WOLF CREEK
NUCLEAR OPERATING CORPORATION

Neil S. "Buzz" Carns
President and
Chief Executive Officer

October 1, 1993

WM 93-0126

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Reference: 1) Letter dated September 13, 1993, from W. D. Reckley, USNRC to N. S. Carns, WCNOC
2) Letter NA 93-0001 dated January 5, 1993 from R. C. Hagan, WCNOC to the USNRC

Subject: Docket No. 50-482: Response To Request For Additional Information Regarding Proposed Power Rerate

Gentlemen:

This letter provides Wolf Creek Nuclear Operating Corporation's (WCNOC) response to a Request for Additional Information (RAI) provided in Reference 1. The RAI concerns WCNOC's Power Rerate License Amendment Request submitted in Reference 2.

At a site visit on September 15, 1993, WCNOC and Mr. W. D. Reckley, Project Manager, Nuclear Regulatory Commission (NRC) discussed the RAI and WCNOC's proposed response. The Attachment provides WCNOC's formal response to the NRC questions provided in Reference 1.

If you have any questions concerning this matter, please contact me at (316) 364-8831, extension 4000 or Mr. Kevin J. Moles at extension 4565.

Very truly yours,

Neil S. Carns

Neil S. Carns
President and
Chief Executive Officer

NSC/jra

Attachment

cc: W. D. Johnson (NRC), w/a
J. L. Milhoan (NRC), w/a
G. A. Pick (NRC), w/a
W. D. Reckley (NRC), w/a

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Response to Power Rerate Request for Additional Information

Question 1:

Provide additional information related to the calculations performed to verify environmental qualification of equipment. Discussions should address equipment located inside and outside containment.

Response:

The environmental qualification of equipment has been reviewed to address the power rerate. Containment temperature and pressure responses for the power rerate were provided from an analysis of the Main Steamline Break (MSLB) and Loss of Coolant Accident (LOCA) events, which are the bounding conditions for environmental qualification. These temperature and pressure curves were compared to the existing temperature and pressure curves to determine if the power rerate would impact environmental qualification requirements inside containment. A composite curve was generated using the peak values from the MSLB and LOCA curves. The composite curve peaked at essentially the same values as in the current analysis, except the long-term temperature response, which was slightly higher than the current analysis for the six month duration.

Equipment inside containment was originally qualified by assuring the peak temperature was enveloped and the long-term effect was quantified assuming the temperature was 120°F for six months. The curve provided was incrementally broken down to finite periods of time and run through the Arrhenius equation to determine the lifetime degradation. The continued use of this process for long-term temperature evaluations remains acceptable since assuming 120°F for the six month duration is still conservative with respect to the rerated conditions.

The chemical and boron effects were unchanged since the equipment is already qualified to 2500 ppm boron and no new chemistry conditions are being implemented as a result of the power rerate.

Equipment qualification outside containment is dependent on events and conditions inside containment and in Area 5 (Main Steam Enclosure). Because the conditions in these areas are bounded by the current analyses (as discussed above), there are no changes in outside containment equipment qualification due to the power rerate. This is discussed in section 3.7.2 of Reference 1.

Question 2:

Provide a discussion regarding the review of licensing basis analyses that are located largely outside of the USAR (e.g. station blackout, anticipated transients without trip, individual plant evaluation).

Response:

The Station Blackout, Anticipated Transients Without Scram (ATWS), and Individual Plant Examination (IPE) analyses were reviewed to determine the impact of the plant rerate. The review determined that these analyses are not affected by the rerate. The following provides a short summary of the results of each review.

The Station Blackout analysis was found to contain only one calculation dependent on reactor power. All other parameters were either treated statistically (such as site meteorology) or will not be affected by power rerate (e.g., Class 1E batteries or compressed air capacity). The calculation to determine the required Condensate Storage Tank (CST) inventory was based on a reactor power of 3411 MWt. This calculation was revised to reflect the CST inventory required for operation at 3565 MWt. The increased power resulted in a 2.6% increase in CST inventory required for coping with a four hour duration Station Blackout. The revised value is still significantly below the Technical Specification requirement for CST inventory, therefore not affecting WCGS's ability to cope with a station blackout.

