describes specifically how these regulatory requirements are met. FPC requests approval of this exemption request by July 15, 1997 to support development of the Technical Specification change request for LTOP features described above and restart from the current outage. If questions arise during your review please contact the Manager of Nuclear Licensing, at (352) 563-4566.

Sincerely,

Hold for JPCowan

John Paul Cowan
Vice President
Nuclear Production

JPC/pmp

Enclosures

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

ENCLOSURE 1

**JUSTIFICATION FOR CONTINUED OPERATION
FOR LOW TEMPERATURE OVERPRESSURIZATION PROTECTION
AT CRYSTAL RIVER UNIT 3**

BACKGROUND

The Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 88-11, "NRC Position on Radiation Embrittlement of Reactor Vessel Materials and Its Impact on Plant Operations," on July 12, 1988. Florida Power Corporation (FPC) responded to the NRC in a letter dated November 23, 1988, requesting the formal response to GL 88-11 be consolidated with a Technical Specification Change Request Notice (TSCRN) for 15 effective full power years (EFPY) pressure/temperature (P/T) curves.

On October 31, 1989, FPC submitted to the NRC a TSCRN to change P/T limits for heat-up, cool-down and inservice leak and hydrostatic testing, based on the 15 EFPY and include Low Temperature Overpressurization Protection (LTOP) features for Crystal River Unit 3 (CR-3) in the Technical Specifications (TS). The TSCRN was FPC's formal response to GL 88-11. The NRC accepted the 15 EFPY P/T curves in a letter dated February 7, 1991. At that time, the LTOP TSCRN was still under review.

Between October 31, 1989 and August 31, 1995, there were several meetings and discussions between the NRC, B&W/Framatome and FPC on the methodology to determine LTOP features. On August 31, 1995, the NRC issued a safety evaluation report (SER) denying the TSCRN for LTOP features. In response to that denial, on September 6, 1996, FPC submitted a schedule to the NRC to revise the response to GL 88-11. The letter identified the interim LTOP administrative controls in place at CR-3 and proposed a date of October 15, 1997 for the GL 88-11 revised response submittal.

On February 4, 1997, the NRC rejected FPC's proposal for LTOP administrative controls and schedule for a response to GL 88-11, and requested FPC submit proposed LTOP Technical Specifications within 60 days. FPC's does not have LTOP features currently in Technical Specifications. FPC has determined administrative controls would be equally effective as a TS change for the current outage.

CURRENT CONDITIONS

CR-3 is currently in MODE 5, with the reactor pressure vessel (RPV) head fully tensioned, and the reactor coolant system (RCS) filled and vented. CR-3 is susceptible to an LTOP occurrence while the plant is in this condition. CR-3 is currently implementing LTOP features by using operating procedures (OP's). Limits and precautions for LTOP features are included in OP-202, "Plant Heat-up," OP-209, "Plant Cool-down," OP-301, "Operation of the Reactor Coolant System," OP-305, "Operation of the Pressurizer," OP-401, "Core Flood System," OP-402, "Makeup and Purification System," and OP-404, "Decay Heat Removal System."

FPC's current procedure limits and precautions related to LTOPS are:

1. Pressurizer level is \leq 220 inches to maintain a compressible volume to accommodate a water level surge.
2. Both trains of High Pressure Injection (HPI) injection valves are closed and breakers secured to prevent inadvertent HPI into the RCS.
3. The PORV is operable with a low setpoint to maintain RCS pressure below the P/T limit curves.
4. The Core Flood Tank (CFT) pressure is maintained within maximum allowable RCS pressure/temperature limits when CFT isolation valves, CFV-5 and/or CFV-6, are open, or these valves are closed to prevent inadvertent CFT injection into the RCS.

ASME SECTION XI RECOMMENDATIONS FOR LTOP

The ASME Section XI Working Group on Operating Plant Criteria (WGOPC), which has the responsibility for Appendix G to Section XI, considered the burden and safety impact imposed by the regulatory requirements for LTOP, and developed Code guidelines for determining the LTOP setpoint pressure and the required LTOP enabling temperature. These guidelines state:

LTOP systems 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

$(RT_{NDT}) + 50^{\circ}\text{F}$, whichever is greater.^{1, 2} LTOP systems shall limit the maximum pressure in the vessel to 110% of the pressure determined to satisfy Appendix G of Section XI, Article G-2215.

These ASME Code guidelines relieve some operational constraints and provide adequate margins against failure for the reactor pressure vessel. Further, by relieving the operational restrictions, these guidelines result in a reduced potential for activation of pressure relieving devices, thereby improving plant safety.

PROPOSED CHANGES

FPC will limit RCS pressure to 100 psig and set the PORV low setpoint to 454 psig. These values are based on the 15 EFPY P/T curves, using the methodology described in ASME, Section XI, Appendix G, with no reactor coolant pumps running. The PORV setpoint will be lowered to 454 psig by May 23, 1997. Procedure changes to control RCS pressure to less than or equal to 100 psig will be completed by June 27, 1997. These administrative controls will remain in effect until revised LTOP Technical Specification features, which address the full range of RCS pressures, are completed.

