



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: 412-374-5005
e-mail: sisk1rb@westinghouse.com

Your ref: Docket No. 52-006
Our ref: DCP_NRC_002521

June 9, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 9)


Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 9. 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-SRP9.5.1-SFPB-01 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 9

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NRO

cc:	D. Jaffe	- U.S. NRC	1E
	E. McKenna	- U.S. NRC	1E
	P. Buckberg	- 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
	P. Loza	- Westinghouse	1E

ENCLOSURE 1

Response to Request for Additional Information on SRP Section 9

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP9.5.1-SFPB-01

Revision: 1

Question:

As noted in RG 1.189, Rev 1, the one-at-a-time assumption for spurious actuations may not adequately address the potential risk attributed to fire. As such, the AP1000 DCD should be revised in the next scheduled consistent with the following suggestions:

- In FSAR subsection 9A.2.7.1, replace "In addition, spurious actuations or signals resulting from the fire are postulated one at a time (except for high/low pressure interfaces)." with "In addition, multiple/simultaneous spurious actuations or signals resulting from the fire are postulated."
- In FSAR subsection 9A.3.7.1, replace "As discussed in subsection 9A.2.7.1, one spurious actuation or signal is postulated at a time (except for high-low pressure interfaces)." with "As discussed in subsection 9A.2.7.1, multiple/simultaneous spurious actuations or signals resulting from the fire are postulated."

Calculations/analyses addressing the consequences of multiple/simultaneous spurious actuations must demonstrate that the plant can achieve and maintain post-fire safe shutdown. The calculations/analyses should also be referenced in the DCD and be available for NRC staff review.

Additional Question: (Revision 1)

In the proposed DCD markup, include the revision number of the referenced APP-FPS-G1R-002 report (Reference 6).

Westinghouse Response: (Revision 0)

Westinghouse has performed an assessment to evaluate the effects of multiple spurious actuations. The assessment is documented in the "AP1000 Fire Induced Multiple Spurious Actuation Report" (Reference 1). The approach followed in the assessment is very similar to that described in SECY-08-0093 (Reference 2). The results of this assessment demonstrate that spurious actuations either do not occur, or the consequences are such that safe shutdown can still be achieved.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

The AP1000 Fire Induced Multiple Spurious Actuation Report will be added as a reference in the DCD as shown below. The document is available for NRC review.

Additional Response: (Revision 1)

The revision number of the referenced APP-FPS-G1R-002 report is included here and in the markup of DCD Section 9A.4, "References," Reference 6.

References:

1. APP-FPS-G1R-002, Revision 1, "AP1000 Fire Induced Multiple Spurious Actuation Report"
2. SECY-08-0093, "Resolution of Issues Related to Fire-Induced Circuit Failures"

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Design Control Document (DCD) Revision: (Revision 0 and Revision 1)

9A.2.7.1 Spurious Actuation of Equipment

Fire-caused damage is assumed to be capable of resulting in the following types of circuit faults: hot shorts, open circuits, and shorts to ground. Spurious actuation of components caused by these circuit faults are evaluated. Components are assumed to be energized or de-energized by one or more of the above circuit faults. For example, air operated and solenoid operated valves are assumed to fail open or closed; pumps are assumed to fail running or not running; electrical distribution breakers could fail open or closed. For three-phase ac circuits, the probability of getting a hot short on all three phases in the proper sequence to cause spurious operation of a motor is considered sufficiently low as to not require evaluation, except for cases involving high-low pressure interfaces. For ungrounded dc circuits, if spurious operation could only occur as a result of two ungrounded hot shorts of the proper polarity, then no further evaluation is necessary, except for any cases involving a high-low pressure interface. Therefore, spurious operation of ac or dc motor operated valves as a result of power cable hot shorts is not assumed, except for cases involving a high-low pressure interface.

It is assumed that a fire results in the loss of all automatic function (signals and logic) from the circuits located in the fire area. In addition, an assessment of multiple/simultaneous spurious actuations or signals resulting from the fire was performed (Reference 6) with the conclusion that spurious actuations either do not occur, or the consequences are such that safe shutdown can still be achieved. ~~spurious actuations or signals resulting from the fire are postulated one at a time (except for high/low pressure interfaces).~~ The spurious actuations and signals that are evaluated are those that could cause a breach in the reactor coolant boundary or defeat safety-related decay heat removal capability or cause an increase in shutdown reactivity of the reactor.

9A.3.7 Special Topics

9A.3.7.1 Evaluation of Spurious Actuation

The potential for spurious actuation of equipment as a result of fire damage to electrical circuits is considered for each fire area containing safety-related equipment. As discussed in subsection 9A.2.7.1, an assessment of multiple/simultaneous spurious actuations or signals resulting from the fire was performed (Reference 6) with the conclusion that spurious actuations either do not occur, or the consequences are such that safe shutdown can still be achieved. ~~one spurious actuation or signal is postulated at a time (except for high-low pressure interfaces).~~ Principal spurious actuation are discussed below. In no case does the spurious actuation of equipment prevent safe shutdown.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

9A.4 References

1. NUREG-0800, U. S. Nuclear Regulatory Commission Standard Review Plan, Section 9.5.1, "Fire Protection Program," Revision 3, July 1981, including Branch Technical Position (BTP) CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," Revision 2, July 1981.
2. Fire Protection Handbook, Edited by A. E. Cote, National Fire Protection Association, 16th edition.
3. NRC Generic Letter 81-12, February 20, 1981.
4. NFPA 92A-2000, "Recommended Practice for Smoke Control Systems."
5. Fire Protection Handbook, National Fire Protection Association, 18th edition.
6. APP-FPS-G1R-002, Revision 1, "AP1000 Fire Induced Multiple Spurious Actuation Report"

PRA Revision: None

Technical Report (TR) Revision: None