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Docket Nos. 50-269/270/287

Mr. Hal B. Tucker
Vice President - Nuclear Production
Duke Power Company
Post Office Box 33189
422 South Church Street
Charlotte, North Carolina 28242

Dear Mr. Tucker:

We have been reviewing your March 10, 1983 response to the "Order for Modification of License" dated December 10, 1982, which proposed an inadequate core cooling (ICC) instrumentation system including a RCS inventory trending system for backfit of Oconee Nuclear Units 1, 2, and 3. We have found that your proposed wide range hot leg level/reactor vessel head monitoring concept used for coolant inventory tracking with pumps on provides a satisfactory basis for you to proceed with final design engineering and procurement. A copy of our evaluation is enclosed.

The staff has identified some concerns which should be addressed during final design and which may require you to modify your concept. The additional information required to address the staff concerns about the dp system concept is outlined in our enclosed evaluation (See Attachment 1 to the enclosure). The staff is also requesting additional information relative to conformance of other components of the ICC instrumentation system to NUREG-0737 design requirements (see pages 3-5 of the enclosure).

You proposed an implementation schedule which should result in installation of the proposed systems for all Oconee Units during refueling outages in the latter half of 1985. Our approval of the system concept noted above should enable you to initiate your procurement and other actions and thus meet your 1985 installation schedule.

Finally, you are requested to provide a schedule within 30 days of receipt of this letter for providing the submittals requested in the enclosure to this letter.

This request for additional information affects fewer than ten respondents; therefore, OMB clearance is not required under Public Law 96-511.

Sincerely,

ORIGINAL SIGNED BY
JOHN F. STOLZ

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

OFFICE	Enclosure: As stated				DL: ORB #4	DSI: CPB	DL: ORB #4
SURNAME				JFS	JFSuermann:cc	LPhillips	JStolz
DATE	cc w/enclosure: See next page				6/8/83	6/8/83	6/8/83

Duke Power Company

cc w/enclosure(s):

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ENCLOSURE

EVALUATION OF DUKE POWER COMPANY RESPONSE TO
"ORDER FOR MODIFICATION OF LICENSE,"
DECEMBER 10, 1982
- NUREG-0737 ITEM II.F.2 FOR OCONEE NUCLEAR UNITS 1, 2, AND 3
DOCKET NUMBERS 50-269, 50-270, AND 50-287

The staff in conjunction with our contractor, Oak Ridge National Laboratory (ORNL), have reviewed the Duke Power Company submittal dated March 10, 1983 in response to the subject order. In this submittal, Duke Power has proposed a differential pressure measurement concept for monitoring of coolant inventory with the pumps not running and a RC pump motor current monitor to indicate void fraction with the Reactor Coolant Pumps turned on for their Oconee Nuclear Stations 1, 2, and 3.

Two versions of the differential pressure measurement concept were presented and the staff was requested to approve one of the designs prior to Duke initiating final design and procurement efforts. One version was a resubmittal of the Hot Leg Level Monitor System (HLLMS) which has been previously rejected by the staff because the range of inventory monitoring is inadequate to satisfy our requirement. The resubmittal emphasized the reduced costs in dollars and personnel radiological exposure of the HLLMS using existing penetrations to monitor the upper 19 feet of each hot leg in comparison to the cost and incremental improvement in safety of the wide range/RV head level system which is the alternate proposed concept. The latter system requires that a tap be added to the existing decay heat drain line in a position slightly lower than the hot leg. The dp measurements would extend from that single tap to the top of the same hot leg and also to the top of

the reactor vessel head at the vent of the control rod drive mechanism. Redundant instrument channels/trains are provided between the common taps from each dp measurement.

Duke Power proposes to complete the necessary plant modifications to fully implement the wide range/RV head level system during the first refueling outage commencing after 24 months after NRC approval of the system (15 months if the HLLMS option is acceptable). Based on projected refueling schedules, this would result in installation during outages scheduled to commence in June 1985 for Unit 1, July 1985 for Unit 2, and November 1985 for Unit 3, contingent on NRC approval in May 1983. The Control Room Design Review and Operating Procedure modifications are scheduled for completion in March 1984 and November 1984 respectively.

