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Your ref: Docket No. 52-006
Our ref: DCP/NRC2288

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Subject: AP1000 Responses to Requests for Additional Information (SRP16)

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

Responses are provided for RAI-SRP16-CTSB-01,-14,-32,-40 and -52 as sent in emails from S. K. Mitra to Sam Adams dated August 18, 2008 and September 24, 2008, respectively. These responses complete nineteen of seventy-five requests received to date for SRP Section 16. Responses for RAI-SRP16-CTSB-07 and -26 and for RAI-SRP16-CTSB-46,-50,-56, and -65 were submitted under letter DCP/NRC2282 dated October 27, 2008. Responses for RAI-SRP16-CTSB-03,-04,-15,-16,-19,-21,-41, and -75 were submitted under letter DCP/NRC2277 dated October 17, 2008.

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,

A handwritten signature in black ink, appearing to read 'Robert Sisk', written over a white background.

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

/Enclosure

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

cc: D. Jaffe - U.S. NRC 1E
E. McKenna - U.S. NRC 1E
S. Mitra - U.S. NRC 1E
P. Ray - TVA 1E
P. Hastings - Duke Power 1E
R. Kitchen - Progress Energy 1E
A. Monroe - SCANA 1E
J. Wilkinson - Florida Power & Light 1E
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E. Schmiech - Westinghouse 1E
G. Zinke - NuStart/Entergy 1E
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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-01
Revision: 0

Question:

TS Section 1.1, Definitions, Shutdown Margin.

Related TS Sections requiring review;

TS Section 3.1.4, Rod Group Alignment Limits, and associated Bases;

TS Section 3.1.5, Shutdown Bank Insertion Limits, and associated Bases;

TS Section 3.1.6, Control Bank Insertion Limits, and associated Bases.

Clarify the role of Gray Rod Control Assemblies (GRCAs).

GRCAs are mentioned in the TS and associated Bases, yet their role is not adequately explained. In TS Section 1.1, Definitions, Shutdown Margin, the GRCAs are mentioned in paragraph c, by stating, "In MODES 3, 4, and 5, the worth of fully inserted GRCAs will be included in the SDM calculation." The implication is that in MODES 1 and 2 the GRCAs worth is not included; the treatment of GRCAs in the SDM calculation should be explicit.

Westinghouse Response:

In MODES 2 with $k_{eff} < 1.0$, 3, 4 and 5 SHUTDOWN MARGIN calculations subsequent to startup physics testing will include the calculated worth of the inserted GRCAs, with appropriate uncertainties, providing that the total measured GRCA rod worth is confirmed to meet the physics testing acceptance criteria (Reference 1).

Therefore, the following revision of Tech Spec SHUTDOWN MARGIN Definition paragraph c is required:

- c. In MODE 2 with $k_{eff} < 1.0$, and MODES 3, 4, 5, the worth of fully inserted GRCAs will be included in the SDM calculation.

In MODES 1 and 2 with $k_{eff} \geq 1.0$, the OPDMS will provide continuous surveillance of compliance with SDM requirements of LCO 3.2.5. The calculated worth available from GRCAs is conservatively excluded from this surveillance of SDM (reference 1) in that they are assumed to not move on reactor trip. See response to RAI-SRP 16-CTSB-18 for more information on the OPDMS calculation performed for continuous surveillance monitoring of SDM.

Reference:

1. Westinghouse Topical Report, WCAP-16943-P. "Enhanced GRCA Rodlet Design," M.E. Conner, M.J. Hone, et al, June 2008 (approval pending).

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Design Control Document (DCD) Revision:

A markup of the affected DCD Revision 17 page is attached.

