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_002644

October 2, 2009

Subject: AP1000 Response to Request for Additional Information (SRP 18)

Westinghouse is submitting a response to the NRC request for additional information (RAI) on SRP Section 18. 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-SRP18-COLP-22

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 18

D063
NRO

cc:	D. Jaffe	-	U.S. NRC	1E
	E. McKenna	-	U.S. NRC	1E
	P. Donnelly	-	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
	B. Seelman	-	Westinghouse	1E

ENCLOSURE 1

Response to Request for Additional Information on SRP Section 18

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-SRP18-COLP-22
Revision: 0

Question:

The ISV Plan did not address all of the commitments for ISV made in the *Programmatic Level Description of the AP1000 Human Factors Verification and Validation Plan* (WCAP-15860, Rev 2) dated Oct 2003. In some cases the ISV Plan takes exceptions to these commitments. Some examples follow:

1. Technical Support Center (TSC): WCAP-15860 calls for the V&V scope to include the TSC, but it is out of scope per the ISV.

2. Risk Important Human Actions (RIHAs): WCAP-15860, Sec. 4.4 calls for ISV of risk-important tasks. The RIHAs and tasks are identified in TR-59/WCAP-16555. Section 3.2 identifies 22 post-accident RIHAs in Table 3.2-2. The ISV includes essentially all of these 22 RI HAs in scenarios. However, it is not clear why the HA #19 was excluded.

3. Risk Important Maintenance, Test, and Inspection Human Actions (RIMTIS Has): WCAP-15860, Section 4.5 calls for risk-important MTIS tasks. Section 3.3 of TR-59/WCAP-16555 is titled Risk Important Human Actions for MTIS and has two tables that identify many RI MTIS activities. However, the ISV Plan does not appear address these. It seems like they could all be addressed by one ISV scenario where the plant is at a normal full power operating status and the operators validate each of the RI MTIS interfaces while maintaining a normal operating status.

4. Validation of All EOPs: WCAP-15860, Sec. 4 states that the validation of EOPs is explicitly included in ISV. The ISV Plan does include many EOPs in the scenarios, but it states in Sec. 5.1.2 "Not all EOPs will be individually exercised in ISV scenarios." If that is the case, then how will these missing EOPs be validated?

5. Beyond Design Basis Scenarios: WCAP-15860, Sec. 4.4 states that ISV will include beyond design-basis-accident scenarios. At least one scenario that goes to core damage should be included, so that actions leading up to core damage to prevent core damage can be more fully evaluated. Additionally, the capability to support post-CD actions can be assessed.

6. Reactor Trip Scenario: WCAP-15860 indicates that a reactor trip transient (as opposed to an accident scenario) event will be included, but the ISV Plan does not appear to include one.

7. Validation of HRA Assumptions: WCAP-15860, Sec. 4.6 states that ISV will include validation of key HRA modeling assumptions for RIHAs. Section 30 of the PRA describes the modeling of RIHAs, which includes the 'time window' 'estimated actual

time' and 'slack time.' There is no discussion in the ISV about how HRA modeling assumptions are addressed. The ISV does appropriately verify that the RIHAs can be performed within the time window. However, documentation of actual times during the scenarios and then feeding that information back to the HRA to see that assumptions were correct and that recovery and HEPs were appropriately treated seems to be missing.

8. Participant Experience: WCAP-15860, Sec. 4.9, Subjects, states that "steps will be taken to identify and select test subjects from crews with less experience or unexceptional performance." This does not appear to be addressed in the ISV.

9. Adequacy of Staffing: WCAP-15860, Sec. 4.3 and 4.4 calls for evaluation of the adequacy of staffing. It is not clear from the ISV how this will be done.

10. Selection of Crews: Section 4 of the ISV Plan indicates that crews will come from at least three different utilities. The utilities will assign "typical crews" based on availability and that crews will not be selected based on individual characteristics. However, no information is provided to address how utilities will select crews or what instruction Westinghouse will provide to utilities to prevent sample bias.

Conformance to WCAP-15860 is part of COL item and ITAAC commitments. Please address the general issue of conformance to WCAP-15860, as well as the specific issues noted above.

Westinghouse Response:

WEC agrees that any discrepancies between the commitments stated in WCAP-15860 (Reference 1) and the ISV Plan need to be addressed. It should be noted that WCAP 15860 was issued in 2003, and since that time the OCS and HFE design has progressed. Therefore, some minor adjustments may be justifiable or inevitable, although it is confirmed that the AP1000 HFE V&V will conform to the intent of WCAP 15860, and any discrepancies will be resolved.

1. Technical Support Center (TSC): It is confirmed that WCAP-15860 identified the TSC as within V&V scope. However, the V&V associated with the TSC is part of the design verification scope (see WCAP-15860, Section 3, Reference 1, and APP-OCS-GEH-120, "AP1000 Human Factors Engineering Design Verification Plan", Reference 2). Also, note that the extent of the HFE design verification will be limited to the design aspects of the TSC that are within the scope of Westinghouse.

2. Risk Important Human Actions (RIHAs): A scenario to address RIHA #19 (RHN-MAN04, Failure to recognize the need and failure to isolate the RNS system given rupture of the

RNS piping when the plant is at hot/cold conditions) will be included in Revision C of the ISV Plan, to be issued by January 31, 2010.

