AP1000DCDFileNPEm Resource

From: Michael Miernicki
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Cc: Perry Buckberg; Rhonda Carmon
Subject: RAI SRP 3.9.6-CIB1-01 thru 12
Attachments: RAIs 3.9.6-CIB1-01thru12.doc

Sam, please see attached RAIs. They are numbered 1 thru 12 in the attachment, but for our tracking purposes become SRP3.9.6-CIB1-01 thru 12. Please let me know as soon as possible whether Westinghouse understands these questions or whether a conference call is necessary for any clarifications. Thanks.

Mike

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T. Scarbrough
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REQUEST FOR ADDITIONAL INFORMATION

NRC STANDARD REVIEW PLAN SECTION 3.9.6, "FUNCTIONAL DESIGN, QUALIFICATION, AND INSERVICE TESTING PROGRAM OF PUMPS, VALVES, AND DYNAMIC RESTRAINTS,"

AND RELATED SECTIONS

IN SUPPORT OF NRC SAFETY EVALUATION ON

PROPOSED REVISION TO AP1000 DESIGN CERTIFICATION

Background

Westinghouse is proposing changes to the version (Revision 15) of the Design Control Document (DCD) specified in the design certification for its AP1000 reactor design codified in Part 52 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 52). Westinghouse has submitted for NRC review Revision 16 to the AP1000 DCD and Technical Report APP-GW-GLR-134 (TR 134), "AP1000 DCD Impacts to Support COLA Standardization," which includes changes to the AP1000 DCD Revision 16. With respect to Inservice Testing (IST) and Motor-Operated Valve (MOV) programs, the NRC staff review of a Design Certification DCD focuses on accessibility for the performance of IST activities, and on the general description of the IST and MOV programs. Combined license (COL) applicants referencing the AP1000 design need to fully describe IST, MOV and other operational programs as defined in Commission Paper SECY-05-197, "Review of Operational Programs in a Combined License Application and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria." The NRC staff is currently reviewing the COL application submitted by the Tennessee Valley Authority (TVA) for Bellefonte Nuclear Plant Units 3 and 4 that references proposed Revision 16 to the AP1000 DCD and TR 134. The NRC staff is using Standard Review Plan (SRP) Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints," in its review of the proposed changes to the AP1000 DCD and the Bellefonte COL application. On March 26 and 27, 2008, the NRC staff held a public meeting with Westinghouse and TVA to discuss the ongoing review of the AP1000 DCD revision and the Bellefonte COL application. At the conclusion of the meeting, Westinghouse and TVA identified their respective topic areas where requests for additional information (RAIs) should be directed such that TVA can incorporate by reference the AP1000 DCD in its Bellefonte COL application with minimal supplemental information. The NRC staff needs this information in order to complete its review of the IST program description and implementation for AP1000 plants. The following RAIs are being directed to Westinghouse based on the public meeting discussion:

Request for Additional Information

1. Provide a schedule for the availability of the procurement specifications for safety-related valves and dynamic restraints to be used in the AP1000 reactor for NRC staff audit. Subsection 3.9.3.2, "Pump and Valve Operability Assurance," in Chapter 3, "Design of Structures, Components, Equipment and Systems," of the AP1000 DCD Tier 2 refers to

operational tests to verify that the valve opens and closes prior to installation. Subsection 3.9.3.2.2 of the AP1000 DCD Tier 2 specifies cold hydro tests, hot functional tests, periodic inservice inspections, and periodic inservice operations to be performed in situ to verify the functional capability of the valves. Subsection 5.4.8, "Valves," of Section 5.4, "Component and Subsystem Design," in Chapter 5, "Reactor Coolant System and Connected Systems," of the AP1000 DCD Tier 2 includes provisions regarding design and qualification, and preoperational testing of valves within the scope of Chapter 5, and refers to these activities for other safety-related valves. Subsection 5.4.8.1.2, "Motor-Operated Valves Design and Qualification," of the AP1000 DCD Tier 2 states that provisions are provided to reduce the susceptibility of the valve to bonnet overpressurization, pressure locking and thermal binding. Subsection 5.4.8.1.3, "Other Power-Operated Valves Including Explosively Actuated Valves Design and Qualification," of AP1000 DCD Tier 2 does not discuss resolution of potential pressure locking and thermal binding for other power-operated gate valves. Subsection 5.4.9, "Reactor Coolant System Pressure Relief Devices," of the AP1000 DCD Tier 2 includes provisions for design, testing, and inspection of relief devices in the reactor coolant system. Subsection 5.4.10, "Component Supports," of the AP1000 DCD Tier 2, includes provisions for design, testing, and inspection of component supports in the reactor coolant system. Subsection 5.4.16, "References," in proposed Revision 16 to the AP1000 DCD Tier 2 refers to the 2002 version (rather than the updated 2007 version) of American Society of Mechanical Engineers (ASME) Standard QME-1, "Qualification of Active Mechanical Equipment used in Nuclear Power Plants." During the March 26-27 public meeting, Westinghouse discussed its ongoing development of procurement specifications for safety-related valves and dynamic restraints for the AP1000 reactor design. Westinghouse stated that the procurement specifications will be available for NRC staff audit later in 2008. Based on the meeting discussion, the NRC staff believes that the procurement specifications will provide additional assurance that the functional design and qualification of safety-related valves and dynamic restraints meet the acceptance criteria in NRC Standard Review Plan (SRP) Section 3.9.6 and other applicable SRP sections in support of COL applicants referencing the AP1000 DCD. For example, the information in the procurement specifications may include:

(a) identification of all active ASME Code Class 1, 2, and 3 valves and dynamic restraints;
(b) presentation of the criteria to be employed in a test program, or a program consisting of tests and analysis, to ensure operability of valves that are required to open or close to perform a safety function during or after the specified plant event;
(c) discussion of features of the qualification program, including conditions of the test, scale effects (if appropriate), loadings for the specified plant event, transient loads, and other information pertinent to assurance of operability;
(d) design stress limits;
(e) provisions for valve testing at maximum flow rates;
(f) provisions for functional design and qualification of each safety-related valve that demonstrate its capability to perform its intended functions for a full range of system differential pressures and flows, and ambient temperatures, and available voltage (as applicable) from normal operating to design-basis conditions;
(g) qualification program for safety-related valves that demonstrates that these valves do not experience leakage from loading;
(h) provisions for functional design and qualification of dynamic restraints in safety-related systems and access for performing IST program activities, including the acceptance criteria in SRP Section 3.9.2;

(i) consideration of flow-induced loading in functional design and qualification to incorporate degraded flow conditions; and
(j) verification that solenoid-operated valves will meet their Class 1E electrical requirements for the appropriate electrical power supply amperage and voltage.

2. Clarify the use of nonintrusive techniques within the IST program. Subsection 3.9.6.2, "Inservice Testing of Valves," in the AP1000 DCD Tier 2 in the third paragraph states that inservice testing incorporates the use of nonintrusive techniques to periodically assess degradation and performance of selected valves.

3. Describe the incorporation of lessons learned from valve programs in planning the IST program for power-operated valves (POVs) other than MOVs. TR 134 modifies the third paragraph in Subsection 3.9.6.2 of Revision 16 to AP1000 DCD Tier 2 by including a statement that POV testing utilizes guidance from Generic Letter 96-05 and the Joint Owners Group (JOG) Program for MOV Periodic Verification, MPR 2524-A (November 2006). TR 134 also includes a statement that during the IST period, the following are performed to demonstrate the acceptability of the functional performance of POVs other than MOVs: (1) periodically assess the diagnostic methods used in the verification for valve function; and (2) evaluation of lessons learned through other related programs such as MOV GL 89-10 and 96-05 Programs.

4. Clarify the use of static tests for operability determinations of POVs. Subsection 3.9.6.2 in the AP1000 DCD Tier 2 in the fourth paragraph states that the operability test for safety-related POVs with an active function may be either a static or a dynamic (flow and differential pressure) test.

5. Clarify the applicability of the statement regarding throttling testing to the edition and addenda of the ASME OM Code referenced in the AP1000 DCD. TR 134 modifies the second paragraph in Subsection 3.9.6.2.1, "Valve Functions Tested," of Revision 16 to AP1000 DCD Tier 2 to state that testing of throttling (pressure regulation) is not required in the ASME OM Code.

6. Correct the typographical error in the definition for Category D valves. TR 134 modifies the last paragraph in Subsection 3.9.6.2.1 of Revision 16 to AP1000 DCD Tier 2 to incorporate the definitions of the valve categories from the ASME OM Code. The NRC staff needs this information to perform its review of the proposed changes to the IST program description in the AP1000 DCD using the acceptance criteria in SRP Section 3.9.6.

7. Clarify the need for a COL applicant to request relief from or an alternative to the OM Code testing requirement with respect to position indication if the Code provisions are not satisfied. TR 134 modifies the second sentence under Remote Valve Position Indication Inservice Tests in Subsection 3.9.6.2.2 of Revision 16 to AP1000 DCD Tier 2 to state that the frequency for a position indication test will be once every 2 years unless otherwise justified.

