



Docket No. 50-346

License No. NPF-3

Serial No. 935

April 15, 1983

RICHARD P. CROUSE
Vice President
Nuclear
(419) 259-5221

Mr. Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission

Dear Mr. Eisenhut:

This submittal is to fulfill Toledo Edison's commitment made on January 17, 1983 (Serial No. 901) regarding our plan to study a reactor vessel head to hot leg vent line in lieu of the reactor head level monitoring system which is included as part of the requirements for the overall Inadequate Core Cooling (ICC) instrumentation system.

The ICC instrumentation system for Davis-Besse Unit 1 has been submitted in detail for Staff review in our response dated March 23, 1983 (Serial No. 974) to the NRC order dated December 22, 1982 (Log No. 1157).

The attachment provides the results of our preliminary analysis for the head to hot leg vent line and addresses the additional information requested in Enclosure 1 of your letter dated March 16, 1983 (Log No. 1240).

The advantages of the head to hot leg vent line in comparison to the head level monitoring system can be summarized as follows:

1. The vent line will improve reactor coolant system operations by providing a means to reduce the possibility of forming a steam bubble in the RV head. Should the bubble form, the vent line will quickly eliminate it by venting to the hot leg where it could be condensed.
2. During natural circulation cooldown, the vent line can effectively increase the rate of cooldown of the metal in the RV head, so that it follows the metal temp. in the rest of the RCS, and therefore reduce the thermal stress in the head.

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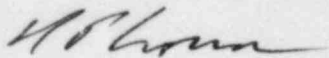
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3. Since the steam bubble or the non-condensable gases can be quickly vented to the hot leg, the hot leg level measurement system (HLLMS) becomes more effective in tracking the inventory of the RCS and detects an approach to ICC.
4. The estimated man-rem exposures for the construction of the head level measurement system and the vent line are approximately 30-40 man-rem and 10-20 man-rem respectively. During each refueling outage, to dismantle sections of the systems in preparation for head removal also to reconnect the system after the outage, the estimated exposures are 4-6 man-rem and 1-2 man-rem respectively. For ALARA consideration, we believe the vent line can substantially reduce the overall man-rem exposures as compared to the head level measurement system.

Toledo Edison will commit to install the RV head to hot leg vent line if the staff provides the approval and agrees that the vent line, as described, can be used in lieu of the head level monitoring system. The actual installation can be implemented in two refueling outages where the core drills for the piping pass through the steam generator shield and the drilling for pipe support anchors can be accomplished in a refueling outage (most likely in 1984) and the piping, restraints, anchors and instrumentation can be made in the following refueling outage.

If you or any of your Staff have any questions please feel free to contact Toledo Edison.

Very truly yours,



RPC:FYC:rs

Attachments

cc: DB-1 NRC Resident Inspector

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Attachment I

Response to Enclosure 1 of the NRC letter (Log No. 1240) dated March 16, 1983.

Information Requested

- (1) Completion of the conceptual design description of the inventory tracking system to address the requirement for coolant inventory monitoring in the vessel upper head when reactor coolant pumps are off.

Response

The conceptual design of the RV head to hot leg vent line is provided in Attachment II. This vent line will obviate the need for a RV head level monitoring system. With the vent line the possibility of forming a bubble in the head would be greatly reduced and, if a bubble is formed, it will be quickly vented to the top of the steam generator. There will be a thermocouple installed in the vent line to monitor the coolant temperature. This will enable the operators to maintain subcooling in the vent line during a controlled depressurization and cooldown thus assuring no large steam bubble formation in the RV head. This capability to control bubble size does not exist with the RV head level measurement system.

Information Requested

- (2) Results of an analysis to support evaluation of how the proposed instrumentation system responds in approach to ICC.

Response

The proposed RV head to hot leg vent line is not an instrumentation system to monitor the approach to ICC conditions. Instead, it is a system that will help to monitor the approach to ICC through the use of the hot leg level measurement system. The results of our preliminary analysis (see Attachment II) show that during the most demanding fast natural circulation cooldown and depressurization (due to a steam generator tube rupture event), the vent line effectively reduces the size of the steam bubble when a bubble is formed and quickly eliminates it by venting to the hot leg. This would effectively enhance the capability of the Hot Leg Level Measurement System (HLLMS) to perform the function of RCS inventory tracking.

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Information Requested

- (3) Detailed cost/benefit evaluations if needed to justify any deviations from NUREG-0737 Item II.F.2 design requirements (identified in the 90 day response).

Response

The estimated costs for the RV head to hot leg vent line is approximately \$1.5 million as compared to \$2.5 million for the head level measurement system. The benefit of the vent line far outweighs the head level monitoring system as described in the response for Item (2). Toledo Edison does not feel a detailed cost/benefit evaluation is needed. The evaluation as mentioned above provides justification for our commitment to install the RV head to hot leg vent line.

Information Requested

- (4) Evaluation of any alternate design concepts for monitoring coolant inventory in the reactor vessel head. If a continuous venting system is proposed, the evaluation should include, as a minimum, calculations which show that continuous venting does not produce any adverse effects on any events analyzed for Chapter 15 of the FSAR, in particular those in which any region of the primary system is calculated to saturate.

Response

The impact of the proposed continuous vent line on FSAR Chapter 15 analyses has been briefly evaluated (see Attachment II). The conclusion is that there will be no adverse effects on the existing Chapter 15 analysis results. Detailed calculations will be performed to confirm this conclusion under the analyses program for the compliance of NUREG-0737, Item II.K.3.31.

Information Requested

- (5) A summary of operator actions required in an approach to ICC.

Response

If the vent line is installed, the operation instructions will be incorporated into the Davis-Besse Unit 1 ATOG procedure.

There is no specific instructions for operators to put the system into operation because the vent line is strictly a passive system (no valves in the line).

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There will be instructions for the operator to watch the fluid temperature in the vent line and the RCS pressure and take necessary actions to maintain subcooling in the vent line under any controlled natural circulation cooldown and depressurization conditions.

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Attachment II

Davis Besse
Continuous RV
Head Vent
Design Evaluation
Report

Engineering Services

Babcock & Wilcox
a McDermott company