The ATWS analysis was found to be unaffected by the power rerate. The methodology used to evaluate ATWS at WCGS is consistent with SECY 83-293 [Reference 2], which accounts for items such as the plant trip history, plant transients, auxiliary feedwater availability, and pressure relief device availability based on past operation. There were no items identified to be directly affected by the power rerate since the methodology employs a statistical approach relying on actual plant data.

The Wolf Creek Generating Station (WCGS) Probabilistic Risk Assessment (PRA) (used for the IPE effort) was reviewed to determine the effect of the power rerate on the PRA analysis. The PRA analysis concluded that the power rerate would not result in any substantive change in the PRA logic models or success path criteria. The various power, temperature, pressure, or flow rate changes from the rerate effort would likely result in minor changes in the timing of key events, but will not significantly affect the overall PRA results and conclusions.

To confirm the evaluation, plant parameters for the rerate were modeled in a significant event previously analyzed for the PRA using the Modular Accident Analysis Program (MAAP) and the results were compared. The comparison confirmed a minor change in the timing of core damage, but the release consequences were unchanged.

Question 3:

Provide a discussion regarding plans for USAR update and/or other configuration control practices which will address the large number of evaluations performed for the rerate. In particular, address the concern that licensing/design basis analyses, while bounding, may not reflect planned operating conditions. How will future changes to the facility capture not only the specific change but also the rerated operating conditions.

Response:

Changes to the Updated Safety Analysis Report (USAR) are being made to reflect the power rerate operating conditions. These changes include revising Chapter 15 to include the analyses performed at the rerated power level since these analyses bound the majority of the current analyses. Other USAR sections will also be revised to reflect the rerated power conditions as the nominal operating conditions.

The containment integrity analysis for the Loss of Coolant Accident (LOCA) in USAR Section 6.2.1.3 will remain unchanged since the current analysis was previously performed at 3565 MWt. USAR section 6.2.1.4, Main Steamline Break (MSLB), will however, be revised to include explanations that the analysis was performed at 3411 MWt, since it bounds the reanalysis performed for rerate at 3565 MWt. Clarification to USAR Section 6.2.1.4 is necessary, particularly in the area of the containment integrity analysis, due to the MSLB analysis being performed at different power levels. Currently, the licensing basis containment analysis covers a spectrum of main steam line breaks at power levels ranging from 0 percent to 102 percent of the current thermal power of 3411 MWt. With the rerate thermal power increase to 3565 MWt, clarification of USAR Section 6.2.1.4 will be needed to avoid confusion that may occur once the rerate is implemented. See the response to Question 6 for further information on the containment integrity analysis.

Changes to plant protection and control systems are implemented using the approved plant modification process. These changes include the setpoint changes (e.g., rescaling the signal processing circuitry, as necessary, to allow the plant to achieve the new operating conditions) and the addition of new reference material into the WCGS document control system. Controlled documents affected by a plant modification, e.g., standard and emergency operating procedures, surveillance and calibration procedures, the plant setpoint database, and the Precautions, Limitations and Setpoints document, are identified as affected documents as part of the modification process. Organizations responsible for the maintenance of these affected documents make the necessary changes, which are verified by the organization that initiated the modification, prior to close-out of the modification.

Question 4:

Provide clarification regarding the pressurizer subcompartment analysis. What evaluations and reanalyses were reperformed.

Response:

The pressurizer subcompartment analysis was re-evaluated using the following method based on an increase in the short-term mass and energy (M&E) releases. The short-term M&E releases are strongly affected by the initial fluid conditions of the Reactor Coolant System (RCS). The short-term M&E releases are linked directly to the critical mass flux, which increases with decreasing temperatures. It has been determined, primarily due to the potential reduction in the initial temperature conditions of the RCS fluid at the rerated conditions when compared to the current design basis conditions, that the M&E releases will increase.

Since most of the blowdown transients are characterized by a peak M&E release rate that occurs during a subcooled condition, the Zaloudek correlation, as it appears in the critical flow routine of the SATAN computer program, was used to evaluate the increase in M&E releases. This is the same code that was used for the current design basis short-term M&E releases.

