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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002628

September 21, 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-19
RAI-SRP18-COLP-24

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
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/Enclosure

1. Response to Request for Additional Information on SRP Section 18

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NRO

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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-19
Revision: 0

Question:

Related to Section 9.4, Criterion 2 of NUREG-0711, Revision 2:

> An analysis should be conducted to determine the impact of providing CBPs and to specify where such an approach would improve procedure utilization and reduce operating crew errors related to procedure use. The justifiable use of CBPs over paper procedures should be documented. An analysis of alternatives in the event of loss of CBPs should be performed and documented.

The staff issued an RAI to the applicant requesting the analysis of alternatives to CBPs, in the event that a loss of CBPs should occur. In RAI-SRP18-COLP-14, Westinghouse stated that it would conduct this analysis as part of the second OSA, described in Section 2.1 of APP OCS J1R 210.

Subsequent to this RAI, the staff reviewed APP-OCS-J1R-210, Rev. 1. In the OSA-2 results report document, the loss of CBPs was identified as Task 24. This task, to transition from CBPs to paper procedures, is given six action steps that are described in Scenario 16. Also, in this section of OSA-2 Westinghouse described how the loss of CBPs task would be supported by the current design. The estimated times and upper limit times for the operator action steps described in Scenario 16 were detailed in Appendix B, Section B.22, of the report.

The staff had multiple concerns with regard to OSA-2, Task 24:

a. Westinghouse states that the analysis is addressed by the worst case scenario, where the operators will rely on a printed report to identify the step and continuous actions in affect at the time.

   - It is not clear if the scenario means that at the exact time of the loss of CBPs the corresponding procedure is able to be printed out, and that this printed report is what is used in the transition.
   - It is not clear to the staff the criteria Westinghouse used to justify the "worst case scenario."

b. In the Transition stage, Westinghouse states that the CPS is able to print status reports at the end of each procedure step. It further states that, "In case of a CPS failure, operators have sufficient information about what procedures and steps they have completed and where they currently are in the procedure process while utilizing the CPS."

- Clarification is not provided for the timing of the printouts. For instance, are the procedure steps printed out at regular intervals, every 5 minutes or every procedure step?

- If at the time of the loss of the CPS the operators are unable to print out the current step, how would the operators handle this situation? Also, it is plausible that if the system prints out the procedures steps every 5 minutes that the operators could be at a step in between prints at the time of the loss of the CPS. It is unclear how Westinghouse would address this issue.

- In some instances multiple procedures may be in use at one time, will printouts be available for each procedure being used?

General staff concerns to the loss of CBPs:

c. Please clarify how the timing estimates were achieved for Scenario 16's tasks.

d. Please clarify why there is no formal procedure associated with the loss of CBPs.

e. Please clarify how will the operators be trained for the loss of CBPs?

Westinghouse Response:

The response to each point is provided below:

Response to NRC Concern Item a:

- CPS has the capability to print out a status report at the end of each step. This is stated in Table 3.2-1 of the OSA-2 results report (APP-OCS-J1R-220). CPS will print a report following the completion of every step, and this printout is automatically generated (ie. it does not require to be requested by the operator). In addition, the printer is located within the main control area (MCA). The report contains the details of the step; including the status of the step upon its completion, the status of the parameters and components associated with the step and details of any continuous actions that are in effect. Therefore, in the event of a CPS failure, a printed report is readily available to assist the operators reconstruct their actions and assist in the transition to paper-based procedures.

- For the purpose of the OSA-2 analysis, the worst case scenario is defined as scenario in which every plausible step is involved, and this therefore results in the longest task time. For the task of responding to the failure of CPS, the worst case scenario is that after a

loss of CPS the operators have to rely on the printed report to reconstruct their actions. Consequently, three more steps are involved when using the printed report rather than going directly to the paper copy (i.e. Step 2.1 Obtain CPS printed reports, Step 2.2 Identify step in effect and Step 2.3 Identify continuous actions in effect). Typically, the operators should remember the last step they were executing and any continuous actions required by the procedures. Therefore, operators do not necessarily need to use the printed report; instead they can go directly to bookshelf in the MCA and obtain a pre-printed paper copy of the procedure(s) that they require. Furthermore, operator training will include executing scenarios without CPS so that they will be prepared for the eventuality of losing CPS.

Response to NRC Concern Item b:

- As explained in point a above, a status report is printed out upon completion of every procedure step. There is no interval or delay.

- See above. Also, in the event that the printer had failed prior to the failure of CPS, the printout may either be re-direct to another printer in the MCA or MCR, or they may directly select the correct paper copy and continue the appropriate operations/steps based on their training and knowledge of where they were in the procedure.

- Yes it can be confirmed; CPS printouts will be available for each procedure being used if multiple procedures are in use at one time.

Response to NRC Concern Item c:

The operator task time estimates for the task of responding to the loss of CPS were obtained by following the same method for the other tasks analyzed in OSA-2. The method to derive the times is described in Section 2.2.2 of the OSA-2 results report. In summary, each operator action was assigned to a generic action category, as listed in Table 2.2-1 'Generic Actions and Estimated Operator Performance Times'. The task times were based upon engineering and operator judgment plus data obtained from the analysis of operator performance in which operators utilized the AP1000 control room development facility and HSI resources in simulated scenarios (See APP-OCS-TR2-030, AP1000 Human Factors Engineering Test Phase 3 Report). Each generic action category has an estimated average performance time and an estimated upper-limit performance time, and these were used to estimate operator average task time and operator upper-limit task time for each task sequence.

