

BWRVIP

97-365

BWR Vessel &
Internals Project

Issue Management and Resolution

April 18, 1997

USNRC Commissioners

Attention: Mr. John C. Hoyle
Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Hoyle

This letter is to request a meeting between the Boiling Water Reactor Vessel and Internals Project (BWRVIP), the NRC staff and the USNRC Commissioners. The purpose of the meeting is to discuss alternate BWR reactor pressure vessel (RPV) inspection criteria that have been proposed to the NRC staff and to reach a decision on the issue.

Background

The BWRVIP has determined that an alternative to the current ASME Section XI RPV shell weld inspection criteria and to the current augmented inspection rules of 10CFR50.55a for all domestic BWRs is warranted. Presently the regulation requires that essentially 100% of the RPV shell welds (both longitudinal and circumferential) be inspected each interval. The proposed revision is to inspect only the longitudinal shell welds. This is based on a comprehensive study of the BWR RPV design, manufacturing process, inservice inspections to date, and operating experience as well as the results of extensive probabilistic analyses.

The BWRVIP met with the staff on July 18, 1995 to describe the technical approach used to evaluate the RPV inspection criteria. Staff comments were considered after which the technical basis for this approach was transmitted on September, 28, 1995, to the NRC staff in a report entitled, "BWR Reactor Pressure Vessel Weld Inspection Recommendations (BWRVIP-05)." The staff forwarded two requests for additional information (RAIs) dated April 2, and May 20, 1996, to which the BWRVIP provided answers on June 24, 1996.

The BWRVIP Executive Oversight Committee (EOC) met with the NRC staff and senior management, including Ashok Thadani and William Russell on July 11, 1996 to discuss the merits of the proposal. At that meeting, no additional major deficiencies were identified. It was suggested that rulemaking could be pursued. However, the BWRVIP would need to submit a petition for rulemaking, with the appropriate justification, to the staff. The BWRVIP met again with the staff on October 15, 1996, to further discuss rulemaking and revision to the inspection

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scope. At that meeting it was concluded that rulemaking would not occur in time for the industry to realize benefits from the proposed inspection scope. Therefore, by letter dated October 29, 1996, the BWRVIP requested that the staff, pursuant with the provisions of 10CFR50.55a(a)(3)(i), authorize a technical alternative to the scope provisions of 10CFR50.55a(g)(6)(ii)(A)(2) for BWRs. Finally, at a meeting between the BWRVIP EOC and staff senior management on January 16, 1997, the BWRVIP inquired about the status of the BWRVIP-05 review and the request for a technical alternative. The staff indicated that policy issues were being considered and that a decision would be rendered soon. The EOC requested a meeting with NRC senior management and the Commissioners if the staff decided to deny the BWRVIP request.

Discussion

The BWRVIP performed a comprehensive evaluation of the current inspection requirements for the RPV shell welds contained in ASME Section XI and in the augmented rules of 10CFR50.55a. The evaluation included a review of fabrication practices, inservice inspection history, operational issues and experience, and degradation mechanisms. Extensive probabilistic fracture mechanics analyses were also performed to assess the failure probabilities as a result of the proposed changes in inspection scope.

Some of the key results from BWRVIP-05 and subsequent evaluations performed in responding to RAIs are:

- BWR RPVs were fabricated to extremely high quality standards and the inspections performed during fabrication provide very high assurance that the vessels will be free of manufacturing defects potentially detrimental to vessel integrity.
- An updated industry survey shows that over 7000 linear feet of BWR RPV weldment has been inspected to date. These inspections have been conducted at large cost and personnel radiation exposure, yet have detected only a small number of innocuous, subsurface indications with no potential impact on plant safety.
- The governing loading condition, from the standpoint of challenge to BWR vessel integrity, is the cold pressure tests conducted following each refueling outage. These tests are normally conducted at or near sub-cooled conditions (<212°F) with the core cold and non-critical. Successful completion of the pressure test ensures brittle fracture will not occur during operation and thus there are no safety concerns for the vessel.
- Inservice inspection of circumferentially oriented RPV welds is of little or no value. The applied stress levels are so low that the probability of failure or crack growth resulting from postulated 360° cracks in these welds is essentially nil.
- A probabilistic fracture mechanics evaluation demonstrated that the major beneficial effect of vessel inservice inspections is a reduction in the already

small probability of a vessel leak developing. This evaluation also demonstrates that the probability of vessel rupture or brittle fracture is several orders of magnitude below the NRC safety goals, with no inspection at all, even when using very conservative assumptions regarding stress corrosion cracking.

- Implementation of the inspection scope proposed will result in significant cost savings and reduction in personnel exposure, especially for plants that are inspected from the vessel outside diameter. The cost savings and impact on safety was provided in the October 29, 1996 request for the alternative and is as follows:

<u>Case</u>	<u>Probability of Vessel Failure</u>	<u>Cost of Inspection per plant</u>	<u>BWR fleet</u>
inspect all shell welds	5.69×10^{-8}	\$3.3M	\$119M
inspect longitudinal. welds only	5.69×10^{-8}	\$1.85M	\$67M

Reason for Meeting

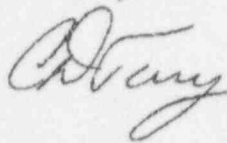
At the conclusion of the January 16, 1997, meeting with NRC, the EOC felt confident that an official NRC position concerning the alternative inspection scope would be issued quickly. However, that has not happened. While we are not sure of the reason for the delay, we can only conclude that the staff has no additional technical issues which the BWRVIP needs to address as no additional RAIs have been issued. Further, it is our belief that the staff wants each BWR plant to perform RPV inspections of all welds to develop a baseline and is therefore not inclined to accept the proposed technical alternative as a matter of policy. Although the staff's desire to have data is understood, we believe that the results of vessel inspections performed to date provides sufficient data to support our conclusions as well as a substantial baseline. Also, the future longitudinal weld inspections we propose will continue to provide a significant amount of data on the most risk significant welds so that the industry and the staff can be assured that vessel integrity is maintained.

The BWRVIP believes the analyses and inspection data submitted to the NRC demonstrates that inspecting only the BWR RPV longitudinal shell welds provides an acceptable level of quality and safety. As noted in the preceding table, there is no reduction in the probability of vessel failure associated with the reduced inspection scope proposed by the BWRVIP. However, there is a significant difference in the costs. Clearly the added costs for inspecting the BWR RPV circumferential shell welds does not result in a compensating increase in the level of quality or safety and thus there is no value added. Additionally, there is a sense of urgency on the part of utilities that stand to benefit from the proposal. Even if the staff were to eventually approve the alternative, the longer the delay in dispositioning the request, the greater the likelihood that large sums of money will be spent and significant personnel exposure will result with no benefit to the public health and safety. Therefore, we request a meeting with the

Commissioners and the staff as soon as practical so this issue can be discussed and brought to closure.

Should you have questions or need additional information, please feel free to contact me or Robin Dyle of Southern Nuclear at (205) 992-7121.

Sincerely,

A handwritten signature in cursive script, appearing to read 'C. Terry'.

Carl Terry,
Acting BWRVIP Chairman
Niagara Mohawk Power Company

cc: L. Joseph Callan, NRC
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