

March 16, 2006

Bill Eaton, BWRVIP Chairman  
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SUBJECT: NRC APPROVAL LETTER FOR BWRVIP-75-A, "BWR VESSEL AND  
INTERNALS PROJECT, TECHNICAL BASIS FOR REVISIONS TO GENERIC  
LETTER 88-01 INSPECTION SCHEDULES"

Dear Mr. Eaton:

By letter dated October 31, 2005, the Boiling Water Reactor Vessel and Internals Project (BWRVIP) submitted Proprietary Report BWRVIP-75-A, "BWR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules," for Nuclear Regulatory Commission (NRC) staff review.

The BWRVIP-75-A report proposes revisions to the extent and frequencies for piping inspections contained in Generic Letter (GL) 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel." The proposed revisions are based on the consideration of inspection results and service experience gained by the industry since the issuance of GL 88-01 and include additional knowledge regarding the benefits of improved BWR water chemistry. The BWRVIP-75-A report also provides justification for the proposed inspection criteria for Category A through E welds for the respective conditions of normal water chemistry (NWC) and hydrogen water chemistry (HWC), including noble metal chemical addition (NMCA).

The BWRVIP-75-A report presents a compilation of information from the BWRVIP-75 report and the NRC staff final safety evaluation (SE) dated May 14, 2002, which includes the BWRVIP's associated responses to staff open items, as documented in the staff's initial SE dated September 15, 2000.

The NRC staff has reviewed the information in the BWRVIP-75-A report and has found that the report accurately incorporates all of the relevant information which was submitted by the BWRVIP in the documents noted above to support NRC staff approval of the report. The staff noted that several editorial changes were made, which are not discussed in this letter. The staff also found that several technical revisions were made to the BWRVIP-75 report in the production of the BWRVIP-75-A report. These revisions are discussed in detail below.

The first revision was that the BWRVIP added a statement to Sections 3 and 4 of the BWRVIP-75 report to state that the revised inspection criteria contained in the report are based on a deterministic evaluation. The BWRVIP added the following statement to Sections 3 and 4 of the BWRVIP-75 report, "The revised inspection criteria is based on a deterministic evaluation

and the methodology does not rely on risk insights to justify the reduction in inspection scope and frequency.” The staff determined that the BWRVIP adequately revised Sections 3 and 4 of the BWRVIP-75 report to provide clarification of the revised inspection criteria.

The second revision was that the BWRVIP revised the text in Section 3 to address Open Item 3.1 from the staff’s September 15, 2000, SE, whereby the staff requested that the BWRVIP include a requirement that each licensee will need to pursue an alternative to the requirements of Title 10 of the Code of Federal Regulations Section 50.55a (10 CFR 50.55a) to use the sample sizes specified in the BWRVIP-75 report with regard to the Category B-J and B-F welds. The BWRVIP included the following in Section 3 of the BWRVIP-75 report, “each licensee will need to pursue an alternative to 10 CFR 50.55a requirements for Category B-J and B-F welds pursuant to 10 CFR 50.55a(3)(i) to use the sample sizes specified in this report.” The staff determined that the BWRVIP adequately revised Section 3 of the BWRVIP-75 report to address Open Item 3.1.

The third revision was that the BWRVIP added a paragraph to Section 3 of the BWRVIP-75 report to provide clarification regarding what constitutes a qualified examination. The staff determined that the BWRVIP adequately revised Section 3 of the BWRVIP-75 report to provide a detailed description of qualified examinations.

The fourth revision was with respect to the BWRVIP revising Section 3.6 of the BWRVIP-75 report to address Open Item 3.8 from the staff’s September 15, 2000, SE, whereby the staff requested that the BWRVIP revise the text to state that licensees need to verify and validate the demonstration of effective HWC. The BWRVIP modified the third paragraph of Section 3.6 to state, “Therefore, for purposes of this report, effective HWC (including NMCA) can be demonstrated either through a plant-specific evaluation approved by NRC or the licensee should verify and validate that an effective HWC program (i.e., available at least [ ] of the time and ECP [electrochemical potential] of [ ] or less), in accordance with the NRC-approved BWRVIP-62 guideline, has been achieved for welds in every piping system for which HWC credit is taken.” The staff determined that the BWRVIP adequately revised Section 3.6 of the BWRVIP-75 report to address Open Item 3.8.

