

September 22, 2011

Mr. David Czufin, Chairman  
Exelon Generation  
Chairman, BWR Vessel and Internals Project  
Electric Power Research Institute  
3420 Hillview Avenue  
Palo Alto, CA 94304-1395

SUBJECT: U.S. NRC APPROVAL LETTER WITH COMMENT FOR TECHNICAL REPORT BWRVIP-182-A, "BWR VESSEL AND INTERNALS PROJECT, GUIDANCE FOR DEMONSTRATION OF STEAM DRYER INTEGRITY FOR POWER UPRATE," ELECTRIC POWER RESEARCH INSTITUTE TECHNICAL REPORT 1020802 (TAC NO. ME5923)

Dear Mr. Czufin:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of Technical Report (TR) Boiling Water Reactor (BWR) Vessel Internals Project (BWRVIP)-182-A, "BWR Vessel and Internals Project, Guidance for Demonstration of Steam Dryer Integrity for Power Uprate," dated May 2010. This report was submitted for NRC staff review and approval by letter dated February 24, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML110620291).

The TR provides guidance in demonstrating the structural integrity of BWR steam dryers for power uprates (EPUs) greater than 2 percent of current licensed thermal power (CLTP) up to EPU conditions. In addition, it presents guidance in defining the process to be followed and the criteria to be used when developing, documenting, validating, and applying methods to demonstrate steam dryer integrity.

The revision of this TR encompassed editorial changes, technical additions proposed by BWRVIP in response to an NRC Request for Additional Information (RAI), recommendations in the NRC safety evaluation (SE), and any necessary changes identified since the previous publication of the report.

By letter dated January 30, 2008 (ADAMS Accession No. ML080380544), the BWRVIP submitted for the NRC staff review and approval the Electric Power Research Institute TR 1016166, "BWR Vessel and Internals Project, Guidance for Demonstration of Steam Dryer Integrity for Power Uprate, (BWRVIP-182)." By letter dated December 31, 2008 (ADAMS Accession No. ML083650080), the NRC staff issued a RAI regarding the BWRVIP-182 TR. By letter dated April 23, 2009 (ADAMS Accession No. ML091170690), BWRVIP submitted its response to the NRC staff's RAI.

By letter dated January 11, 2010 (ADAMS Accession No. ML093561332), the NRC issued the final SE for the BWRVIP-182 TR and determined it was acceptable for referencing in licensing documentation to the extent specified and under limitations delineated in the TR and the SE. By letter dated February 24, 2011, the BWRVIP submitted an approved version, BWRVIP-182-A, "BWR Vessel And Internals Project, Guidance For Demonstration Of Steam Dryer Integrity For Power Uprate," Electric Power Research Institute Technical Report 1020802, with changes

incorporated by the responses by the BWRVIP to the staff's RAIs and recommendations in the SE.

The NRC staff has reviewed the information in BWRVIP-182-A and has found that the report accurately incorporates the relevant information which was submitted by the BWRVIP in the documents noted above to support NRC staff approval of the TR. The NRC staff found that 12 changes were made in the production of the TR BWRVIP-182-A. These changes are discussed in detail below.

The first change was to add the NRC SE behind the title page of the report in accordance with an NRC request. The NRC staff finds this revision acceptable because the document requested was incorporated in the report.

The second change was the revision of Figure 2-1 and the addition of five notes that provided additional information pertaining to the figure. The NRC staff finds this revision acceptable because the revision provides additional information and clarification in the report as requested.

The third change to the BWRVIP-182-A TR was to include a discussion in Section 5.1 regarding the importance of determining the "noise floor" of the data acquisition system. Once the "noise floor" is defined, checks are performed to confirm that it is exceeded by unfiltered signals obtained at any non-zero power level. The NRC staff finds this revision acceptable because Section 5.1 was revised to include an extended discussion pertaining to the "noise floor" of the data acquisition system.

The fourth change was the revision of Section 5.3 in order to provide examples of alternative methods for determining the change in steam dryer loading from CLTP up to EPU. The NRC staff finds this revision acceptable because the examples have been incorporated and provide useful information to the report.

The fifth change was the revision of Section 5.3 in order to add the requirement that "bump-up" factors (CLTP to EPU) shall not be less than the ratio of main steam line (MSL) velocities squared. The NRC staff finds this revision acceptable because the information requested was incorporated.

The sixth change was the revision of Section 7.0 in order to add the statement that, based on past experience, the use of structural damping coefficients greater than 1 percent must be substantiated with measurements per guidance given in Regulatory Guide 1.20, "Comprehensive Vibration Assessment Program for Reactor Internals during Preoperational and Initial Startup Testing." The NRC staff finds this revision acceptable because the information requested was incorporated.

The seventh change was to revise Section 7.0 in order to add the requirement that a stress concentration factor (for fatigue) of no less than 1.8 shall be used for fillet welds. The NRC staff finds this revision acceptable because the information requested was incorporated.

The eighth change was to revise Section 7.0 in order to add the requirement that after considering all end-to-end bias errors and uncertainties as well as appropriate stress concentration factors, and until additional validation is completed that demonstrates improved prediction accuracy, an interim minimum stress ratio of 2.0 shall be maintained in steam dryer

components, when fluctuating pressure load prediction on the steam dryer relies on MSL strain gage measurements. The NRC staff finds this revision acceptable because the information requested was incorporated.

The ninth change was to revise Section 8.0 in order to add the requirement that a detailed summary table shall be prepared documenting all known end-to-end bias and uncertainties, (bias errors and uncertainties associated with analytical or test methods used in developing fluctuating pressure loads acting on the dryer), instrument location and measurement uncertainties, frequency discretization error, finite element mesh discretization error, and uncertainties associated with finite element modeling simplifications and approximations. The NRC staff finds this revision acceptable because the information requested was incorporated.

The tenth change was to revise Section 8.0 in order to add the requirement that evaluations of any existing un-repaired flaws in the steam dryer components and their impact on steam dryer operation at EPU conditions shall be documented. The NRC staff finds this revision acceptable because the information requested was incorporated.

The eleventh change was to revise Section 9.0 in order to clarify the discussion of Level 1 and Level 2 steam dryer performance criteria to be monitored during power ascension testing and what actions must be taken if either limit is exceeded. The NRC staff finds this revision acceptable because the information requested was incorporated.

The twelfth change was to revise Appendix A in order to clarify that acoustic mitigation devices can also be applied to MSL valve standpipes with blind flanges. The NRC staff finds this revision acceptable because Appendix A was revised to include an extended discussion pertaining to acoustic mitigation devices that can also be applied to MSL valve standpipes.

Based on the discussion above, the NRC staff has determined that the BWRVIP-181-A TR is acceptable. Please contact my staff, Andrew Hon at (301) 415-8480, if you have any further questions regarding this subject.

Sincerely,

**/RA/**

Robert A. Nelson, Deputy Director  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Project No. 704

cc: See next page

D. Czufin

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The twelfth change was to revise Appendix A in order to clarify that acoustic mitigation devices can also be applied to MSL valve standpipes with blind flanges. The NRC staff finds this revision acceptable because Appendix A was revised to include an extended discussion pertaining to acoustic mitigation devices that can also be applied to MSL valve standpipes.

Based on the discussion above, the NRC staff has determined that the BWRVIP-181-A TR is acceptable. Please contact my staff, Andrew Hon at (301) 415-8480, if you have any further questions regarding this subject.

Sincerely,

**/RA/**

Robert A. Nelson, Deputy Director  
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Office of Nuclear Reactor Regulation

Project No. 704

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**ADAMS ACCESSION NO.: ML112580589**

**NRR-106**

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