PRA Revision:

None

Technical Report (TR) Revision:

None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Definitions

1.1

1.1 Definitions

SHUTDOWN MARGIN (continued)

However, with all RCCAs verified fully inserted by two independent means, it is not necessary to account for a stuck RCCA in the SDM calculation. With any RCCAs not capable of being fully inserted, the reactivity worth of these assemblies must be accounted for in the determination of SDM; and

- b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the nominal zero power design level.
- c. In MODE 2 with $k_{eff} < 1.0$, and MODES 3, 4, and 5, the worth of fully inserted Gray Rod Cluster Assemblies (GRCAs) will be included in the SDM calculation.

STAGGERED TEST BASIS

A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during n Surveillance Frequency intervals, where n is the total number of systems, subsystems, channels, or other designated components in the associated function.

THERMAL POWER

THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

TRIP ACTUATING DEVICE OPERATIONAL TEST (TADOT)

A TADOT shall consist of operating the trip actuating device and verifying the OPERABILITY of all devices in the channel required for trip actuating device OPERABILITY. The TADOT shall include adjustment, as necessary, of the trip actuating device so that it actuates at the required setpoint within the required accuracy. The TADOT may be performed by means of any series of sequential, overlapping, or total channel steps.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP16-CTSB-14
Revision: 0

Question:

B3.6.5 Containment Air Temperature

Clarify the Bases regarding the containment vessel design temperature. In the Bases, on page B 3.6.5-2 in the APPLICABLE SAFETY ANALYSIS section, it states that the containment vessel design temperature is 300 degrees Fahrenheit and that containment vessel temperature remains below 300 degrees Fahrenheit for DBAs. However, in the FSAR Chapter 6, Table 6.2.1.1-1 three of the four DBAs listed have peak temperatures (416.5, 373.9, and 375.3 degrees) that exceed 300 degrees. Clarify this discrepancy regarding containment vessel design temperature for accuracy between the Bases and FSAR.

Westinghouse Response:

The temperatures listed in Table 6.2.1.1-1 are for the temperature of the containment atmosphere, not of the containment vessel. The 300°F temperature is the design temperature for the containment vessel, not the atmosphere.

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP16-CTSB-32
Revision: 0

Question:

TS 3.7.6 Main Control Room Habitability System.

Demonstrate that generic safety issues identified in the NRC Generic Letter 2003-01, Control Room Habitability, are addressed in the AP1000 DCD and in the AP1000 Generic Technical Specifications.

The adoption of the NRC approved TSTF-448, Control Room Habitability, Revision 3, if determined to be applicable, would be an acceptable option to resolve the above stated issues.

Westinghouse Response:

DCD Section 6.4.5.4, Main Control Room Envelope Habitability, was added in revision 16 to address Generic Letter 2003-01. This new section specifies requirements for periodic testing of the main control room envelope habitability during VES operation in accordance with ASTM E741, as recommended by the Generic Letter.

The existing LCO 3.7.6 requirements for VES operability include the integrity of the MCR pressure boundary. If the ASTM E741 inleakage test fails, then an evaluation must be performed to determine if the failure represents a loss of MCR pressure boundary integrity. If there is a loss of integrity, then entry into LCO 3.7.6, Condition C is required.

The ASTM E741 periodic testing commitment specified in DCD Section 6.4.5.4 in combination with the existing LCO 3.7.6 requirements are considered to adequately address the NRC Generic Letter 2003-01 issues and to provide requirements equivalent to those approved by TSTF-448.

No Technical Specification changes are needed.

Design Control Document (DCD) Revision:

None

PRA Revision:

None

Technical Report (TR) Revision:

None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP16-CTSB-40
Revision: 0

Question:

TS 1.1 Definition (EDITORIAL)

Spell out the acronym GRCA in the definition for SHUTDOWN MARGIN, para. (c).

The acronym is not spelled out here and it is the first use of the acronym in the Technical Specifications. Upon the first reference in each Specification or Bases to a phrase for which an abbreviation is desired to be used, use the full phrase followed by the acronym or initialism set off by parentheses. Use the abbreviation alone on all subsequent references in that Specification or Bases.

Westinghouse Response:

Westinghouse will incorporate this change in the next revision to the DCD.