The fifth revision was that the BWRVIP revised Sections 3.1.1, 3.2.1, 3.3.1, and 4.1 of the BWRVIP-75 report to address Open Item 3.9 from the staff’s September 15, 2000, SE, whereby the staff requested that the BWRVIP revise various sections of the BWRVIP-75 report to address the selection and priority of locations for inspections. The BWRVIP revised Sections 3.1.1, 3.2.1, 3.3.1, and 4.1 of the BWRVIP-75 report to state that, “During the selection of locations for inspection, consideration should be given regarding locations where IGSCC could be accelerated by crevice corrosion or thermal fatigue. In addition, locations having attributes that would promote IGSCC [intergranular stress corrosion cracking] should have higher priority for inspection. The attributes that may be considered include: high carbon or low ferrite content, crevice or stagnant flow condition, evidence of weld repair, surface cold work, and high fit-up, residual and operating stresses.” The staff determined that the BWRVIP adequately revised the BWRVIP-75 report to address Open Item 3.9.

The sixth revision was that the BWRVIP revised Section 3.2.1 of the BWRVIP-75 report to address Open Item 3.2 from the staff's September 15, 2000, SE, whereby the staff requested that the BWRVIP revise the BWRVIP-75 report to address the Category B inspection frequency when IGSCC exams have not been conducted. The BWRVIP revised Section 3.2.1 of the BWRVIP-75 report to add, "If qualified IGSCC examinations have not been conducted, the inspection frequency for Category B welds will be [ ] percent of the population every [ ] years under NWC conditions, or [ ] percent every [ ] years under HWC conditions." The staff determined that the BWRVIP adequately revised Section 3.2.1 of the BWRVIP-75 report to address Open Item 3.2.

The seventh revision was that the BWRVIP revised Sections 3.3.1 and 3.3.2 of the BWRVIP-75 report to address Open Item 3.3 from the staff's September 15, 2000, SE, whereby the staff requested that the BWRVIP revise the BWRVIP-75 report to address the Category C inspection frequency of welds that have been treated with induction heating stress improvement. The BWRVIP revised Sections 3.3.1 and 3.3.2 of the BWRVIP-75 report to include a requirement that the licensee must ensure that an effective stress improvement was achieved and that there must have been either: (1) a preservice (post-stress improvement) and inservice examination with a qualified procedure with no cracking identified, or (2) for welds that were stress-improved prior to the publication of the BWRVIP-75-A report but did not receive a preservice examination, at least one examination performed with a qualified procedure after more than two operating cycles and no cracking detected. The staff determined that the BWRVIP adequately revised Sections 3.3.1 and 3.3.2 of the BWRVIP-75 report to address Open Item 3.3.

The eighth revision was that the BWRVIP added new information to Section 3.3.2 of the BWRVIP-75 report to document that flaws were found in three welds after the mechanical stress improvement process (MSIP) was performed. The BWRVIP added the following footnote to Section 3.3.2 of the BWRVIP-75 report, "Subsequent to the issuance of BWRVIP-75 and the NRC Safety evaluation, three welds treated with MSIP were determined to contain SCC-type indications. All flaws were contained in the weld metal. The root cause included a review of previous NDE [nondestructive examination] results. It was determined that the flaws likely existed at the time MSIP was performed. The review also confirmed the effectiveness of MSIP in that no through-wall propagation of the flaws occurred following MSIP." The staff determined that the BWRVIP adequately revised Section 3.3.2 of the BWRVIP-75 report to clarify that there had been MSIP-treated welds identified with intergranular stress corrosion cracking.

The ninth revision was that the BWRVIP revised Section 3.5.1.1 of the BWRVIP-75 report to address Open Item 3.4 from the staff's September 15, 2000, SE, whereby the staff requested that the BWRVIP add additional restrictions to the BWRVIP-75 report regarding weld overlays made of non-resistant material. The BWRVIP added the following statements to Section 3.5.1.1 for Category E welds, "Licensees shall identify all welds made of non-resistant materials in their plant-specific submittal to adopt the BWRVIP-75 report for determination of sample size and scope expansion criteria. These welds will be reviewed on a case-basis by the NRC." The staff determined that the BWRVIP adequately revised Section 3.5.1.1 to address Open Item 3.4.

