Westinghouse

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_002710

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Subject: AP1000 Response to Request for Additional Information (SRP 19)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 19. 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):

OI-SRP19.0-SPLA-07 R1
RAI-SRP19.0-SPLA-18 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 19

D063
NRO

cc:	D. Jaffe	-	U.S. NRC	1E
	E. McKenna	-	U.S. NRC	1E
	S. Sanders	-	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
	T. Ray	-	Westinghouse	1E

ENCLOSURE 1

Response to Request for Additional Information on SRP Section 19

AP1000 DCD SER Open Item REVIEW

Open Item Resolution

OI Response Number: OI-SRP19.0-SPLA-07
Revision: 1

Question:

The staff is looking for more information related to Westinghouse's response to RAI-SRP19.0-SPLA-07.

Implementation of corrective action post audit, resolving and requantifying the corrected model as well as revising TR102 and making associated changes to the DCD consistent with COL/DC-ISG-3.

(Email Chris Procter to Thom Ray, 2/5/09, "Preliminary draft list of Chapter 19 Open Items")

Westinghouse Response:

TR-102 will be revised to include results of the requantified PRA as discussed in RAI-SRP19.0-SPLA-07. If the CDF and LRF values are still represented by the results reported in Revision 8 of the AP1000 PRA Report, the DCD will not be changed at that time. If the new results are not represented by the Revision 8 PRA, the DCD will be modified as appropriate.

The PRA requantification described above and in SRP19.0-SPLA-07 will be completed by late October 2009.

Additional Westinghouse Response based on PRA requantification (Revision 1):

As was previously discussed in RAI-SRP19.0-SPLA-07, Rev. 1, the model has been revised to reflect component specific common cause beta factors for the PMS and PLS system components that are modeled in the PRA. One of the modeling issues that was addressed as a result of top cutset review for the modified model is the modeling of manual DAS as a means of opening squib valves V-118A and V-118B. Credit for this action is taken in the PRA documentation (Reference 1). The AP1000 PRA model did not include manual DAS actuation of V-118A and V-118B. Additionally, the initiating event frequency for the spurious automatic depressurization system (IEV-SPADS) has been updated to reflect the new instrumentation and control (I&C) modeling.

Results of the quantification (PRA AP1000R3B) (Reference 2) are summarized in the table below which compares these results to those documented in the AP1000 PRA chapters (Reference 1). The RAW value for CCF of the CIMs from this quantification remains >250 (975), again indicating the safety significance of these components.

Open Item Resolution

Results	APP-GW-GL-022 Revision 8	PRA AP1000R3B
CDF	-	-
At Power CDF (events/year)	2.41E-07	2.13E-07
RTNSS Sensitivity CDF (events/year)	2.12E-06	2.10E-06
LRF	-	-
At Power LRF (events/year)	1.95E-08	1.86E-08

It should be noted that the requantification of the at power PRA indicate that the at power CDF and LRF values and top cutsets closely compare with these items documented in the DCD PRA, APP-GW-GL-022, Rev. 8 (Reference 1).

The DCD PRA content in Chapter 19 and the associated appendices was reviewed for content changes necessary as a result of the modeling changes discussed in this OI for the internal event at power quantification and to be included in Rev. 1 of TR102. No content changes to the DCD are required as the DCD content for the internal event at power quantification is representative.

References:

1. APP-GW-GL-022, Rev. 8, "AP1000 Probabilistic Risk Assessment"

2. APP-PRA-GSC-236, Rev. 1, "AP1000 PRA Quantification"

Design Control Document (DCD) Revision: None.

PRA Revision: None

Technical Report (TR) Revision:

The PRA model changes discussed in this Open Item Response are included in Rev. 1 of TR102.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP19.0-SPLA-18
Revision: 1

Question:

The staff evaluated the analysis of the AP1000 response to external events according to the SRP, which states that the applicant's analyses should be comprehensive in scope, and address all applicable...external events and all plant operating modes. The applicant's analysis is documented in TR101 and described in the DCD; however the applicant did not address the case of high winds while in MODE 5 and 6. This may be of particular concern when maintenance conditions increase the risk significance of active SSCs and external events increase the vulnerability of motive energy (electric power).

Please provide a basis for screening such scenarios from consideration, amending the design to address them, or otherwise controlling the associated risk.

Additional NRC Question for Rev 1:

The risk associated with high winds while in MODE 5 and MODE 6 can also be controlled by relying on operator actions associated with Investment Protection Short-Term Availability Controls (as defined in Section 16.3 of the AP1000 Design Control Document), Abnormal Operation, Emergency Operation, and/or Refueling and Outage Planning Procedures as required in Section 13.5.1 of the DCD. The NRC has requested that the risk actions to address this issue be addressed in the DCD. The response should address actions to be taken to reduce risk associated with high winds when the refueling cavity is not full and PRHR HXs are not available (e.g., when the RCS is open to the containment).

