



Westinghouse Electric Company
Nuclear Power Plants
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

Direct tel: 412-374-6206
Direct fax: 724-940-8505
e-mail: sisk1rb@westinghouse.com

Your ref: Docket No. 52-006
Our ref: DCP_NRC_002984

July 29, 2010

Subject: AP1000 Response to Request for Additional Information (SRP 23)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 23. 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-DCP-CN08-ICE-02
RAI-DCP-CN60-ICE-02
RAI-DCP-CN63-ICE-01
RAI-DCP-CN64-ICE-01
RAI-DCP-CN65-ICE-01

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 Strategy

/Enclosure

1. Response to Request for Additional Information on SRP Section 23

DOB3
NRO

cc:	D. Jaffe	- U.S. NRC	1E
	E. McKenna	- U.S. NRC	1E
	B. Anderson	- U.S. NRC	1E
	M. Wentzel	- U.S. NRC	1E
	T. Spink	- TVA	1E
	P. Hastings	- Duke Power	1E
	R. Kitchen	- Progress Energy	1E
	A. Monroe	- SCANA	1E
	P. Jacobs	- Florida Power & Light	1E
	C. Pierce	- Southern Company	1E
	E. Schmiech	- Westinghouse	1E
	G. Zinke	- NuStart/Entergy	1E
	R. Grumbir	- NuStart	1E
	S. Ritterbusch	- Westinghouse	1E

ENCLOSURE 1

Response to Request for Additional Information on SRP Section 23

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-DCP-CN08-ICE-02

Revision: 0

Question:

Provide clarification for the time delay inconsistency between the design change description and marked-up figures. Also, justify the need for a 5 second time delay between the firing of the two In-containment Refueling Water Storage Tank (IRWST) injection squib valves.

10 CFR 52.47(a)(2) requires that an application must contain a sufficient description and analysis of the structures, systems, and components of the facility, with emphasis upon performance requirements, the bases, with technical justification therefore, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished. The description shall be sufficient to permit understanding of the system designs and their relationship to the safety evaluation. The design information provided for the design basis items, taken alone and in combination, should have one and only one interpretation. The applicant is requested to provide clarification and/or justification for the following two observations:

1. In the description of Design Change Package (DCP) 8, a 5-second time delay was analyzed to be needed between the firing of the 1st and 2nd squib valves for both IRWST injection squib valves and containment sump recirculation squib valves, but the staff found that the newly added note on the markups for AP1000 Design Control Document (DCD) Tier 2, Figure 7.2-1 (sheet 16 of 20) and Figure 7.2-1 (sheet 20 of 20) allow different time delays to fire the squib valves. The original figures do not show any delay for the firing of the above squib valves. Provide clarification for the inconsistency between the design change description and marked-up figures.
2. In addition, Figure 6.3-3 in AP1000 DCD, Tier 2, shows the two containment sump recirculation squib valves are in a parallel configuration, but the two IRWST injection squib valves are shown as one used and as a bypass for the other, but they are not indicated in a parallel configuration. Provide clarification for the need of a 5-second time delay between the firing of these two IRWST injection squib valves.

Westinghouse Response:

1. The 5 second time delay is required to prevent a negative structural impact on the supporting bracket from induced vibrations if both squib valves are fired simultaneously. The firing of one of the commonly mounted explosive valve followed by a five seconds time delay will have no negative impact on operation. The test data obtained from the current vendor verify this fact (for comparison the time for the impulse force from the squib valve actuation to the piston striking the bottom of the valve is less than 0.02 seconds). Therefore, when using the current vendor's

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

analysis, all above mentioned commonly mounted squib valves will have a 5 second time delay. The design change poses the conditions for an improved protection of the safety function of the IRWST injection and containment recirculation, by avoiding potential adverse consequences connected to the simultaneous firing of squib valves physically housed on the same structural frame module.

The notes added allow for different time delays to be included, to cover different possible specific characteristics and/or squib valves actuation forces, which may be different in future application, being dependent on squib valves test data received by a different vendor.