Design Control Document (DCD) Revision:

The DCD revision is shown in the response to RAI-SRP16-CTSB-01.

PRA Revision:

None

Technical Report (TR) Revision:

None



AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP16-CTSB-52
Revision: 0

Question:

TS 3.3.3 Post Accident Monitoring

Resolve the apparently conflicting bases for the required minimum number of core exit thermocouples per core quadrant, as described in Note (b) of Table 3.3.3-1 and B 3.3.3 for the core exit temperature function, and in DCD Table 7.5-1, Sheet 2. In addition, provide a specific reference to the appropriate supporting technical evaluation described in the text of B 3.3.3.

Note (b) of Table 3.3.3-1 states that the minimum requirement is two OPERABLE thermocouples in each of the two divisions, and that a channel consists of two thermocouples within a single division. The text on page B 3.3.3-5 stipulates in part that, based on evaluations (not presented or referenced in B 3.3.3), adequate detection of inadequate core cooling is assured with two valid core exit thermocouples per quadrant. However, DCD Table 7.5-1, Sheet 2, "Post-Accident Monitoring System," identifies that three instruments per quadrant are required.

Westinghouse Response:

Table 7.5-1 Sheet 2 of the AP1000 DCD will be revised to reflect the minimum number of core exit thermocouples as described in Table 3.3.3-1 and section B 3.3.3 of the AP1000 Technical Specifications.

To determine that two core exit thermocouples per quadrant per train are sufficient for AP1000, Westinghouse compared the AP1000 reactor design to those of current operating plants. The AP1000 core is a 157 fuel assembly core using the Westinghouse 17x17 fuel assembly, similar to many three-loop plants of the existing operating fleet. Allowable core peaking factors are similar to operating units and core loading patterns are anticipated to be similar to those in operating plants. Therefore, Westinghouse determined that two core exit thermocouples per quadrant per division, the same as required in operating plants, are sufficient to detect inadequate core cooling.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Design Control Document (DCD) Revision:

7. Instrumentation and Controls

AP1000 Design Control Document

Table 7.5-1 (Sheet 2 of 12)

POST-ACCIDENT MONITORING SYSTEM

Variable	Range/ Status	Type/ Category	Qualification		Number of Instruments Required	Power Supply	QDPS Indication (Note 2)	Remarks
			Environmental	Seismic				
Core exit temperature	200- 2300°F	B1, C1, F2	Harsh	Yes	3 quadrants 2 quadrant per Division	IE	Yes	
PRHR HX inlet temperature	50- 650°F	D3	None	None	1	Non-IE	No	Primary indication is RCS Ea
PRHR HX outlet temperature	50- 500°F	B1, D2	Harsh	Yes	1	IE	Yes	Diverse variable to PRHR flow
PRHR flow	700- 3000 gpm	B1, D2, F2	Harsh	Yes	2	IE	Yes	Diverse measure- ment: PRHR outlet temperature
IRWST water level	0-100% of spm	B1, D2, F2	Harsh	Yes	3 (Note 4)	IE	Yes	
RCS subcooling (Note 6)	200°F Sub- cooling to 35°F super heat	B1, F2	Harsh	Yes	2	IE	Yes	Diverse measure- ment: Core exit temperature & wide range RCS pressure
Passive containment cooling water flow	0-150 gpm	B1, D2	Mild	Yes	1 (Note 1)	IE	Yes	
PCS storage tank water level	5-100% of tank height	B1, D2	Mild	Yes	2	IE	Yes	Diverse measure- ment: PCS flow
IRWST surface temperature	50- 300°F	D3	None	None	1	Non-IE	No	
IRWST bottom temperature	50- 300°F	D3	None	None	1	Non-IE	No	
Steam line pressure	0-1200 psig	F2	Harsh/ Mild (Note 8)	Yes	1/steam generator (Note 11)	IE	No	

Tier 2 Material

7.5-14

Revision 17

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

PRA Revision:

None

Technical Report (TR) Revision:

None