Whenever data from both the current configuration and the rerated configuration was used directly in the critical flow correlation, an increase in peak M&E releases of approximately 10% was calculated. To add additional conservatism to the calculation: (1) an additional 5% was included, and (2) it was decided to apply the constant multiplier of 1.15 on both the M&E releases for the entire blowdown transient.

The methodology for determining the increase in M&E releases was to utilize the correlation given for the critical mass flux, and ratio the rerated and the design basis critical mass flux and determine the percent change. Additional conservatism was then added as described above.

The pressurizer subcompartment evaluations included using an across-the-board 15% increase in the time dependent M&E releases. Based on the conservatisms in component, equipment, and compartment structural designs, the rerate analysis results remain within the current design requirements.

Question 5:

Clarify the discussion regarding the CST inventory and the adequacy of the existing technical specifications considering both the required inventory and the allowances for configuration and losses.

Response:

Condensate Storage Tank (CST) inventory is currently maintained by WCGS Technical Specifications to be no less than 281,000 gallons. A volume of 240,000 gallons of water is required to allow the plant to be maintained in Hot Standby for four hours followed by a cooldown to residual heat removal conditions (as stated in Reference 1). Since approximately 23,000 gallons in the CST are unusable, a margin of 18,000 gallons is maintained when the CST level is at the Technical Specification limit.

Question 6:

Provide additional details regarding initial conditions assumed for the containment pressure and temperature analyses. Clarify the assumptions related to the maximum SI case.

Response:

The containment integrity analysis to support the power rerate was performed using the following initial conditions:

- Containment pressure: 1.5 psig
- Containment temperature: 120 °F
- Relative humidity inside containment: 50 %

Except for the containment pressure, the other initial conditions were identical to those used in the current licensing basis containment integrity analysis. For this rerate reanalysis, the assumed initial containment pressure of 1.5 psig was based on WCGS Technical Specification 3.6.1.4, which requires the containment internal pressure be maintained between +1.5 psig and -0.3 psig. Assuming the pressure to be +1.5 psig is conservative for determining the peak containment pressure following a limiting pipe break. The results of the containment integrity analysis at rerated conditions show that the peak calculated containment pressure is less limiting than the peak containment pressure calculated in the current WCGS licensing basis analysis and well below the design pressure of 60 psig.

As discussed in Reference 1, the lower containment peak pressure from the rerate reanalysis resulted from the new M&E release model that generated the long-term LOCA M&E release data. The rerate reanalysis was performed with the 1979 M&E release model which produces smaller M&E release than the 1975 model that was used in the current licensing basis analysis.

Since the current licensing basis containment integrity analysis remains bounding for the rerate, the current licensing basis containment integrity analysis will remain unchanged as a result of the rerate analysis. This means the maximum pressure of 48 psig required for integrated leakage rate testing remains unchanged.

The rerate LOCA containment integrity analysis was performed for the three limiting pipe break cases, namely: Double-Ended Pump Suction Guillotine (DEPSG) break with minimum and maximum safety injection, and Double-Ended Hot Leg Guillotine (DEHL) break.

The assumptions and initial conditions used in the DEPSG with minimum and maximum safety injection cases are identical with the exception of the containment heat removal system. The minimum safety injection case assumed a single failure of the containment heat removal system that resulted in one of the two trains of the containment heat removal system being inoperable. The analysis of the minimum safety injection case used one train of the containment spray system, the residual heat removal system, and the containment cooling system to remove excessive heat from the containment. The maximum safety injection case assumed full operation of the containment heat removal system. The analysis for this case used two trains of the containment spray system, the residual heat removal system, and the containment cooling system for containment heat removal.

References:

1. NA 93-0001, "Docket No. 50-0073: Proposed Revision to License and Technical Specifications for Power Rerate," from R. C. Hagan to USNRC, January 5, 1993.

2. SECY-83-293, "Amendments to 10CFR50 Related to Anticipated Transients Without Scram," W. J. Dircks, USNRC, July 19, 1983.