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Dockets Nos. 50-269, 50-270
and 50-287

Mr. William O. Parker, Jr.
Vice President - Steam Production
Duke Power Company
P. O. Box 33189
422 South Church Street
Charlotte, North Carolina 28242

Dear Mr. Parker:

We are continuing our review of NUREG-0737, Item II.B.1, "Reactor Coolant System Vents" and find that additional information is needed for us to complete our review of the Oconee Nuclear Station. The information required is contained in the enclosed request for additional information. We request that you provide this information within 45 days of your receipt of this letter.

Since this information request is in regard to specific submittals for the Oconee Nuclear Station, fewer than ten respondents are affected; therefore, OMB clearance is not required under P.L. 96-511.

If you have any questions on this matter, please contact your NRC Project Manager.

Sincerely,

"ORIGINAL SIGNED BY
JOHN F. STOLZ"

John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing

Enclosure:
Request for Additional Information

cc w/enclosure:
See next page

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Duke Power Company

cc w/enclosure(s):

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# REQUEST FOR ADDITIONAL INFORMATION
# FOR
# OCONEE 1, 2, & 3

1. In addition to the operating guidelines for the high point vent system provided as part of your response to NUREG-0737 Item II.B.1, provide additional information regarding the following:

   a. Criteria or pertinent information concerning a decision to terminate venting due to containment hydrogen concentration limits or allowable pressurizer level limits (reference NUREG-0737 Item II.B.1 Clarification A.(2)).

   b. Methodology describing the determination of the location and size of a noncondensible gas bubble in the reactor coolant system (references NUREG-0737 Item II.B.1 Position (2) and Clarification A.(2)).

   c. Operating guidelines for venting of the pressurizer in order to maintain system pressure and volume control (reference NUREG-0737 Item II.B.1 Clarification C.(3)).

2. The guidelines state that the operator will open the hot leg high point vents when the refill phase of the accident commences. In practice, the operator has no means to determine whether steam or saturated water is present in the hot legs, and will probably not notice a difference between natural circulation and steam condensing heat transfer modes. A transition from one heat transfer mode to another may be obscured by temporary operation of the pressure vessel internal vent valves between the cold and hot legs. Discuss in detail how timely venting can be assured and present the necessary diagnostic and operational steps in explicit guideline form.

3. Section 3.3 states that once natural circulation is established and temperatures in the hot and cold legs are between $50^{o}F$ and $100^{o}F$ subcooled, the operator is to depressurize the plant with the PORV. We assume this applies to plants without vessel head vents. Moreover, this depressurization rate is based on assuring that the rate of expanding steam from the vessel head into the hot legs is less than the relieving capability of the hot leg high point vents in order to preclude a net accumulation of steam at the top of the hot legs and interruption of natural circulation. The staff disagrees with this method of depressurization for the following reason:

> The depressurization rates provided in Figure 2 appear to be based on computer analyses. B & W and their customers have yet to satisfactorily demonstrate to the staff the adequacy of their analysis models to properly predict the transport of steam in the vessel and primary coolant loops under transient and accident conditions, including post-LOCA. As such, we believe the uncertainties in the depressurization rates to be unquantified, and the consequences of incorrect depressurization significant.

We, therefore, request that you identify a method of depressurizing the primary system which does not rely on computer calculated curves and does not involve a risk of interruption of natural circulation.

4. During conditions of inadequate core cooling, the operator is instructed to open the high point vents. Another instruction is to start the RCP's. If the pumps are started, can a slug of water impact the reactor vessel head or hot leg piping at the high point vent location? If so, is the vent system designed to withstand the dynamic loads associated with these water slugs? If not, what precautionary measures are provided or will be provided to preclude pump start with the vents open?

5. Recently, a number of plants with B & W-designed NSSS's have experienced bubble formation in the hot leg piping while in the shutdown cooling mode. This has been caused by the flashing of stagnant hot water in the hot legs during depressurizing operations by the operator (the hot water was possibly due to outsurges from the pressurizer).

What instructions are provided to the operator regarding the use of the vents to remove trapped steam under these conditions? In particular, should the vents be used or not? Consider that the containment may not be isolated and personnel may be in containment. If vent operation under these conditions must be avoided, what provisions have been made to preclude vent operation?

6. State which of the following two categories applies to the size (including orifices) of the reactor vessel head vent and provide the requested information as applicable:

   a. Smaller than the size corresponding to the definition of a loss-of-coolant accident (LOCA) (10 CFR Part 50, Appendix A). Provide the pertinent design parameters of the reactor coolant makeup system and a calculation of the maximum rate of loss of reactor coolant from the largest reactor vessel head vent break that can be postulated.

   b. Within the LOCA definition. Verify that an analysis has been performed showing compliance with 10 CFR 50.46, or that the size has been considered in a previous LOCA analysis and found to be acceptable (reference NUREG-0737 Item II.B.1 Clarifications A.(4) and (7)).

