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SUBJECT: Requests specific exemptions,examption from certain requests of 10CFR50.60, "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation."

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10 CFR §50.12
10 CFR §50.60

APR 08 1993

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Request for Exemption - ASME Code Case N-514

Introduction

The purpose of this letter is to request, in accordance with the provisions of 10 CFR §50.12, "Specific exemptions," an exemption from certain requirements of 10 CFR §50.60, "Acceptance criteria for fracture prevention measures for lightwater nuclear power reactors for normal operation" for Turkey Point Units 3 and 4.

Title 10 CFR §50.60 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. Title 10 CFR §50.60 specifies that proposed alternatives to the described requirements of 10 CFR Part 50 Appendices G and H may be used when an exemption is granted by the Commission under 10 CFR §50.12.

This exemption is requested to allow the application of American Society of Mechanical Engineers (ASME) Code Case N-514, "Low Temperature Overpressure Protection", in determining the acceptable low temperature overpressure protection (LTOP) Overpressure Mitigating System (OMS) setpoint for Turkey Point Units 3 and 4.

Discussion

Pressure/temperature (P/T) limits for low temperature overpressure events can be characterized by two parameters: the system enable temperature, and the vessel maximum pressure. According to current regulatory guidelines, the OMS must be enabled at temperatures less than or equal to $R_{t\,(NDT)}$ + 90 degrees Fahrenheit (°F), where $R_{t\,(NDT)}$ is the adjusted reference temperature, including margin, at the one quarter thickness location. At temperatures greater than $R_{t\,(NDT)}$ + 90° F, LTOP need not be provided. The maximum LTOP system pressure is determined based on system-specific considerations but is chosen so that the maximum pressure attained in the vessel will not exceed the P/T limit curve defined by Appendix G to ASME Sections III and XI and Appendix G to 10 CFR Part 50.

Current OMS limits produce operational constraints by limiting the range available to the operator to heat up and cool down the plant.

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For example, the "operating window" through which the operator can heat up and cool down the reactor coolant system is determined by the difference between the maximum allowable pressure determined from ASME, Section XI, Appendix G and, for the minimum allowable pressure, a sufficient differential pressure (i.e., between reactor coolant system pressure and atmospheric pressure) for the reactor coolant pump seals.

The OMS can have a significant economic impact by restricting plant operation. Further, the narrow operating window can have an adverse safety impact if it increases the possibility of unnecessary actuations of the OMS pressure relieving devices.

Based on information recently provided to Florida Power & Light Company (FPL), it has been determined that the generic methodology used to calculate the OMS setpoint for Turkey Point did not account for the differential pressure across the reactor core during reactor coolant pump operation. The pressure input to the OMS is sensed at the reactor coolant system hot leg. With three reactor coolant pumps operating, the pressure at the core inlet may be as much as 57 psig higher than at the pressure sensing point.

FPL has reviewed plant-specific setpoint calculations for Turkey Point Units 3 and 4 and determined that the Turkey Point Units 3 and 4 calculations are also affected by the omission. Adding this differential pressure to the Turkey Point Units 3 and 4 OMS setpoint analyses results in the design basis event pressure exceeding the limits of the Appendix G curves in a water solid condition when reactor coolant temperature is below approximately 180° F. The design basis mass addition event is the injection of coolant into the water solid reactor coolant system by a safety injection pump. Although the safety injection pump mass addition event is a part of the licensing basis assumption included in the OMS setpoint calculational analysis, the Turkey Point Units 3 and 4 Technical Specifications require that the safety injection pumps pathways for water injection be isolated below 275° F. The NRC was notified promptly concerning the failure to account for the pressure differential in establishing the OMS setpoint, and preliminary discussions have been held with the NRC's Office of Nuclear Reactor Regulation (NRR) staff.