2. The design configuration for the containment screen suction to the squib valves for the A train is physically different from the B train. The A train uses two 8" suction lines to a common 8" header thus providing a parallel path. The B train uses a single 10" suction line to a common 8" header thus providing a bypass, which is considered parallel vs. series. The design configuration for IRWST Injection A train is identical to the B train. Each train has a main common 8" suction line and two 8" isolation paths considered parallel paths by design not series, to a common 8" header. The configurations of all four trains (Containment Sump Recirculation A/B and IRWST A/B) squib valve isolations paths are identical. Each couple of squib valves paths is designed for single train isolation. The paths are connected by the same ganged pipe supports, the same mechanical module and they supply to the downstream common header. The increase of loads produced by the coupled relationship of the simultaneous firing of squib valves isolating a single train would generate negative structural impacts in each Containment Sump Recirculation A/B and IRWST A/B train. Therefore the both IRWST trains A and B squib valves and both Containment Sump Recirculation trains A and B squib valves will have a 5 second actuation time delay.

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-DCP-CN60-ICE-02
Revision: 0

Question:

Regarding CN 60, clarify if there is any additional logic involved in the newly added reactor trip signal from the inadvertent PRHR actuation since the cross-references do not appear to match on the two marked-up figures.

10 CFR 52.47(a)(2) requires in part, that the description shall be sufficient to permit understanding of the system designs and their relationship to the safety evaluation. The design information provided for the design basis items, taken alone and in combination, should have one and only one interpretation.

The markup for AP1000 DCD, Tier 2, Figure 7.2-1 (sheet 2 of 20) shows the newly added "PRHR [Passive Residual Heat Removal] Actuation from Nuclear Overpower Trips (**APP PMS J1 104**)". However, the markup for AP1000 DCD, Tier 2, Figure 7.2-1 (sheet 4 of 20) shows that the newly added cross-reference from inadvertent PRHR actuation goes to "Reactor Trip (**APP PMS J1 102**)."

Westinghouse Response:

The "cross reference" was inadvertently omitted from the DCD mark-up of 7.2-1 (sheet 2 of 20). Where the words in red that read "PRHR Actuation" are written in, there should be the reference document, "(APP-PMS-J1-104)" directly following. In accordance with 10 CFR 52.47(a)(2), this will point the reader to the DCD mark-up of 7.2-1 (sheet 4 of 20), where the PRHR position indication trip is depicted. Corrected sheet below:

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

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-DCP-CN63-ICE-01
Revision: 0

Question:

Regarding CN63, provide justification for adding another time delay for open PRHR discharge valves.

10 CFR 52.47(a)(2) requires in part, that the description shall be sufficient to permit understanding of the system designs and their relationship to the safety evaluation. The design information provided for the design basis items, taken alone and in combination, should have one and only one interpretation. The markup for AP1000 DCD, Tier 2, Figure 7.2-1 (sheet 19 of 20), added a time delay to open PRHR discharge valves. The new time delay was not mentioned in CN63.

Westinghouse Response:

The DAS employs system-level control for automatic logic. Timers have been provided in the functional design to support sequencing of the output field devices associated with a system-level control function. The cited time delay was added as part of the change that added the Reactor and Turbine Trip generated from High Hot Leg Temperature. This delay timer was added to be consistent with the use of timers in the existing functional design (e.g., Low Steam Generator Water Level logic).

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-DCP-CN64-ICE-01
Revision: 0

Question:

Regarding CN64, justify the changes in the environmental qualification of the containment pressure sensors. Also, identify which Category 1 Post Accident Monitoring System (PAMS) transmitters are moved.

10 CFR 52.47(a)(2) requires that an application must contain a sufficient description and analysis of the structures, systems, and components of the facility, with emphasis upon performance requirements, the bases, with technical justification therefore, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished. The description shall be sufficient to permit understanding of the system designs and their relationship to the safety evaluation. The applicant is requested to provide clarifications or justifications for the following changes:

1. In the markup for AP1000 DCD, Tier 1, Table 2.2.2-1, for CN64, the applicant changed the qualification for harsh environment from "Yes" to "No" for the 7 containment pressure sensors. This change is not justified because the containment pressure sensors are still inside containment, even though the transmitters are moved outside containment.
2. In CN64, eighteen Category 1 PAMS transmitters are relocated above the maximum DBA flood level. The CN does not clearly list which eighteen Category 1 PAMS transmitters are moved.

