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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002542

June 30, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 15)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 15. 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-SRP15.0-SRSB-05

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,

John T. DeBlasio

Robert Sisk, Manager
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/Enclosure

1. Response to Request for Additional Information on SRP Section 15

D063
NRO

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ENCLOSURE 1

Response to Request for Additional Information on SRP Section 15

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP15.0-SRSB-05
Revision: 0

Question:

A footnote is added to Revision 17 to DCD Tables 15.0-4a and 15.0-4b, respectively, stating that the valve stroke times listed in these tables reflect the design basis of the AP1000; the applicable DCD Chapter 15 accidents were evaluated for the design basis valve stroke time with the results showing a small impact on the analysis, validating the conclusions; and the output provided for the analyses is representative of the transient phenomena.

(a) List the protection and safety monitoring system and equipment for which the Chapter 15 safety analyses were performed with the time delay assumptions different from the design basis values specified in Table 15.0-4a and 15.0-4. Provide comparisons of the design basis values and the safety analysis assumed values of the delay times.

(b) List the Chapter 15 events where the analyses were performed with the assumed delay times different from those listed in Tables 15.0-4a and 15.0-4b. For each of these events provide a comparison of the analysis results and the new results if the design basis valve stroke times are used.

Westinghouse Response:

(a) Table 1 provides a comparison of the differences in DCD Table 15.0-4a between Revisions 16 and 17. Only the two items provided are different from the design basis values in the safety analysis transients provided in Revision 17 of the DCD. The remaining changes to Table 15.0-4a reflect the analyses presented in Revision 17 of the DCD.

Table 2 provides a comparison of the valve stroke times used in the safety analysis transients provided in Revision 17 of the DCD, which are different from the current design basis values.

Table 1: Changes to Table 15.0-4a
Safety Analyses vs. Design Basis Values

Function	DCD Rev. 17 Safety Analysis	Design Basis
ADS Stage 1 actuation on core makeup tank low level signal (seconds for control valve to begin to open)	20	30
ADS Stage 4 actuation on core makeup tank (seconds for squib valve to begin to open)	30	2.0

Table 2: Changes to Table 15.0-4b
Valve Stroke Times
Safety Analyses vs. Design Basis Values

		Stroke time (seconds)	
Valve	Valve Tag #	DCD Rev. 17 Safety Analysis	Design Basis
ADS Stage 1 Control	APP-RCS-PL-V001A/B	30	40
ADS Stage 2 Control	APP-RCS-PL-V002A/B	80	100
ADS Stage 3 Control	APP-RCS-PL-V003A/B	80	100
ADS Stage 4 Control	APP-RCS-PL-V004A/B/C/D	2	2
CVS Makeup Isolation	APP-CVS-PL-V090	10	30
CVS Makeup Isolation	APP-CVS-PL-V091	10	30

For the events which utilize the equipment for which there are time value differences, only a small impact on the analysis exists, and the output provided for the analyses is representative of the transient phenomena and the conclusions remain valid.

(b) The Chapter 15 events where the analyses were performed with assumed delay times or valve stroke times different than those listed in DCD Tables 15.0-4a and 15.0-4b are the small break LOCA transient, the boron dilution event; the inadvertent CVS actuation event, the loss of normal feedwater event, and the inadvertent operation of the ADS event.

For the small break LOCA transient, the ADS stroke time and logic evaluated was previously provided in the response to RAI-SRP5.4.6-SRSB-01.

The response to RAI-SRP9.3.6-SRSB-01 provided information on the boron dilution event for the increase in the CVS makeup pump discharge isolation valves closure time.

The inadvertent CVS actuation event has been evaluated for potential impact as the increased CVS makeup isolation stroke time results in an increase in reactor coolant system (RCS) inventory. The inadvertent CVS actuation analysis used a 12-second valve closure for the CVS makeup isolation, which includes an assumed 2-second microprocessor delay. Adding 20 seconds to the valve closure time would add a maximum of 28.03 lbm/sec (the flow rate assumed in the analysis) for 20 seconds or 560.6 lbm. Assuming a density of 40.5 lbm/ft^3, which is based on a conservatively low pressure of 1800 psia and a conservatively high temperature of 620°F, this would result in a maximum increase in volume of less than 15 ft^3. This is less than the margin available in the DCD case analysis (51.21 ft^3 based on 2197.01 ft^3 - 2145.8 ft^3); therefore, it can be accommodated in the analysis without changing the conclusions of the DCD.

The Loss of Normal Feedwater event has been evaluated for the potential impact as the increased CVS makeup isolation stroke time will result in an increase in RCS inventory. The Loss of Normal Feedwater analysis models a 12-second valve closure for the CVS makeup isolation, which includes an assumed 2-second microprocessor delay. Adding 20 seconds to the valve closure time would add a maximum of 28.03 lbm/sec (the maximum flow rate for all pressures assumed in the analysis) for 20 seconds or 560.6 lbm. Assuming a density of 40.5 lbm/ft^3, which is based on a conservatively low pressure of 1800 psia and a conservatively high temperature of 620°F, this would result in a maximum increase in volume of less than 15 ft^3. This is less than 1% of the total pressurizer volume and can be accommodated in the analysis without changing the conclusions of the DCD.

The only non-LOCA event potentially impacted by a change in the valve stroke times is the Inadvertent Operation of the ADS event; all other non-LOCA events do not model the ADS valves. The Inadvertent Operation of the ADS event currently models a 25-second stroke time. An increase in the ADS valve stroke time would result in essentially the same results for the event as the current analysis, since the ADS valves are not yet fully open at the time of minimum DNBR; therefore, the existing DCD analysis remains bounding.

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None