7. The following items apply to the portions of the RCS high point vent system that form a part of the reactor coolant pressure boundary, up to and including the second normally closed valve, added as a result of the TMI Action Plan (reference NUREG-0737 Item II.B.1 Clarification A.(7)):

   a. Provide the design temperature and pressure of the piping, valves, and components.

   b. Verify that the piping, valves, components, and supports are classified Seismic Category I and Safety Class 2 (Safety Class 1 where the size corresponds to the 10 CFR Part 50, Appendix A definition of a loss-of-coolant accident).

   c. Describe the instrumentation that has been provided to detect and measure RCS high point vent system isolation valve seat leakage (reference Appendix A to 10 CFR Part 50, General Design Criterion 30).

   d. Describe the materials of construction and verify that they are compatible with the reactor coolant chemistry and will be fabricated and tested in accordance with SRP Section 5.2.3, "Reactor Coolant Pressure Boundary Materials."

   e. Demonstrate that internal missiles and the dynamic effects associated with the postulated rupture of piping will not prevent the essential operation of the RCS high point vent system, including the PORV pressurizer vent (i.e., at least one vent path remains functional) (reference Appendix A to 10 CFR Part 50, General Design Criterion 4).

8. Verify that the following RCS high point vent system failures have been analyzed and found not to prevent the essential operation of safety-related systems required for safe reactor shutdown or mitigation of the consequences of a design basis accident:

   a. Seismic failure of RCS high point vent system components that are not designed to withstand the safe shutdown earthquake.

b. Postulated missiles generated by failure of RCS high point vent system components.

c. Dynamic effects associated with the postulated rupture of RCS high point vent piping greater than one-inch nominal size.

d. Fluid sprays from RCS high point vent system component failures. Sprays from normally unpressurized portions of the RCS high point vent system that are Seismic Category I, and Safety Class I, 2, or 3 and have instrumentation for detection of leakage from upstream isolation valves need not be considered.

9. Describe the design features or administrative procedures, such as key locked closed valves, alarms, or removal of power during operation, that will be employed to prevent inadvertent actuation of an RCS high point vent path (reference NUREG-0737 Item II.B.I Clarification A.(7)).

10. Verify that the RCS high point vent system discharges into areas in which any nearby structures, systems, and components essential to safe shutdown of the reactor or mitigation of a design basis accident are capable of withstanding the effects of the anticipated mixtures of steam, liquid, and noncondensible gas discharging from the RCS high point vent system.

11. Although exercising the RCS high point vent system valves (including the valves on the pressurizer vent) during cold shutdown is acceptable, verify that all operability testing provisions of subsection IWV of Section XI of the ASME Code for Category B valves will be performed (reference NUREG-0737 Item II.B.I Clarification A.(11)).

12. Verify that all displays (including alarms) and controls, added to the control room as a result of the TMI Action Plan requirement for reactor coolant system vents, have been or will be considered in the human factors analysis required by NUREG-0737 Item I.D.I, "Control-Room Design Reviews."

13. Statements in your June 29, 1981 and January 2, 1980 submittals are ambiguous concerning power supplies for the RCS high point vent system valves. Provide the power source for each valve in order to verify that both valves in a vent path are provided with power from the same emergency power train, and that different vent paths are powered from different emergency power trains to provide a degree of redundancy (reference NUREG-0737 Item II.B.1 Changes (4)).

14. Since your submittal states that the existing power operated relief valve can be used as the required pressurizer vent, demonstrate that a positive indication of the block valve position will be provided in the control room (reference NUREG-0737 Item II.B.1 Clarification A.(5)).

15. On page 5 of the Operating Guidelines, it states that when the RC pumps are not available following a SBLOCA for removing trapped gases from the RCS high points, the hot leg vents can be utilized. Moreover, the first sentence in section 3.1 (page 6) states that operator action will be required to open the vents during small break transients. It is our understanding that neither the RC pumps nor the high point vents are considered to be part of the engineered safety features (ECCS) and are not required to be operable following a LOCA. Previous ECCS analyses submitted on license applications for plants with B&W NSSS's were not performed beyond the start of primary system inventory recovery and it was assumed that single phase natural circulation would be reestablished without the aide of either the RC pumps or the high point vents.

Please state whether or not operation of the RC pumps and/or the high point vents are necessary in order to reestablish single phase natural circulation following a SBLOCA. If they are required, justify why they are not considered part of the engineered safety features, and required to meet the design requirements of ESF's. If they are not required, provide the supporting analyses for SBLOCA's which demonstrates that single phase natural circulation will be reestablished following recovery from a SBLOCA. Discuss how steam trapped in the RCS high points (vessel bend, hot leg "candy cane") will be condensed or removed and not inhibit natural circulation or long-term cooling of the core, per the requirements of 10CFR50.46(b)(5).

When considering the need of the high point vents task into account also the possibility of an early break isolation which takes place during the period between interruption of natural circulation and start of steam condensing heat transfer.