FPL has evaluated lowering the OMS setpoint to account for the omission. This would require lowering the existing setpoint to approximately 360 psig. A minimum of 225 psig differential across reactor coolant pump seals is required for pump starting. With all considerations taken into account, plant operating procedures recommend a system pressure of between 325 psig and 375 psig for operating reactor coolant pumps. An OMS setpoint at or near 360 psig is within the operating range and provides no margin for pressure surges associated with normal operating evolutions (e.g., reactor coolant pump starting, and shifting operating charging

pumps) with the reactor coolant system in a water solid condition. This could result in unnecessary actuation of the OMS and the opening of relief valves.

The present OMS setpoint is based on a plant specific evaluation which determined parametrically the maximum permissible Power Operated Relief Valve (PORV) setpoint. There is no margin between the Appendix G curve at 85° F and the predicted maximum pressure attained during a design basis overpressure event described above. Any differential pressure caused by an operating reactor coolant pump will cause an overpressure excursion in excess of the Appendix G curve.

FPL has calculated the maximum allowable pressure at the reactor vessel midplane using the additional 10% allowed by Code Case N-514 and has also calculated the maximum pressure at the reactor vessel midplane that would result from a low temperature overpressurization event. The current OMS setpoint of 415 psig, accounting for flow induced differential pressures and piping losses, ensures that the maximum pressure at the reactor vessel midplane will not exceed the maximum allowable pressure calculated using Code Case N-514 when applied in conjunction with additional operational limits (e.g., limitations on the operation of reactor coolant pumps, reductions in PORV stroke times, etc.). ASME Code Case N-514 is discussed below.

Code Case N-514

ASME Code Case N-514 allows setting the OMS actuation setpoint such that the Appendix G curves are not exceeded by more than 10%. Application of this Code Case to Turkey Point Units 3 and 4 would allow continued operation with the present setpoint.

The ASME Working Group on Operating Plant Criteria (WGOPC) developed code guidelines to define LTOP limits that will avoid certain unnecessary operational restrictions, provide adequate margins against failure, and reduce the potential for unnecessary activation of pressure relieving devices used for LTOP.

The philosophy used by the WGOPC for developing these guidelines is to ensure that the LTOP limits are still below the P/T limits for normal operation, but allows the pressure that may occur with activation of pressure relieving devices to exceed the P/T limits provided acceptable margins are maintained during these events. This philosophy protects the pressure vessel from LTOP events, and still maintains the P/T limits in the Technical Specifications limits applicable for normal heat up and cool down in accordance with Appendices G to 10 CFR Part 50 and Sections III and XI of the ASME Code.

The WGOPC applied deterministic and probabilistic analysis techniques for several different flaw locations and heat-up and cooldown rates to evaluate the guidelines proposed by the WGOPC (Reference letter dated April 14, 1992 from T. J. Griesbach, Chairman WGOPC, to ASME Codes and Standards Subgroup on Evaluation Standards).

Inherent Margins to 10 CFR Part 50 Appendix G

There are numerous conservatisms in the development of Appendix G pressure/temperature curve calculations. Some of these are:

a) The safety factor of 2 on the principal membrane (pressure) stresses.

b) A margin factor applied to $R_{t(NDT)}$ by USNRC Regulatory Guide 1.99, Revision 2.

c) The disregarding of increased mechanical properties of the vessel which accompanies material embrittlement (elevated yield strength and flow stress).

These conservatisms support the determinations made by the WGOPC in the development of Code Case N-514.

The following additional margins are specific to the Turkey Point Units 3 and 4 reactor pressure vessels.

1) The assumption of a one quarter thickness (1/4 T) flaw in the Turkey Point Units 3 and 4 vessels when no flaws were detected during the 1990-1991 dual unit outage inspections.

2) Turkey Point Units 3 and 4 reactor pressure vessels do not contain axial welds and it is assumed that the welds are axial. This is equivalent to an additional safety factor of 2 in the calculated results since the postulated flaw (in the embrittled weld material) cannot be oriented normal to the greatest stress (hoop stress). Rather, the only plausible orientation for the postulated flaw is normal to the axial stresses, which in turn, is half that of the hoop stress.