Evaluation of Proposed Concepts and Implementation Schedule

During the Commission review of ICC instrumentation requirements (SECY-82-407), it was concluded that dp measurement systems for B&W reactors should have a minimum range extending from the top of the candy cane to the low point in the hot leg and from the vessel upper head to the bottom of the hot leg. The HLLMS system proposed by Duke Power in Attachment 2 does not meet this requirement. Further, the licensee proposal does not provide evidence of any unique design characteristics of the Oconee reactors (compared to other B&W reactors) which would warrant reconsideration of the factors considered (including cost) when the requirement was established. Therefore, the HLLMS proposed in Attachment 2 of the Duke submittal is unacceptable.

The wide range hot leg level/reactor vessel head monitoring system proposed in Attachment III has never been submitted for generic review. The staff will require the additional information described in Enclosure 1 to complete our design review of the Attachment III proposal. However, as indicated in NUREG-0737, final approval of the design does not constitute final approval of the system. An implementation review will be performed to assure that the system functions in accordance with the approved design and human factors considerations are factored into the implementation. Therefore, the design of a system which meets the functional and design requirements specified in NUREG-0737 is the responsibility of Duke Power Company and engineering and procurement should commence on a schedule commensurate with installation of the systems during the 1985 refueling outages for the three Oconee plants.

Accordingly, the proposed timetable for installation during the 1985 refueling outages and for implementation during the subsequent operating cycle is approved for compliance to the condition specified in Section III, Item 1 of our December 10, 1982 Order for Modification of Licenses. The concept described in Attachment III of the submittal provides a satisfactory basis for Duke Power Company to proceed, but should be modified during final design engineering if necessary to resolve the staff concerns expressed in the Attachment 1 information requests and in the summary guidance which follows:

(1) From a measurement standpoint, the concept proposed in Attachment III of the licensee submittal appears to be a satisfactory approach to inventory tracking in the vessel head and one hot leg. However, if the other hot leg is unmonitored per our understanding, we have concerns about the capability to detect voiding and interruption of natural circulation in the unmonitored hot leg. This could be of particular importance for any accidents involving voiding or gas collection in one candy cane and not the other, or accidents requiring isolation of the steam generator associated with the

monitored hot leg. Your evaluation addressing this concern should demonstrate that the monitors provided are sufficient to detect or infer void formation in either hot leg or the reactor vessel and to trend the coolant inventory in the total system.

(2) From a safety standpoint, the staff has identified in Enclosure 1 some concerns which relate primarily to level measurement errors and to the vulnerability and potential consequences of a break in any of the instrument lines leading to the single tap in the decay heat line. During final design, Duke Power Company should be aware of these concerns and modify the design if necessary to assure that conditions which could mislead the operator will not exist. Before final approval of the design, Duke Power Company should provide an analysis of the level measurement errors for both the reactor head level and the hot leg level measurements and provide the additional information requested in Attachment 1. This information may be developed during final design engineering and submitted with the final design description. The staff should be notified of the schedule for this submittal.

Reactor Coolant Pump Motor Current Monitor

Duke Power plans to use existing pump current monitors which are non-safety grade but said to be highly reliable. Justification for deviation from NUREG-0737 seismic and environmental design requirements is not provided.

The staff will require additional information concerning development of the pump current versus void correlations and justification for deviations from NUREG-0737 design requirements before we can complete our review.

Upgrading of Saturation Margin Monitor

Duke Power Company states in their March 10, 1983 submittal that the subcooling margin monitors currently installed on the Oconee Units 1, 2,

and 3 satisfy the requirements of NUREG-0578. Subsequent to installation of these systems, more detailed design requirements were provided in NUREG-0737 to define the long term upgrading requirements indicated by NUREG-0578. The licensee is requested to explain whether or not the presently installed subcooling margin monitor also conforms to the requirements of NUREG-0737 Section II.F.2 and Appendix B.

Upgrading of Core Exit Thermocouples

The licensee's submittal indicates that no exceptions are taken to the NUREG-0737 design requirements. However, the following additional information is needed so that we may complete our review.