Westinghouse Response:

1. In preparing the table markup, the environment for the transmitter, rather than the remote mechanical sensor, was reflected. The sensor is located in containment and will be qualified for a harsh environment and should be listed as such in the ITAAC table. See attached Table 2.2.2-1 for the restoration of the harsh environment qualification as referenced in DCD Rev. 17.
2. The eighteen transmitters to be relocated are shown below:

APP-PXS-JE-LT045 – IRWST Wide Range Level Transmitter A
APP-PXS-JE-LT046 – IRWST Wide Range Level Transmitter B
APP-PXS-JE-LT047 – IRWST Wide Range Level Transmitter C
APP-PXS-JE-LT048 – IRWST Wide Range Level Transmitter D

APP-PXS-JE-FT049A – PRHR HX Flow Measurement A

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

APP-PXS-JE-FT049B – PRHR HX Flow Measurement B

APP-RCS-JE-PT140A - RCS Wide Range Pressure Transmitter A
APP-RCS-JE-PT140B - RCS Wide Range Pressure Transmitter B
APP-RCS-JE-PT140C - RCS Wide Range Pressure Transmitter C
APP-RCS-JE-PT140D - RCS Wide Range Pressure Transmitter D

APP-RCS-JE-PT191A - Pressurizer Pressure Transmitter A
APP-RCS-JE-PT191B - Pressurizer Pressure Transmitter B
APP-RCS-JE-PT191C - Pressurizer Pressure Transmitter C
APP-RCS-JE-PT191D - Pressurizer Pressure Transmitter D

APP-RCS-JE-LT195A – Pzr Level Transmitter A
APP-RCS-JE-LT195B – Pzr Level Transmitter B
APP-RCS-JE-LT195C – Pzr Level Transmitter C
APP-RCS-JE-LT195D – Pzr Level Transmitter D

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Design Control Document (DCD) Revision:

See "Table 2.2.2-1 (cont.)" attached below

PRA Revision:

None

Technical Report (TR) Revision:

None

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Table 2.2.2-1 (cont.)

Component Name	Tag No.	ASME Code Section III	Seismic Cat. I	Remotely Operated Valve	Class 1E/Qual. for Harsh Envir.	Safety-Related Display	Control PMS/DAS	Active Function	Loss of Motive Power Position
Containment Pressure Sensor	PCS-005	No	Yes	-	Yes/Yes	Yes	-	-	-
Containment Pressure Sensor	PCS-006	No	Yes	-	Yes/Yes	Yes	-	-	-
Containment Pressure Sensor	PCS-007	No	Yes	-	Yes/Yes	Yes	-	-	-
Containment Pressure Sensor	PCS-008	No	Yes	-	Yes/Yes	Yes	-	-	-
PCCWST Water Level Sensor	PCS-010	No	Yes	-	Yes/No	Yes	-	-	-
PCCWST Water Level Sensor	PCS-011	No	Yes	-	Yes/No	Yes	-	-	-
High-range Containment Pressure Sensor	PCS-012	No	Yes	-	Yes/Yes	Yes	-	-	-
High-range Containment Pressure Sensor	PCS-013	No	Yes	-	Yes/Yes	Yes	-	-	-
High-range Containment Pressure Sensor	PCS-014	No	Yes	-	Yes/Yes	Yes	-	-	-

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-DCP-CN65-ICE-01

Revision: 0

Question:

Regarding CN65, clarify if there is any additional logic involved in the newly added CVS isolation logic from the "High Steam Generator Water Level (Narrow Range) Coincident with P-4 Reactor Trip" as the cross-references do not match on the two marked up figures.

10 CFR 52.47(a)(2) requires in part, that the description shall be sufficient to permit understanding of the system designs and their relationship to the safety evaluation. The design information provided for the design basis items, taken alone and in combination, should have one and only one interpretation. In the markup for AP1000 DCD, Tier 2, Figure 7.2-1 (Sheet 6 of 20), the cross-reference for the newly added "High Steam Generator Water Level (Narrow Range) Coincident with P-4 Reactor Trip" is from cross-reference APP-PMS-J1-110 to cause CVS isolation valves to be closed. However, in the markup for AP1000 DCD, Tier 2, Figure 7.2-1 (Sheet 10 of 20), the newly signal created for "CVS Isolation" goes to cross-reference APP-PMS-J1-105.

Westinghouse Response:

The cross reference for the newly created signal for "CVS Isolation" in AP1000 DCD, Tier 2, Figure 7.2-1 (Sheet 10 of 20) (i.e., APP-PMS-J1-106) has not changed as a result of CN65. If this cross reference appears to end in a number 5, that is only due to poor resolution of the transmitted CN65. Higher resolution figures impacted by CN65 are attached..

Design Control Document (DCD) Revision:

None

PRA Revision:

None

Technical Report (TR) Revision:

None