The tenth revision was that the BWRVIP added new information to Section 3.4.2 of the BWRVIP-75 report to document that a flaw was found in a control rod drive (CRD) return line nozzle that had been cut and capped. The BWRVIP added the following footnote to Section 3.4.2 of the BWRVIP-75 report, "Subsequent to the issuance of BWRVIP-75 and the NRC Safety evaluation, leakage was detected in a CRD return line nozzle that had been cut and capped. The flaw was located in the weld material and did not exhibit UT [ultrasonic testing] characteristics indicative of IGSCC. The licensee determined that this weld had experienced multiple weld repairs." The staff determined that the BWRVIP adequately revised Section 3.4.2 of the BWRVIP-75 report to document this operating experience.

The eleventh revision was that the BWRVIP revised Section 3.5.1.1 of the BWRVIP-75 report to address Open Item 3.6 from the staff's September 15, 2000, SE, whereby the staff requested that the BWRVIP revise the scope expansion requirements for Category E welds. The BWRVIP deleted the original scope expansion for the Category E welds and added the following requirements for Category E welds to Section 3.5.1.1 of the BWRVIP-75 report, "If cracking is detected in the expanded sample, [ ] of the total population will be examined. If additional cracking is detected the remaining population will be examined." The staff determined that the BWRVIP adequately revised Section 3.5.1.1 of the BWRVIP-75 report to address Open Item 3.6.

The twelfth revision was that the BWRVIP revised Section 3.5.1.2 of the BWRVIP-75 report to address Open Item 3.5 from the staff's September 15, 2000, SE, whereby the staff requested that the BWRVIP include additional clarification to Section 3.5.1.2 regarding the inspection requirements for existing and future stress improved Category E welds. The BWRVIP rewrote the first and second paragraphs in Section 3.5.1.2 of the BWRVIP-75 report to incorporate the detailed inspection frequencies and requirements regarding existing and future stress improved Category E welds. The staff determined that the BWRVIP adequately revised Section 3.5.1.2 of the BWRVIP-75 report to address Open Item 3.5.

The thirteenth revision was that the BWRVIP revised Section 3.6 of the BWRVIP-75 report to address Open Items 3.7 and 3.8 from the staff's September 15, 2000, SE, whereby the staff requested that the BWRVIP include a discussion in Section 3.6 of the BWRVIP-75 report regarding the BWRVIP-62 report, "Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection," and of the BWRVIP-130 report, "BWR Water Chemistry Guidelines-2004 Revision." The BWRVIP revised Section 3.6 to include discussions of the BWRVIP-62 and BWRVIP-130 reports. The staff determined that the BWRVIP adequately revised Section 3.6 of the BWRVIP-75 report to address Open Items 3.7 and 3.8.

The last revision was that the BWRVIP revised Table 3-1 of the BWRVIP-75 report to address all of the staff's comments regarding inspection frequencies for stainless steel piping welds contained in the final SE dated May 14, 2002. The staff determined that the BWRVIP adequately revised Table 3-1 of the BWRVIP-75 report to incorporate all of the changes to the inspection frequencies for the various welds as addressed in the staff's final SE.

B. Eaton

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Based on the discussion above, the staff has determined that the BWRVIP-75-A report is acceptable. Please contact Meena Khanna of my staff at (301) 415-2150 if you have any further questions regarding this subject.

Sincerely,

*/RA/*

William H. Bateman, Deputy Director  
Division of Component Integrity  
Office of Nuclear Reactor Regulation

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B. Eaton

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Based on the discussion above, the staff has determined that the BWRVIP-75-A report is acceptable. Please contact Meena Khanna of my staff at (301) 415-2150 if you have any further questions regarding this subject.

Sincerely,

***/RA/***

William H. Bateman, Deputy Director  
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Office of Nuclear Reactor Regulation

cc: BWRVIP Service List

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