These additional plant-specific margins also support the determinations made by the WGOPC in the development of Code Case N-514.

Bases for Exemption

The requested exemption to the regulations 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.

FPL believes the requested exemption meets the criteria in 10 CFR §50.12(a)(2) in that special circumstances are present. These special circumstances include:

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.

Basis The basis for the OMS setpoint is to preclude reactor coolant system pressure from exceeding the Appendix G curves when there is a potential for brittle failure of reactor vessel material. ASME Code Case N-514 recognizes the conservatism of the Appendix G curves and allows establishing a setpoint which preserves the acceptable margin of safety while maintaining operational margins for reactor coolant pump operation at low temperatures and pressures. Setpoints established in accordance with Code Case N-514 will also minimize the unnecessary actuation of protection system pressure relieving devices. Therefore, establishing an OMS setpoint using Code Case N-514 criteria satisfies the underlying of purpose of the ASME Code and the NRC's regulations to ensure nuclear power plant systems and components are operated to ensure an acceptable level of safety and environmental impact.

Based on the above, application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule.

10 CFR §50.12(a)(2)(iii)

Compliance would result in 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.

Basis Administrative restrictions on reactor coolant pump operations while at low reactor coolant system temperatures, which would be necessary to allow even single reactor coolant pump operation, would result in the inability to operate either unit below 141° F. FPL believes that this burden is unnecessary and can be alleviated by the application of the code case. The guidelines

developed by the WGOPC for LTOP P/T limits provide acceptable margin against crack initiation and failure in reactor vessels. These limits do not significantly change the likelihood of vessel failure associated with normal heat up and cool down P/T limits. Moreover, the LTOP guidelines will reduce the potential for unnecessary activation of protection system pressure relieving devices. Consequently, the LTOP limits developed by the WGOPC provide both economic and safety benefits.

Therefore, compliance would result in 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.

10 CFR §50.12(a)(2)(v)

The exemption would provide only temporary relief from the applicable regulation and the licensee or applicant has made good faith efforts to comply with the regulation.

Basis FPL will require the exemption to be in place only until the NRC approves Code Case N-514 for general use by the industry. Additionally, FPL is pursuing other technical, analytical, and regulatory efforts to alleviate the impact of the analytical omission.

Therefore, this exemption will provide temporary relief from the applicable regulation and FPL has made good faith effort to comply with the regulation.

Conclusion

ASME Code Case N-514 allows setting the OMS actuation setpoint such that the Appendix G curves are not exceeded by more than 10%. The ASME Code Committee has concluded that the LTOP guidelines provide acceptable margin against crack initiation and failure in reactor vessels, and will reduce the potential for unnecessary activation of protection system pressure relieving devices. Consequently, the OMS limits provide both operational (economic) and safety benefits with no adverse safety or environmental impact.

Summary

FPL believes that use of Code Case N-514 provides an acceptable level of quality and safety. Without authorization to use the code case, FPL is required to comply with all requirements of Appendix G referred to by 10 CFR §50.60. Compliance with the currently approved pressure/ temperature limits would result in economic

hardship to FPL and its customers, without a compensating increase in the level of quality or safety.

FPL requests that this exemption from certain requirements of 10 CFR §50.60 be processed in an expeditious manner. Turkey Point Unit 4 will commence a maintenance and refueling outage on April 10, 1993. Presently, reactor coolant system filling and venting following placement of the reactor vessel head is projected to commence by about May 15, 1993. We request that this exemption be processed prior to that time in order to provide maximum operational flexibility in returning Unit 4 to service. Additionally, any event that requires either Unit 3 or Unit 4 to go to Cold Shutdown (Mode 5) has the potential to result in similar difficulties in the return of either unit to Power Operation.

If you have any questions regarding this request, please contact us.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Nuclear

TFP/ejw

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
Ross C. Butcher, Senior Resident Inspector, USNRC, Turkey Point Plant