(1) It is not clear from the design proposed that the primary and backup channels are separate and electrically independent, and that these channels are powered from Class IE power sources. Clarification is requested.

(2) Specific data for surveillance, ease of repair and periodic testing should be provided when it becomes available.

Summary

Duke Power Company has provided a comprehensive submittal for Oconee Nuclear Station, Units 1, 2, and 3 which addresses in detail the information requested by the staff. The staff has rejected the system proposed in the submittal Attachment II because it does not meet NUREG-0737 functional design requirements. The staff has identified a number of concerns relative to the instrumentation system proposed in Attachment III and requests additional information to address these concerns. However, we believe that these concerns can be resolved with attention during the detailed engineering design and with minor conceptual modifications if needed.

The licensee has proposed a schedule which would permit installation of the final system during refueling outages in the latter half of 1985 for all 3 Oconee Units. The schedule is dependent upon commencement of the final design engineering and procurement on or about June 1.

We conclude that the licensee has been responsive to the December 10, 1982 "Order for Modification of License" provided that, upon receipt of this evaluation, final design engineering and procurement of the Attachment 3 proposed system is commenced with due regard to the concerns expressed herein. The licensee should also develop a schedule for submittal of the final design description and for providing the information requested herein.

ATTACHMENT 1

REQUEST FOR ADDITIONAL INFORMATION

DUKE POWER PROPOSED INADEQUATE CORE COOLING INSTRUMENTATION

1. Provide an analysis of the expected errors in the hot leg and reactor vessel head level measurements. This analysis should include not only an overall estimate of the measurement uncertainty, but also a list including estimates of each contributing factor, i.e., temperature of the impulse lines, common mode pressure effects on the differential pressure transducer, and especially uncertainties associated with the transducers. Explain how the individual errors are combined to give an estimate of the overall error.

2. With a single tap in the decay heat drop line implied by Figure 2, a failure in this line would affect all level measurements. Provide an assessment of the vulnerability of this common line to failure. What provisions will be made to protect it?

3. Suppose an impulse line on one hot leg was broken that would tend to drive the dp transducer full scale. How would this condition be detected?

4. Provide specifications for the proposed dp transducers.

5. Provide an analysis to show the effects of flashing of dissolved gases in the impulse lines.

6. Discuss the ability of the transmitters to withstand a LOCA environment within the containment and be available for post-accident monitoring - consider the loss of the pressurizer transmitters in the TMI-II accident in this discussion.

7. Describe the proposed method for temperature compensation. Provide an analysis of the error that would be expected both with and without the temperature compensation.

8. Describe the location of indication of the state of the reactor pumps with respect to the level indicators in the control room. Describe the method proposed for indicating to the operator that the level measurement system should not be used when the pumps are on.

9. Describe the trending displays available for the operator for the ICC instrumentation. Are analog displays (recorders) provided for any of the ICC instrument outputs?

10. Describe the proposed tests to determine the reliability of CETs to 2300°F.

11. Describe in more detail how the SMM is used to monitor and control venting.

12. Estimate the errors in the HLLMS due to low local pressure at the reference tap during venting.

13. The description of the Attachment III proposed HLLMS is somewhat vague about the number of systems that would be installed on each plant.

    (a) Explain the nomenclature used in Figure 2, i.e., OTSG '1A' ('2B' '3B').

    (b) Does a decay heat drop line exist on hot legs '1A' ('2B' '3B')? Is the pressurizer connected to the identified hot legs?

    (c) The proposed design apparently does not include a HLLMS on both hot legs.

IF IT DOES NOT, THEN PROVIDE ANALYSES SHOWING:

(i) All transients or accident scenarios in which it would be possible to have voiding or gas collecting in one candy cane and not the other.

(ii) What procedure would be used to vent noncondensable gases from the unsensed leg with no inventory monitor on that leg.

(iii) The behavior of the water level in each hot leg during a loss of heat sink transient due to a break in a steam generator tube.

(iv) A small break on one hot leg, but not the other.

(v) A loss of feedwater on one side but not the other.

(vi) The behavior of the water level in each hot leg during a transient due to a stuck-open PORV.