ENERGY NORTHWEST

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January 31, 2000
GO2-00-019

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21**
REQUEST FOR AMENDMENT TO TECHNICAL SPECIFICATION
LCO 3.4.9, RESIDUAL HEAT REMOVAL SHUTDOWN
COOLING SYSTEM - HOT SHUTDOWN
(ADDITIONAL INFORMATION)

Reference: Letter, dated January 3, 2000, Jack Cushing (NRC) to JV Parrish (Energy Northwest), "Request for Additional Information (RAI) for WNP-2, (TAC NO. MA6166)"

In the reference, the staff requested that additional information be provided to support review of our pending request for an amendment to revise the Applicability of LCO 3.4.9 in the Technical Specifications.

The additional information is included as an attachment. Should you have any questions or desire additional information regarding the matter, please call me or PJ Inserra at (509) 377-4147.

Respectfully,

D.W. Coleman

DW Coleman
Manager, Regulatory Affairs
Mail Drop PE20

Attachment

cc: EW Merschoff - NRC RIV
JS Cushing - NRC NRR
NRC Sr. Resident Inspector - 927N
DL Williams - BPA/1399
TC Poindexter - Winston & Strawn

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REQUEST FOR AMENDMENT TO TECHNICAL SPECIFICATION LCO 3.4.9, RESIDUAL HEAT REMOVAL SHUTDOWN COOLING SYSTEM - HOT SHUTDOWN (ADDITIONAL INFORMATION)

Question

In its July 29, 1999 submittal, the licensee stated that the basis for the requested technical specification (TS) change is that the original plant design operating temperature for the residual heat removal (RHR) shutdown cooling (SDC) piping and supports is less than the operational limit currently required by TS Limiting Condition for Operation (LCO) 3.4.9. During a conference call with the staff on November 17, 1999, the licensee stated that in 1988, an evaluation was performed to assess the condition of the RHR SDC piping system because of the potential of exposing the piping system to beyond original design operating temperature. The licensee is requested to provide details of the 1988 assessment (with respect to thermal stress limit and thermal fatigue cycle limit) and its findings.

Background

The 1988 system operating temperature discrepancy and resolution was documented in Non-Conformance Report (NCR) 288-028 (February of 1988). The NCR noted that the RHR piping downstream of the heat exchanger was designed for a normal operating temperature of 295°F, while by procedure it was possible to expose a portion of the piping to a maximum temperature of 320°F (saturation temperature for 75 psig) during shutdown. This was because the flow path for initiating RHR was through the heat exchanger bypass valve. A review of the past RHR shutdown cooling operation was completed to supplement the resolution of the 1988 NCR. Additionally, our current review noted that from February of 1984 through March of 1986, the system initiation was allowed at temperatures up to 355°F (saturation temperature for 125 psig). Thus, for our evaluation of the condition of the affected piping system a maximum temperature of 355°F at 125 psig was assumed for the initiation temperature for the RHR Shutdown Cooling (SDC).

Thermal Loads on Piping & Supports

The RHR SDC supply and return piping consists of a combination of ASME Code Class 1 and Code Class 2 piping.

ASME Class 1 piping primary (e.g. earthquake) plus secondary (e.g. thermal expansion) stress intensity range (Equation 10) has an allowable stress of 3Sm, which is based on the stress intensity defined as twice the maximum shear stress. If the Equation 10 allowable is exceeded then the alternative Equation 12 and 13 must be satisfied. Only Equation 12 includes stresses due to thermal expansion and thermal anchor movements. Additionally, ASME Class 1 piping and components are evaluated for cumulative damage caused by various stress cycles applied to systems. The cumulative usage factor shall not exceed 1.0.

Thermal Loads on Piping & Supports (continued)

The effects of thermal expansion on the ASME Class 2 piping system must meet the requirements of either Equation 10 (Sa) or Equation 11 (Sh+Sa). For ASME Class 2 piping, the allowable stress range for expansion stresses (Sa) is based on 7000 full range thermal cycles.

Based on the plant operating cycle history, the plant had been started up 34 times by the end of 1988. During the first year of operation, 1984, the plant experienced 13 startups. Although every shutdown did not include going into the shutdown cooling mode, for this evaluation it is assumed that 34 temperature cycles were experienced. The preferred loop, RHR-B, was normally used to initiate shutdown cooling, but it is possible that each loop would have had a portion of the maximum projected cycles. However, for this evaluation it was assumed that both loops had experienced 34 cycles of higher temperature.

The current ASME Class 1 and 2 stress analyses for the RHR return and supply piping meet the ASME Code allowable stress limits for the applicable operating conditions. These piping analyses were evaluated for the effect of the potential higher operating temperature. The new evaluation showed that the adjusted stresses remain within the ASME Code Class 1 and 2 allowable limits.

During the 1988 assessment, it was concluded that the limiting factor for thermal expansion beyond the analyzed system temperature was the pipe support system (e.g. hangers, anchors, etc.) of the return lines. Given the possibility of initiating the RHR SDC at higher than analyzed temperature, NCR 288-028 identified ten critical pipe supports that may have been loaded in excess of original thermal design load. Those critical supports were inspected and no damage was found. The highest loading would have occurred during 1984 to 1986, when temperatures possibly reached 355°F. From 1986 to 1988 the procedures limited system temperatures to a maximum of 320°F. Thus, the 1988 inspection was sufficient to demonstrate that no damage had occurred in the support system.

Thermal Fatigue Cycle

The ASME Class 1 piping fatigue limit is a cumulative usage factor less than or equal to 1.0. An evaluation was completed that accounted for the increased temperature for initiation of RHR SDC. The results demonstrated that the piping fatigue usage was still less than 1.0 for both RHR piping loops assuming that each loop had been used for all shutdowns. The occurrence of higher temperature RHR SDC injections was noted in the applicable system design calculations and will be accounted for in any future updates of the ASME Class 1 fatigue analyses or evaluations for plant life extension.

Thermal Fatigue Cycle (continued)

The ASME Class 2 piping thermal fatigue cycle limit of 7000 full range cycles is satisfied because the piping thermal expansion stresses, due to the increased temperature, meets the requirement of either Equation 10 or Equation 11 of ASME Code Sub-Section NC-3600.

Conclusion

Prior to 1988, plant procedures allowed for initiation of RHR SDC at temperatures in excess of the specified operating temperature in the RHR system design specification. An evaluation of the thermal fatigue cycles imposed on affected piping determined that ASME limits were not exceeded. Since the time of NCR 288-028, plant procedures were changed to limit RHR SDC operation to a reactor steam dome pressure of less than 48 psig (295° F). This limitation agrees with all current piping system analyses.