Westinghouse Response:

High wind events, including tornados and hurricanes, at the plant site are assumed to cause a loss of offsite power (LOSP) because the plant switchyard is not designed to withstand high winds. The degree to which these high wind events affect plant safety (in terms of core damage) is influenced by the ability of various plant systems and equipment to remain operational following a high wind event. Although the Standby Diesel Generators (DG) are non-safety grade, they are designed and installed to robust standards that increase the probability of their being available following unusual events such as high winds. The structures housing the standby DGs and the DG main fuel supply tanks are constructed in accordance with the Uniform Building Code (UBC) which provides a level of confidence that these structures will maintain their integrity for the majority of storms (lower intensity). The fuel transfer pipes (main storage tanks to the DG day tanks) are underground and would be unaffected by high winds. Similarly, the structures housing non-safety systems (Chemical and Volume Control System,

Normal Residual Heat Removal System, SFW, Diverse Actuation System) are also constructed per the UBC and should not fail as a consequence of the majority of high wind events.

The Shutdown PRA documented in the AP1000 PRA Report includes calculations of core damage frequency (CDF) for LOSP events considering both "drained' and "non-drained" Reactor Coolant System (RCS) conditions. The CDF is somewhat higher for the drained events because the reactor is provided with the least amount of redundancy for core cooling during cold shutdown mid-loop conditions. With the reactor at cold shutdown mid-loop conditions, the reactor is shutdown (rods inserted), the Reactor Coolant Pumps are stopped and Reactor Coolant System (RCS) cooling is provided by the Normal Residual Heat Removal System (RNS). In this case the RCS is assumed to be in a reduced inventory condition with the water level in the Hot Leg (HL). In mid-loop operation, with the RCS drained and the pressure boundary open, core cooling is provided by gravity injection from the In-containment Refueling Water Storage Tank (IRWST). The containment is closed except for the personnel air locks which may be open, but must be capable of being closed prior to any boiling of the coolant. The Technical Specifications (LCO 3.4.13) require the Automatic Depressurization System (ADS) Stage 1/2/3 to be open when in mid-loop operations.

Recognizing the increased vulnerability to risk with the plant in the "drained" condition, emergency response requirements or Emergency Action Levels (EALs) will require that the RCS be taken out of, or not enter into mid-loop operation mode in anticipation of a potentially severe high wind event. The risk associated with high winds while in MODE 5 and MODE 6 can also be controlled by relying on operator actions associated with Investment Protection Short-Term Availability Controls (as defined in Section 16.3 of the AP1000 Design Control Document), Abnormal Operation, Emergency Operation, and/or Refueling and Outage Planning Procedures as required in Section 13.5.1 of the DCD.

In the event that the diesel generators are not available, the RNS is not available. As a result, the RCS temperature will increase and the RCS water may start to boil depending on decay heat load and ability to restore power to the diesel generators. When the hot leg water level drops to a low level, the IRWST MOV isolation valves and ADS stage 4 valves are opened through the Protection and Safety Monitoring System (PMS) or Diverse Actuation System (DAS). In conjunction with the open ADS Stage 1, 2, 3 valves, this provides for effective RCS makeup and venting. The steam generated in the RCS will leave via the ADS valves into the IRWST where it is condensed.

In MODE 5 and MODE 6, the IRWST, with one injection flow path and one containment recirculation flow path, is required to be maintained OPERABLE per LCO's 3.5.7 and 3.5.8 so maintenance cannot be performed on those trains while in those modes. Therefore, adequate core cooling is maintained in MODE 5 and MODE 6 with the RNS system but there is enough redundancy in the system and through operator actions to maintain that same core cooling in MODE 5 and MODE 6 if the diesel generators are not available.

Additional Response: (Revision 1)

This question is the same as has been accepted by Westinghouse as RAI-SRP19.0-SPLA-23. The resolution to this RAI also resolves RAI-SRP19.0-SPLA-23.

See attached mark-up of PRA-Based Insight Table 19.59-18 (Sheet 12 of 25).

Design Control Document (DCD) Revision: ~~None~~

Revise Table 19.59-18 as follows:

Table 19.59-18 (Sheet 12 of 25)

AP1000 PRA-BASED INSIGHTS

	Insight	Disposition
6. (cont.)		
	Interfacing system loss-of-coolant accident (LOCA) between the RNS and the RCS is prevented by: - Each RNS line is isolated by at least three valves. - The RNS equipment outside containment is capable of withstanding the operating pressure of the RCS. - The RCS isolation valves are interlocked to prevent their opening at RCS pressures above its design pressure.	5.4.7.2.2
	CCS provides cooling to the RNS heat exchanger.	Tier 1 Information
	Planned maintenance affecting the RNS cooling function and its support systems CCS and SWS should be performed in modes 1, 2, and 3, when the RNS is not normally operating.	16.3
	Recognizing the increased vulnerability to risk with the plant in a "drained" condition, when the refueling cavity is not full and PRHR HXs are not available, entry into this condition and time spent in this condition during anticipation of a potentially severe high wind event will be minimized	13.5
7.	The component cooling water system (CCS) is a nonsafety-related system that removes heat from various components and transfers the heat to the service water system.	Tier 1 Information

Table 19.59-18 (Sheet 12 of 25)

AP1000 PRA-BASED INSIGHTS

Insight	Disposition
The CCS has redundant pumps and heat exchanger.	Tier 1 Information
During normal operation, one CCS pump is operating. The standby pump is aligned to automatically start in case of a failure of the operating CCS pump.	9.2.2.4.2
The CCS pumps are automatically loaded on the standby diesel generator in the event of a loss of normal ac power. The CCS, therefore, continues to provide cooling of required components if normal ac power is lost.	9.2.2.4.5.4

PRA Revision: None

Technical Report (TR) Revision: None