For Reference
See 50-133

MEETING SUMMARY DISTRIBUTION:

~~Docket~~ (22)
NRC PDR (22)
Local PDR (22)
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

March 24, 1976

Docket Nos. 50-133, 50-219, 50-220,
50-237, 50-245, 50-249,
50-254, 50-259, 50-260,
50-263, 50-265, 50-271,
50-277, 50-278, 50-293,
50-298, 50-321, 50-325,
50-331, 50-333, 50-336

SUMMARY OF MEETING REGARDING BWR FEEDWATER NOZZLE CRACKING

On February 25, 1976, representatives of General Electric (GE) and several licensees met with members of the Regulatory staff to discuss the latest data concerning the BWR feedwater nozzle cracking problem and to receive the GE recommended interim program for the detection and elimination of the cracks.

A list of attendees, copies of the viewgraphs presented at the meeting, and GE's recommended program are attached. Significant points discussed are summarized below:

1. GE believes that the nozzle area can tolerate, without catastrophic failure, a through-wall flaw under 1000 psig pressure and 100°F feedwater temperature.

2. The cause of the cracking is still believed to be temperature fluctuations in the nozzle area. Because of leakage around the thermal sleeve, the blend radius area is exposed to temperature swings which range from the hot saturation temperature of core water to the relatively cold entering feedwater temperature. A frequency of 1 Hz. can be reached during those temperature swings.

3. Although there is some uncertainty that the cracking is due to leakage flow, the proposed "fix" is based upon the assumption that it is the cause.

4. The maximum depth of the cracks found to date has been approximately .5". The maximum depth of penetration into base metal has been approximately .25". Less than 50% of the cracks found to date have penetrated the base metal.

5. At Millstone I, the number of cracks found in the second examination (one year after the first cracks discovered has been ground out) was greater than the number found in the original examination. The depth of the cracks was approximately the same.

6. The cracks are difficult to detect, even using dye penetrant examination, because they are easily plugged by oxide. Ultrasonic testing from the external nozzle circumference has not yet been shown to be a viable alternative. However, GE mentioned investigation into a new technique which may prove successful.

7. GE's Mr. I. Kobsa explained in detail the testing program which is taking place at San Jose. Questions from the NRC staff showed concern for the studies in the thermal-hydraulic area. GE replied that such studies were now in progress. The staff also expressed concern about the thermal and pressure stress (long-term) model for crack growth. GE answered that the long-term analysis was also in progress.

8. Mr. Kobsa discussed in detail GE's recommended interim examination program, which is based upon the determination of the number of cycles (N) to reach 1/10 of the minimum metal path (MMP) between the point at which the nozzle inside diameter is tangent to the blend radius and the exterior surface of the reactor pressure vessel (RPV). The maximum allowable flaw size is assumed to be .1 MMP and inspections would be based upon the number of start-up/shutdown cycles (N) to reach this amount of crack depth, with the first scheduled refueling outage after N-20 having been selected as the starting point for annual UT inspections from the outside of the RPV. MR. Kobsa stated that this was in conformance with the intent of ASME Code Section XI. A UT examination of all feedwater nozzle blend radii and safe ends would be performed at the next scheduled refueling outage following N startup/shutdown cycles. At this time a PT inspection of one nozzle would be accomplished. The remaining nozzles would be inspected if cracking were found in the first. The NRC staff took exception to several points of this proposal. First, little data had been presented to verify that UT techniques external to the vessel were acceptable. Second, the choice of N-20 for the first inspection was questioned, and the NRC staff members stated they required more data to justify not requiring inspections prior to that point. Mr. Kobsa mentioned that there are plants operating beyond the N-20 cutoff which have not made the initial inspection. These questions were left open, to be resolved by specific questions from the NRC staff and answers from GE.

9. Mr. Kobsa mentioned that GE believes that the welded thermal sleeve and sparger, with resultant zero bypass leakage, will be the solution to the problem. This was questioned by NRC staff members, who believe that the welds may crack under stress and who also object to the inaccessability for inspection afforded by a welded sparger. Mr. Kobsa pointed out that the new design incorporates a larger (by a factor of 4) annular space, allowing inspection.

10. Mr. W. Zarella of GE made a presentation concerning the implementation of the various fixes (interference fit sparger/welded-in sparger/ blend radii indication grind-out) and broke down time, manpower, exposure, and monetary requirements for each of the options. The data is contained in the FW Nozzle Program document (Enclosure 2). Note the various assumptions which were made.

As mentioned above, several items remain outstanding and will require communication between the staffs of the NRC and GE. GE has promised to provide more information as it becomes available, and more meetings may be set for the future.

Richard P. Snaider, Project Manager
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Enclosures:
1. List of Attendees
2. Viewgraph copies - "FW Nozzle Program"
3. GE paper entitled "Feedwater Nozzle Interim Examination Recommendation"

cc: See next page

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