3. Maintenance, Test, Inspection and Surveillance (MTIS) Tasks for Risk-important Structures, Systems, and Components (SSCs): A subset of the "Representative MTIS Activities for Risk-Significant Components" (WCAP-16555, Section 3.3, Reference 3) will be included in a number of the scenarios in ISV. Other MTIS activities in Table 3.3-1 and Table 3.3-2 will be incorporated as scenario complications.

   Any MTIS activities in WCAP-16555, Section 3.3, which can not be reasonably incorporated into an ISV scenario will be subject to HFE analysis by another means. This may include assessment against HFE design guidelines, task walkthrough, maintenance trails utilizing manufactured equipment or part of the HFE design verification at plant startup (Reference 4), as appropriate.

   The MTIS activities that will be addressed in ISV will be identified during the detailed scenario description development being completed for Revision C of the ISV Plan (to be issued by January 31, 2010). Once this process is complete, WEC will determine the appropriate means to ensure that any remaining MTIS activities are adequately assessed to confirm human factors acceptability.

4. Validation of All EOPs: All EOPs are validated by the AP1000 Operations Procedures Group prior to issue for use as numeric revisions. The ISV scenarios are designed to ensure that a representative subset of the EOPs are exercised and validated in ISV.

   The ISV scenarios will ensure that all functional operator knowledge, skills and abilities addressed in the AP1000 EOPs are examined and validated in ISV. While the ISV scenarios may not explicitly cause the operators to enter each of functional recovery procedures, the demand to perform similar EOP steps will be represented in other scenarios. All major action categories identified in all AP1000 EOPs will be validated in ISV.

   Additionally, the AP1000 Operations Procedure group performs multiple walk-through validations of the AP1000 EOPs prior to ISV. These walk-throughs will exercise all major EOP action categories, validating the procedure steps and mitigation strategies. Insights and comments identified during these walk-throughs will be reflected in subsequent numeric revisions of the EOPs, and will be reviewed by Builder's Group operations personnel prior to ISV. These walk-throughs are ongoing and have been scheduled so that the applicable simulator models will be available to provide the fidelity and dynamic feedback necessary to evaluate the EOPs. This ensures that the findings from the walk-throughs are valid, and that the EOPs will be ready for use in ISV.

5. Beyond Design Basis Scenarios: It can be confirmed that a number of beyond design basis scenarios will be incorporated into ISV. However, it should be noted that the AP1000 passive safety features make core damage highly improbable in Modes 1 through 5; even assuming multiple equipment failures and operator errors. Also, the simulator will not model core damage.

   Actions taken in response to core damage have a long time scale and are addressed by Severe Accident Management Guidelines. The traditional training approach to address such extreme situations is by walk-throughs and scripted role play. Therefore, such substitute measures will be used in ISV to assess the events leading to core damage (for example, violating safety limits or technical specifications) and the actions in response to core damage. The details of this scenario will be provided in Revision C of the ISV Plan, to be issued by January 31, 2010

6. Reactor Trip Scenario: A number of the ISV scenarios include a reactor trip. WEC will include an uncomplicated reactor trip in one of the scenarios in Revision C of the ISV Plan, to be issued by January 31, 2010.

7. Validation of HRA Assumptions: The validation of key HRA modeling assumptions for Risk Important Human Actions will be explicitly included in the ISV Plan. Exceeding the time window is deemed to be a trial failure, and will result in the generation of a Priority 1 Human Engineering Discrepancy (HED). The details of the time windows from Chapter 30 of the PRA (Reference 5) will be included in the scenario descriptions in Revision C of the ISV Plan, to be issued by January 31, 2010.

8. Participant Experience: A future revision of the ISV Plan (i.e., after Rev. C) will include further details on the selection and identification of subjects; including qualifications and experience. WEC confirms that the selection of subjects will be in accordance with the information provided in WCAP-15860, Section 4.9. However, please note that due to the ongoing development of the utility schedules for operator training (and hence the availability of utility crews), further details can not be provided at this time.

9. Adequacy of Staffing: WEC confirms that staffing levels and roles will be addressed as stated in WCAP-15860 Section 4.3 and 4.4. In particular, staffing aspects will be explicitly included in respect to the scenarios containing risk-important human actions. Guidance to address staffing issues will also be included in observer guides. Details will be included in Revision C of the ISV Plan, to be issued by January 31, 2010.

10. Selection of Crews: A future revision of the ISV Plan (i.e., after Rev. C) will include further details on the selection of crews. WEC confirms that the selection of subjects will be in accordance with the information provided in WCAP-15860. However, please note that due to the ongoing development of the utility schedules for operator training (and hence the availability of utility crews), further details can not be provided at this time.

References:

1. APP-OCS-GEH-020 (WCAP-15860), Rev. 2, "Programmatic Level Description of the AP1000 Human Factors Verification and Validation Plan," Westinghouse Electric Company LLC.

2. APP-OCS-GEH-120, "AP1000 Human Factors Engineering Design Verification Plan", Westinghouse Electric Company LLC.

3. APP-GW-GL-011 (WCAP-16555), Rev. 0, "AP1000 Identification of Critical Human Actions and Risk Important Tasks," Westinghouse Electric Company LLC.

4. APP-OCS-GEH-520, "AP1000 Plant Startup Human Factors Engineering Design Verification Plan," Westinghouse Electric Company LLC.

5. APP-GW-GL-022, Chapter 30, Rev. 0, "AP1000 Probabilistic Risk Assessment," Westinghouse Electric Company LLC.

Design Control Document (DCD) Revision:

None.

PRA Revision:

None.

Technical Report (TR) Revision:

None.