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RECEIVED AUG 25 1981 U.S. NUCLEAR REGULATORY COMMISSION

Docket No. 50-334

Mr. J. J. Carey, Vice President
Nuclear Division
Duquesne Light Company
P. O. Box 4
Shippingport, Pennsylvania 15077

Dear Mr. Carey:

SUBJECT: TMI ACTION PLAN ITEM II.F.2.3 (NUREG-0737), WESTINGHOUSE REACTOR VESSEL LEVEL INSTRUMENTATION SYSTEM FOR MONITORING INADEQUATE CORE COOLING

Re: Beaver Valley

The NRC staff has completed its review of the Westinghouse Summary Report on their reactor vessel level instrumentation system for monitoring inadequate core cooling, which was submitted in December 1980. The report was submitted in response to TMI Action Plan II.F.2.3 of NUREG-0737. Enclosed is a request for additional information. Your response is requested before September 1, 1981.

Sincerely,

Original Signed By:

Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Enclosure:
Request for Additional Information

cc: See next page

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REQUEST FOR ADDITIONAL INFORMATION
ON SUMMARY REPORT
"WESTINGHOUSE REACTOR VESSEL LEVEL INSTRUMENTATION SYSTEM
FOR MONITORING INADEQUATE CORE COOLING" (7304 Sys)

1. Justify that the single upper head penetration meets the single failure" requirement of NUREG 0737 and show that it does not negate the redundancy of the two instrument trains.

2. Describe the location of the level system displays in the control room with respect to other plant instrument displays related to ICC monitoring, in particular, the saturation meter display and the core exit thermocouple display.

3. Describe the provisions and procedures for on-line verification, calibration and maintenance.

4. Describe the diagnostic techniques and criteria to be used to identify malfunctioning components.

5. Estimate the in-service life under conditions of normal plant operations and describe the methods used to make the estimate, and the data and sources used.

6. Explain how the value of the system accuracy (given as +/- 6%) was derived. How were the uncertainties from the individual components of the system combined? What were the random and systematic errors assumed for each compenent? What were the sources of these estimates?

7. Assume a range of sizes for "small break" LOCA's. What are the relative times available for each size break for the operator to initiate action to recover the plant from the accident and prevent damage to the core? What is the dividing line between a "small break" and a "large break"?

8. Describe how the system response time was estimated. Explain how the response times of the various components (differential pressure transducers, connecting lines and isolators) affect the response time.

9. There are indications that the TMI-2 core may be up to 95% blocked. Estimate the effect of partial blockage in the core on the differential pressure measurements for a range of values from 0 to 95% blockage.

10. Describe the effects of reverse flows within the reactor vessel on the indicated level.

11. What is the experience, if any, of maintaining Dp cells at 300% overrange for long periods of time?

12. Five conditions were identified which could cause the Dp level system to give ambiguous indications. Discuss the nature of the ambiguities for 1. accumultor injection into a highly voided downcomer, 2. when the upper head behaves as a pressurizer, 3. upper plenum injection, and 4. periods of void redistribution.

13. No recomendations are made as to the uncertainties of the pressure or temperature transducers to be used, but the choice appears to be left to the owner or AE. What is the upper limit of uncertainties that should be allowed? Describe the effect of these uncertainites on the measurement of level. What would be the effect on the level measurement should these uncertainties be exceeded?

14. Only single RTD sensors on each vertical run are indicated to determine the temperatures of the impulse lines. Where are they to be located? What are the expected temperature gradients along each line under normal operating conditions and under a design basis accident? What is the worst case error that could result from only determining the temperature at a single point on each line?

15. What is the source of the tables or relationships used to calculate density corrections for the level system?

16. The microprocessor system is stated to display the status of the sensor input. Describe how is this indicated and what this actually means with respect to the status of the sensor itself and the reliabilty of the indication.

17. Describe the provisions for preventing the draining of either the upper head or hot leg impulse lines during an accident. What would be the resultant errors in the level indications should such draining occur?

18. Discuss the effect on the level measurement of the release of dissolved, noncondensable gases in the impulse lines in the event of a depressurization.

19. In some tests at Semi-scale, voiding was observed in the core while the upper head was still filled with water. Discuss the possiblity of cooling the core-exit thermocouples by water draining down out of the upper head during or after core voiding with a solid upper head.

20. Describe the behavior of the level measurement system when the upper head is full, but the lower vessel is not.

21. One discussion of the microprocessor system states that water in the upper head is not reflected in the plot. Does this mean that there is no water in the upper head or that they system is indifferent to water in the upper head under these conditions?

22. Describe the details of the pump flow/Dp calculation. Discuss the possible errors.

23. Have tests been run with voids in the vessel? Describe the results of these tests.

24. Estimate the expected accuracy of the system after an ICC event.

25. Describe how the conversion of RTD resistance to temperature made in the analog level system.