JUSTIFICATION FOR CONTINUED OPERATION

CR-3 is currently in MODE 5 with the RPV head fully tensioned and the RCS filled and vented. FPC will remain in the current plant configuration based on the administrative controls and PORV setpoint change described above.

The proposed LTOP features are based on the approved (15 EFPY) P/T curve analyses for CR-3, and on the accepted methodologies for this type of analysis. Specifically, the values are based on ASME, Section XI, Appendix G, as referenced by 10 CFR 50, Appendix G.

The PORV low setpoint will be adjusted to 454 psig. This value is based on the analysis for the approved 15 EFPY P/T curves for CR-3, using ASME, Section XI, Appendix G. The proposed LTOP setpoint for the PORV of 454 psig will protect the current steady state P/T curves at 100% of the Appendix G limits, provided that no RC pumps are operating.

¹ The coolant temperature is the reactor coolant inlet temperature.

² The vessel metal temperature is the temperature at a distance one fourth of the vessel section thickness from the inside wetted surface in the vessel beltline region. RT_{NDT} is the highest adjusted reference temperature (for weld or base metal in the beltline region) at a distance one fourth of the vessel section thickness from the wetted inner surface as determined by Regulatory Guide 1.99, Revision 2.

Based on the analysis using ASME Code Case N-514, LTOP protection is provided when pressurizer level is ≤ 220 inches if the RCS pressure is limited to < 200 psig. Until ASME Code Case N-514 is approved for use at CR-3 through the approval of the enclosed exemption request, the RCS pressure will be limited to ≤ 100 psig for the current outage (MODE 5), and the allowable pressurizer water level will remain ≤ 220 inches, in accordance with the administrative controls described earlier. FPC selected 100 psig as the administrative limit for the RCS pressure to provide margin to the analytical limit.

In addition to the revised PORV setpoint and RCS pressure limits, the existing limits and precautions established for LTOP will remain in effect to control inadvertent addition of mass to the RCS.

FPC is also requesting an exemption from 10 CFR 50.60 to use ASME Code Case N-514 to establish the LTOP features for CR-3. FPC determined that the revised LTOP features, without the use of the ASME Code Case N-514, resulted in reactor coolant pump operational prohibitions, based on pressurizer level and the window between the P/T curves and reactor coolant pump net positive suction head curve. Therefore, use of ASME Code Case N-514 is necessary to develop the LTOP features for CR-3.

CR-3 is in a safe condition for current plant operating mode. Reducing the PORV low set point to 454 psig will protect the P/T curve from being exceeded, therefore, assuring RPV integrity is maintained. The administrative controls provide a defense in-depth to prevent an LTOP occurrence due to an inadvertent introduction of water into the RCS. The inherent conservatism in the ASME Code, Section XI, Appendix G analysis methodology, provide further assurance the RPV integrity will not be jeopardized.

ENCLOSURE 2

EXEMPTION REQUEST TO USE ASME CODE CASE N-514

EXEMPTION REQUEST

10 CFR 50.60, "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors For Normal Operation," states "Except as provided in paragraph (b) of this section, all lightwater nuclear power reactors must meet the fracture toughness and material surveillance program requirements for the reactor coolant pressure boundary set fourth in Appendices G and H to this part." Part 50, Appendix G, Paragraph IV(A)(2)(b), requires that "...pressure-temperature limits...be at least as conservative as limits obtained by following the methods of analysis and the margins of safety of Appendix G of Section XI of the ASME Code." 10 CFR 50.60, Paragraph (b) allows alternatives to Appendices G and H when the Commission grants an exemption to the Rule under 10 CFR 50.12.

Pursuant to 10 CFR 50.12, FPC hereby requests an exemption from 10 CFR 50.60 and approval to use ASME Code Case N-514, "Low Temperature Overpressure Protection Section XI, Division 1" in lieu of ASME Code, Section XI, Appendix G. Code Case N-514 will be used to establish the LTOP setpoints for CR-3.

10 CFR 50.12 states the Commission may grant exemptions from the requirements contained in 10 CFR 50 which are:

1) *Authorized by law*

No law exists which precludes the activities covered by this exemption request. 10 CFR 50.60(b) allows the use of alternatives to 10 CFR 50, Appendices G and H when an exemption is granted by the Commission under 10 CFR 50.12.

2) *Will not present an undue risk to the public health and safety*

This exemption does not present an undue risk to public health and safety for the following reasons. The LTOP setpoint will utilize 110% of the pressure determined to satisfy ASME Section XI, Appendix G, Paragraph G-2215, as a design limit. PORV setpoints and enabling temperatures will be developed based on the appropriate P/T curves. The enable temperature is

to provide a bounding low coolant temperature for reactor vessel integrity protection during an LTOP design-basis transient. The approach is justified because the resulting P/T curve provides adequate margin to protect the reactor vessel against brittle fracture.