8. Clarify the discussion of POV operability in the AP1000 DCD. Subsection 3.9.6.2.2, "Valve Testing," in the AP1000 DCD Tier 2 discusses valve testing in a subsection titled "Power-Operated Valve Operability Tests." TR 134 includes a revision to this subsection that operability testing as required by 10 CFR 50.55a(b)(3)(ii) is performed on MOVs in

the ASME OM Code IST program to demonstrate that the MOVs are capable of performing their design-basis safety functions. The areas of clarification are as follows:

a. The use of non-intrusive diagnostic techniques for inservice operability testing of POVs indicated in the first sentence of Subsection 3.9.6.2.2 of the AP1000 DCD Tier 2.

b. The valves to undergo operability testing with regard to the statement in the second sentence of this subsection that Table 3.9-16 identifies valves that may require operability testing.

c. The initial test frequency for periodic design-basis verification of POV capability and its applicability to the JOG Program for MOV Periodic Verification established in response to Generic Letter 96-05.

d. The use of static testing with diagnostic measurements for operability assessments in light of the weaknesses in this approach revealed by valve operating experience and research programs.

e. The approach for determining risk ranking and functional margin as indicated in this DCD subsection, or the application of an approved methodology (such as the JOG program for MOVs).

f. The basis and justification for proposed determination of functional margin without dynamic performance data.

9. Clarify the discussion of the IST program for check valves in the AP1000 DCD. The subsection titled "Check Valve Tests," in Subsection 3.9.6.2.2 of Revision 16 to the AP1000 DCD Tier 2 provides a brief discussion of check valves within the IST program at a nuclear power plant with an AP1000 reactor. TR 134 modifies Subsection 3.9.6.2 and Subsection 3.9.6.2.2 of Revision 16 to the AP1000 DCD Tier 2, to indicate that check valves must be exercised in the open and closed directions. The AP1000 DCD should be clarified for COL applicants incorporating the DCD by reference to provide sufficient information for the NRC staff to perform its review of the IST program description for check valves using the acceptance criteria in SRP Section 3.9.6. The information to be clarified includes (a) description of the preservice and IST for each check valve (including diagnostic equipment or nonintrusive techniques, testing performed under temperature and flow conditions, how test results identify flow required to open the check valve, and how testing includes effects of rapid pump starts and stops and other reverse flow conditions); (b) description of nonintrusive diagnostic techniques to periodically assess degradation and performance characteristics; (c) description of how successful completion of pre-service and IST is assessed (including demonstrating that the disk fully opens or closes, determining disk positions without disassembly, verifying free disk movement, and demonstrating disk is stable in open position); (d) confirmation of system design features accommodate check valve testing requirements; and (e) showing, where applicable, how the IST program meets guidelines of Appendix II to ASME OM Code (including bi-directional testing of check valves).

10. Provide, or reference the location of, information regarding the safety and relief valves (including their type and test parameters) to be used in the AP1000 reactor. The subsection titled "Pressure/Vacuum Relief Devices," in Subsection 3.9.6.2.2 of the

AP1000 DCD Tier 2 provides a brief description of the IST program for pressure and vacuum relief devices.

11. Update Note 31 of Table 3.9-16, "Valve Inservice Test Requirements," in AP1000 DCD Tier 2 to reflect planned changes to the AP1000 DCD discussed during the March 26-27 public meeting. Table 3.9-16 lists the valves in the IST Program for the AP1000 design. TR 134 modifies Table 3.9-16 to indicate the type of valve and actuator for power-operated valves.

12. Discuss the basis for changes specified in TR 134 to Table 3.9-16, "Valve Inservice Test Requirements," of Revision 16 to AP1000 DCD Tier 2. In particular, discuss the following changes to the table:

    Note 2: Addition of the sentence – "Valves with an active-to-failed function shall be tested by observing the operation of the actuator upon loss of valve actuating power. This 'fail-safe' requirement is not otherwise shown and is performed during exercise testing."

    Note 20: Deletion of the provision that the main steam isolation valves and main feedwater isolation valves will be partially stroked on a quarterly basis.

    Note 33: Deletion of the statement that exercise testing of valve FHS-V001 will be performed during refueling shutdowns prior to removing the fuel transfer tube flange.

    Note 38: This note states that the exercise stroke test for the main control room emergency habitability system (VES) pressure regulating valves is the stroke distance sufficient to provide the pressure regulating function.