Response to NRC Concern Item d:

It can be confirmed that the formal procedure for the loss of CPS is contained in Abnormal Operating Procedure AOP-321, 'Malfunction of DDS" (APP-GW-GJP-321). This procedure includes direction on responding to the loss of CPS.

Response to NRC Concern Item e:

Operators will be trained for the scenario involving the loss of CPS via the implementation of Abnormal Operating Procedure AOP-321, "Malfunction of DDS" (APP-GW-GJP-321). To ensure that the operators will be prepared for the eventuality of losing CPS, the operators' training will include running other concurrent scenarios where CPS fails in the middle of an event. In addition, all of the classroom training will be carried out using the paper version of the procedures. To ensure reliable operator performance, the operators will be trained to be proficient using both CPS and paper procedures. Furthermore, the Integrated System Validation exercise will contain a scenario that includes the loss of CPS. This analysis will ensure that good operator performance can be attained during scenarios involving the loss of CPS.

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-SRP18-COLP-24
Revision: 0

Question:

The ISV Plan does not address simulator verification beyond software testing identified in Section 2.3. Please add this information to the ISV Plan.

Westinghouse Response:

The objective of simulator testing in preparation for ISV is to demonstrate that the simulator responds in a manner similar to the reference unit while utilizing the operating procedures. The testing will be carried out in four phases and will take a total of 22 calendar weeks, with WEC personnel working double shifts. The details of the four phases of simulator testing are provided below. This information will be added to the ISV Plan Rev C to be issued by January 31, 2010. Note that the detailed list of simulator test is based on the current information regarding the ISV scenarios. This list may alter once the final detailed scenario descriptions are complete.

PHASE 1

In Phase 1, simulator stabilization and a series of 24 dedicated tests will be performed. Details of these tests can be found in the table at the end of this RAI Response. At the end of Phase 1, approximately 4 calendar weeks are allowed to fix any identified problems and retest as necessary.

PHASE 2

Phase 2 will comprise a repetition of the Phase 1 tests, but without the simulator stabilization process. The Phase 2 testing will take a total of 19.5 shifts, or 2 weeks in duration. At the end of Phase 2, approximately 2 calendar weeks are allowed to fix any identified problems and retest as necessary.

PHASE 3

Phase 3 will put into effect the ISV scenarios as described in the ISV Plan. Six of the scenarios will take 10 shifts to test, and the remaining twenty scenarios will each take half a shift. Therefore, the twenty-six scenarios will take a total of 20 shifts or 2 calendar weeks to test. At the end of Phase 3, approximately 4 calendar weeks are allowed to fix any identified problems and retest as necessary. Note, that if the total number of scenarios was to change, the amount of required testing will be adjusted accordingly.

PHASE 4

Phase 4 will repeat the tests of Phase 3, and therefore will take 2 calendar weeks. At the end of Phase 4, approximately 2 calendar weeks are allowed to fix any identified problems and retest as necessary.

Table of Phase 1 Tests

TEST PROCEDURE TITLE	TIME REQUIRED
Simulator Stabilization	160 hours
AP1000 Simulator 100% Power Steady-State Accuracy Test Procedure	8 hours
AP1000 Simulator Normal Operations Test Procedures: • Normal Operation at 100% Power General Operating Test Procedure • Plant Shutdown from Mode 1 to Mode 3 Test Procedure • Plant Cooldown From Mode 3 to Cold Shutdown Test Procedure • Plant Cooldown From Mode 5 to Refueling Mode Test Procedure • Plant Heatup from Refueling Configuration to Mode 5 Test Procedure • Plant Heatup from Mode 5 to Mode 4 • Plant Heatup from Mode 4 to Mode 3 Test Procedure • Plant Startup from Mode 3 to 2% Power Test Procedure • Plant Power Escalation From 2% to 100% Power Test Procedure	80 hours
AP1000 PXS06 - IRWST to Containment Leak Malfunction Test Procedure	3 hours
AP1000 Simulator Component Failure Test Procedure	24 hours
AP1000 Simulator Loss of all Feedwater w/ATWS Scenario Test Procedure	8 hours
AP1000 Simulator SGS03 - Steamline Break Downstream of MSIVs Malfunction Test Procedure	3 hours
AP1000 Simulator RCS07 - Cold Leg LOCA Malfunction Test Procedure	3 hours
AP1000 Simulator RXS01 - Core Fuel Leak Malfunction Test Procedure	3 hours
AP1000 Simulator RCS17 - Steam Generator Tube Leak/Rupture High in Tube Bundle Malfunction Test Procedure	3 hours
AP1000 Simulator WLS02 – Effluent Holdup Tank Leak Malfunction Test Procedure	3 hours
AP1000 Simulator ECS01 - Station Blackout Malfunction Test Procedure	3 hours
AP1000 Simulator CCS06 - Aux Building Header Leaks Malfunction Test Procedure	3 hours
AP1000 Simulator SGS01 - Steamline Break Inside Containment Malfunction Test Procedure	3 hours

TEST PROCEDURE TITLE	TIME REQUIRED
AP1000 Simulator CAS01 - CAS Instrument Air Line Break D/S MT01A/B Malfunction Test Procedure	3 hours
AP1000 Simulator RCS03 - Reactor Coolant Pump Shaft Break Malfunction Test Procedure	3 hours
AP1000 Simulator SWS02 - SWS Discharge Line Break Malfunction Test Procedure	3 hours
TOTAL HOURS	316 hours
TOTAL SHIFTS	39.5 shifts
Calendar Weeks	4 weeks

References:

None.

Design Control Document (DCD) Revision:

None.

PRA Revision:

None.

Technical Report (TR) Revision:

None.