Restrictions on allowable operational conditions and equipment operability requirements have been established to ensure that operating conditions are consistent with the assumptions of the accident analysis. Specifically, RCS pressure and temperature must be maintained within the heat-up and cool-down rate dependent pressure/temperature limits specified in TS 3.4.3, "RCS Pressure and Temperature Limits."

3) *Consistent with the common defense and security*

This exemption request applies to the operation of the CR-3 RCS at low temperatures and pressures. It does not effect the common defense and security.

10 CFR 50.12(a)(2) states "*The Commission will not grant an exemption unless special circumstances are present.*" FPC's request meets the special circumstances as described below:

a) 10 CFR 50.12(a)(2)(ii), *Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule...;*

ASME Code Case N-514 recognizes the conservatism of the ASME Appendix G curves and allows setting LTOP setpoints such that the ASME Section XI, Appendix G limits are not exceeded by more than 10%. The Code Case permits use of an LTOP enable temperature equal to the reference temperature, nil-ductility (RT_{NDT}) plus 50°F for the limiting material, or 200°F, whichever is greater. This allows the implementation of LTOP features which preserve an acceptable margin of safety while at low temperatures and pressures. The LTOP features established in accordance with ASME Code Case N-514 will also reduce the risk of unnecessary actuations of the protection system pressure relieving device (the PORV). Therefore, establishing the LTOP features in accordance with ASME Code Case N-514 criteria satisfies the underlying purpose of the ASME Code and the NRC regulations to ensure an acceptable level of safety.

b) 10 CFR 50.12(a)(2)(iii), *compliance would result in undue hardship or other costs that are significant if the regulation is enforced;*

The reactor coolant system pressure/temperature operating window at low temperatures is defined by the LTOP features. Implementation of LTOP features without the additional margin allowed by ASME Code Case N-514 would restrict the pressure/temperature operating window and would potentially result in undesired actuation of the PORV. This constitutes an undue hardship that can be alleviated by the application of ASME Code Case N-514. Implementation of LTOP features in accordance with ASME Code Case N-514 provides assurance that the reactor vessel is protected at low temperatures.

10 CFR 50.12(a)(2)(v), the exemption will provide only temporary relief from the applicable regulation and the licensee has made good faith efforts to comply with the regulations.

The exemption provides only temporary relief from the regulation and FPC has made a good faith effort to comply with the regulations. FPC will implement LTOP features in accordance with the regulations as described in Enclosure 1. However, FPC determined that implementation of the LTOP features, without the use of the ASME Code Case N-514, results in operational prohibitions for reactor coolant pumps and, therefore, prohibits plant heat-up and cool-down. FPC requests that the exemption be granted until such time as the NRC endorses Code Case N-514 for use by the industry. However, to obtain sufficient pressure/temperature operating margin for normal reactor startup, FPC requires the exemption to use ASME Code Case N-514.

CONCLUSION FOR EXEMPTION TO USE ASME CODE CASE N-514

As discussed above, this exemption request will not present undue risk to the health and safety to the public. Compliance with the requirements of 10 CFR 50.60 would result in undue hardship without a compensating increase in the level of quality and safety. ASME Code Case N-514 allows setting the PORV setpoint and enable temperature such that the ASME, Section XI, Appendix G limits are not exceeded by more than 10%. The Code Case recognizes the conservatism of the Appendix G curves and allows establishing a PORV setpoint that retains an acceptable margin of safety while maintaining operational margins for reactor coolant pump operation at low temperatures and pressures. The Code Case provides an acceptable margin of safety against reactor vessel failure and reduces the potential for an undesired PORV actuation. Therefore the application of ASME Code Case N-514 at CR-3 will ensure an acceptable level of safety.

Code Case N-514 was approved by ASME on February 12, 1992, and incorporated into the 1993 Addenda to ASME Boiler and Pressure Vessel Code,

Section XI, Appendix G. Code Case N-514 provides guidance on when LTOP features shall be implemented and the maximum RCS pressures allowable for LTOP.

Regulatory Guides 1.84, 1.85, and 1.147 list the ASME Code Cases that have been approved by the NRC. Code Case N-514 has not yet been added to those Regulatory Guides, although it has been approved for use at other facilities. Code Case N-514 is also discussed in the attachment to SECY-94-267, Section 4.5.2, "Status of Low Temperature Overpressurization Protection Limits Issue." That discussion concludes with the statement "The content of Code Case N-514 has been incorporated into Appendix G of Section XI of the ASME Code and published in the 1993 Addenda to Section XI. The NRC Staff is currently developing a revision to 10 CFR 50.55a that will endorse the 1993 Addenda and Appendix G of Section XI in the regulations."