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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002773

February 11, 2010

Subject: AP1000 Response to Request for Additional Information (SRP 16)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 16. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following RAI(s):

RAI-SRP16-CTSB-20 R1

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Request for Additional Information on SRP Section 16

D063
NRO

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ENCLOSURE 1

Response to Request for Additional Information on SRP Section 16

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP16-CTSB-20
Revision: 1

Question (Revision 0):

Bases B.3.1.8; Pages B.3.1.8-3 and B.3.1.8-7:

Provide the correct edition year for referencing ANSI/ANS-19.6.1. Confirm the version used in the current submittal is justified and implemented.

The "Applicable Safety Analyses" paragraph makes reference to ANSI/ANS-19.6.1-1985 (Ref 4), however, the Reference Section lists Reference 4 as having a revision year of 1997 (ANSI/ANS-19.6.1-1997).

In addition, per ANSI/ANS, both ANSI/ANS-19.6.1-1997 and ANSI/ANS-19.6.1-1985 are retired. The active version is ANSI/ANS-19.6.1-2005.

NOTE:
It appears that the BASES Background section describes the testing requirements per ANSI/ANS-19.6.1-2005, which only gives three tests at Hot Zero Power (HZP) instead of the four tests required per ANSI/ANS-19.6.1-1997. If ANSI/ANS-19.6.1-1997 is governing, then the Differential Boron Worth (The Critical Boron Concentration - Control Rods Inserted Test) test will need to be described.

Question for Revision 1:

Provide justification for not including the Neutron Flux Symmetry Test as part of the Physics Tests to be performed in Mode 2 as prescribed in Technical Specification 3.1.8.

The bases portion of WOG Standard Technical Specification (STS) 3.1.8 state that ""The PHYSICS TESTS required for reload fuel cycles in MODE are listed below:" The fifth test on the list is the Neutron Flux Symmetry test, and the bases portion continues to provide a summary of the test's performance, including a statement which instructs that the Neutron Flux Symmetry can be performed in either MODE 1 or 2. The WOG STS references the ANSI Code which governs reload startup physics tests for pressurized water reactors: ANSI/ANS-19.6.1-2005.

The code ANSI/ANS-19.6.1-2005 contains a table on page 3 which is titled "Required Physics Test Program", which includes the Flux Symmetry test to be performed between 0 and 30% of full power to check for a core anomaly, which supports the STS position that the test can be performed in either MODE 1 or 2.

Provide justification for omitting the Neutron Flux Symmetry test from the tests listed in B 3.1.8 of the AP1000 DCD. This information is required to ensure that the Physics Test program is being conducted in accordance with the applicable American Nuclear Society code.

Westinghouse Response (Revision 0):

The correct reference for the AP1000 at the time of design certification should have been the 1997 version. The mentioned Differential Boron Worth test as described in the 1997 version of the standard is not consistent with the reload startup test program envisioned for the AP1000. At the time of the issue of the 1997 version of the standard, Westinghouse had just licensed the Dynamic Rod Worth Measurement (DRWM) technology per WCAP-13360-P-A. This was not reflected in the 1997 version, which is significant since DRWM does not require the Differential Boron Worth measurement. This technology advancement is reflected in the 2005 version of the standard, which post-dates the original submittal and does not require said test."

The reference will be changed to the 2005 version.

Westinghouse Response for Revision 1:

The Flux Symmetry Test noted in ANSI/ANS-19.6.1-2005 and earlier versions is applicable for traditional Westinghouse reactor plants with moveable detector instrumentation systems. These systems can perform a flux map in MODE 2, where the fixed detector systems in use in the CE, B&W, and AP1000 plant designs require MODE 1 conditions (~15% RTP). It is because of the instrumentation differences that the Flux Symmetry Test is not included in the list of tests for the MODE 2 physics tests exception, 3.1.8, for the AP1000.

Design Control Document (DCD) Revision:

See attached markup of Revision 17 of the DCD for Revision 0 of this response.

PRA Revision:

None

Technical Report (TR) Revision:

None

BASES

BACKGROUND (continued)

Worth Measurement (DRWM), moves each bank, individually, into the core to determine its worth. The bank is dynamically inserted into the core while data is acquired from the excore channel. While the bank is being withdrawn, the data is analyzed to determine the worth of the bank. This is repeated for each control and shutdown bank. Performance of this test will violate LCO 3.1.4, "Rod Group Alignment Limits," LCO 3.1.5, "Shutdown Bank Insertion Limit," or LCO 3.1.6, "Control Bank Insertion Limits."

c. The ITC Test measures the ITC of the reactor. This test is performed at HZP. The method is to vary the RCS temperature in a slow and continuous manner. The reactivity change is measured with a reactivity computer as a function of the temperature change. The ITC is the slope of the reactivity versus the temperature plot. The test is repeated by reversing the direction of the temperature change and the final ITC is the average of the two calculated ITCs. Performance of this test could violate LCO 3.4.2, "RCS Minimum Temperature for Criticality."

APPLICABLE SAFETY ANALYSES

The fuel is protected by LCOs that preserve the initial conditions of the core assumed during the safety analyses. The methods for development of the LCOs that are excepted by this LCO are described in the Westinghouse Reload Safety Evaluation Methodology report (Ref. 5). The above mentioned PHYSICS TESTS, and other tests that may be required to calibrate nuclear instrumentation or to diagnose operational problems, may require the operating control or process variables to deviate from their LCO limitations.

Chapter 14 defines requirements for initial testing of the facility, including low power PHYSICS TESTS. Sections 14.2.10.2 and 14.2.10.3 (Ref. 6) summarize the initial criticality and low power tests.

Requirements for reload fuel cycle PHYSICS TESTS are defined in ANSI/ANS-19.6.1 ~~1985~~ 2005 (Ref. 4). Although these PHYSICS TESTS are generally accomplished within the limits for the LCOs, conditions may occur when one or more LCOs must be suspended to make completion of PHYSICS TESTS possible or practical. This is acceptable as long as the fuel design criteria are not violated. When one or more of the requirements specified in:

LCO 3.1.3 "Moderator Temperature Coefficient (MTC),"
LCO 3.1.4 "Rod Group Alignment Limits,"
LCO 3.1.5 "Shutdown Bank Insertion Limit,"

BASES

SURVEILLANCE REQUIREMENTS (continued)

Using the ITC accounts for Doppler reactivity in this calculation because the reactor is subcritical, and the fuel temperature will be changing at the same rate as the RCS.

The Frequency of 24 hours is based on the generally slow change in required boron concentration and on the low probability of an accident occurring without the required SDM.

REFERENCES

1. 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."
2. 10 CFR 50.59, "Changes, Tests and Experiments."
3. Regulatory Guide 1.68, Revision 2, "Initial Test Programs for Water-Cooled Nuclear Power Plants," August 1978.
4. ANSI/ANS-19.6.1-~~1997~~2005, "Reload Startup Physics Tests for Pressurized Water Reactors," American National Standards Institute, ~~August 22, 1997~~November 29, 2005.
5. WCAP-9273-NP-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.
6. Chapter 14, "Initial Testing Program."
7. WCAP-11618, including Addendum 1, April 1989.