March 19, 2010

Mr. Rick Libra
Exelon
Chairman, BWR Vessel and Internals Project
3420 Hillview Avenue
Palo Alto, CA 94304-1395

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION APPROVAL LETTER FOR TOPICAL REPORT BWRVIP-34-A, "BWR [BOILING WATER REACTOR] VESSEL AND INTERNALS PROJECT [BWRVIP], TECHNICAL BASIS FOR PART CIRCUMFERENCE WELD OVERLAY REPAIR OF VESSEL INTERNAL CORE SPRAY PIPING: EPRI [ELECTRIC POWER RESEARCH INSTITUTE TECHNICAL REPORT 1016377" (TAC NO. ME2301)

Dear Mr. Libra:

By letter dated June 26, 2008 (Agencywide Documents Access and Management System, (ADAMS), Accession No. ML081840666), as supplemented by letter dated February 26, 2010, (ADAMS Accession No. ML100640637), the Boiling Water Reactor Vessel and Internals Project (BWRVIP) submitted Topical Report BWRVIP-34-A, "BWR Vessel and Internals Project, Technical Basis for Part Circumference Weld Overlay Repair of Vessel Internal Core Spray Piping," Electric Power Research Institute (EPRI) Technical Report 1016377, for the Nuclear Regulatory Commission (NRC) staff review.

BWRVIP-34-A provides a generic weld repair concept that includes design basis and design requirements for a part circumference weld overlay repair for internal core spray piping; the technical basis and methodology for evaluation of core spray piping; the technical basis and methodology for evaluation of core spray leakage when part circumference overlay repairs are applied; the materials and welding qualifications performed to demonstrate this repair technique; and the evaluation performed to confirm the inspectability of part circumference overlay repairs.

BWRVIP-34-A includes revisions to the previously published report BWRVIP-34, "Technical Basis for Part Circumference Weld Overlay Repair of Vessel Internal Core Spray Piping," submitted May 22, 1997. These revisions were implemented in accordance with the NRC staff review of BWRVIP-34 contained in the staff safety evaluation (SE) dated June 27, 2007, "Safety Evaluation of Proprietary EPRI Report, 'BWR Vessel and Internals Project, Technical Basis for Part Circumference Weld Overlay Repair of Vessel Internal Core Spray Piping (BWRVIP-34),'" ADAMS Accession No. ML071790313, with supplemental information submitted on March 30, 1998, November 1, 2004, and July 18, 2006 (ADAMS Accession Nos. ML100700553, ML043090015, and ML062010129), in response to staff requests for additional information dated December 14, 1997, October 7, 2004, and March 16, 2006 (ADAMS Accession Nos. ML100700561, ML042880139, and ML060800311).

The NRC staff has reviewed the information in BWRVIP-34-A and has found that the topical report accurately incorporates all of the changes requested in the BWRVIP-34 SE, and thus meets the NRC staff requirements for approval. The NRC staff requested changes resulting in numerous additions to the BWRVIP-34 document which are discussed in detail below.
The first revision to BWRVIP-34 was the inclusion of a preamble to the document designed to address numerous issues and make several clarifications with regards to the use of BWRVIP-34-A. Specifically, the preamble addressed staff concerns that the following points be made clear:

- Any repair design should be consistent with the latest Edition and Addenda of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) as identified in the Owner's In-Service Inspection Plan and with applicable ASME Code Cases as endorsed in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1"
- The Z-factor must be included in design calculations when required by ASME Code
- Shear load transfer must be properly evaluated
- Residual stress must be considered
- Ferrite shall be limited between 7.5 and 12 FN (Ferrite Number)

The preamble stressed that BWRVIP-34-A was written prior to several changes in policy and thinking both on the industry side and at the NRC and provided adequate guidance for a user to ensure that their solutions based on BWRVIP-34-A meet the necessary changes in expectations and guidance. The staff determined that the preamble adequately meets the issues it was written to address.

The second revision added discussion to Section 3.2 clarifying that the worked example there did not include a Z-factor despite current ASME Code requirements that would require a Z-factor to be included in certain cases. This revision adequately addresses the concern that a Z-factor might be forgotten when it should be included.

The third revision consisted of a large addition to Section 7 (Inspection of Core Spray Internal Piping Weld Overlays) covering numerous issues from the BWRVIP-34 SE. The addition served to:

- Provide guidance for inspection of overlays
- Clarify that cracks in the underlying base metal heat-affected zone (HAZ) should be monitored
- Clarify that overlay design length should be sufficient to allow for effective ultrasonic (UT) inspection
- Clarify that design overlay thickness should be sufficient to allow surface preparation for UT inspection

The staff noted that the cautions included regarding overlay length and thickness were not echoed in Sections 3.3 and 3.4 despite these sections explicitly covering the design thickness and length determinations. In its February 26, 2010, response to a staff request for additional information, the BWRVIP stated that a note added to Section 3 which sends the user to the relevant information in Section 7 was deemed to be adequate. The BWRVIP also stated that, "should the report require revision at some future date, the BWRVIP will consider moving the

applicable text from Section 7 into Section 3." With this clarification, the staff determined that the addition of this content to Section 7 adequately addresses the issues it is intended to cover.

The fourth revision replaced Section 5 with a reference to BWRVIP-97, "Guidelines for Performing Weld Repairs to Irradiated BWR Internals," for guidance. This was consistent with the staff position laid out in the BWRVIP-34 SE. The staff determined that the replacement of Section 5 with a reference to BWRVIP-97 adequately addressed staff concerns.

The fifth revision deleted reference to Type 312 weld metal. This was in response to staff concerns and the staff has determined that the removal of Type 312 from BWRVIP-34 adequately addresses these concerns.

The sixth revision added discussion to Section 6 that any design must be consistent with BWRVIP-19-A, "Internal Core Spray Piping and Sparger Repair Design Criteria," and BWRVIP-84, "Guidelines for Selection and Use of Materials for Repairs to BWR Internal Components." This is consistent with the staff SE for BWRVIP-34 and the staff has determined that this clarification meets staff expectations.

The seventh and final revision clarified the meaning of "nearly-as-welded condition" via Appendix K. A definition of the term was included in Appendix K, "'nearly-as-welded condition' is one in which the surface has been modified only by knocking off slag and weld splatter with no intentional alteration of the weld surface quality." This clarification adequately addresses staff concerns from the BWRVIP-34 SE.

Based on the discussion of revisions above, the staff has determined that BWRVIP-34-A is acceptable. Please contact Eric Bowman of my staff at (301) 415-2963 if you have on questions on this subject.

Sincerely,

/RA/

Thomas B. Blount, Deputy Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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ADAMS Accession No: ML100700570 *Concurrence by e-mail

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