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Your ref: Project Number 740
Our ref: DCP/NRC1966

July 27, 2007

Subject: AP1000 COL Response to Requests for Additional Information (TR #59)

In support of Combined License application pre-application activities, Westinghouse is submitting another response to NRC requests for additional information (RAI) on AP1000 Standard Combined License Technical Report 59, APP-GW-GLR-011, Rev. 0, Execution and Documentation of the Human Reliability Analysis/Human Factors Engineering Integration. This RAI response is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in the response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

The response is provided for request for additional information TR59-COLP-11. This is the final response for TR59. Responses to TR59-COLP-10 and TR59-COLP-12 were submitted on June 8, 2007 under transmittal letter DCP/NRC1927.

Pursuant to 10 CFR 50.30(b), the response to request for additional information on Technical Report 59 is submitted as Enclosure 1 under the attached Oath of Affirmation. The detailed request for additional information is included with the response in Enclosure 1.

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,

D. F. Hutchings for

A. Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

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D063

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NRO

/Attachment

1. "Oath of Affirmation," dated July 27, 2007

/Enclosure

1. Response to Request for Additional Information on Technical Report No.59

cc:	D. Jaffe	-	U.S. NRC	1E	1A
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	G. Zinke	-	NuStart/Entergy	1E	1A
	T. Schulz	-	Westinghouse	1E	1A

ATTACHMENT 1

"Oath of Affirmation"

ATTACHMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	)
NuStart Bellefonte COL Project	)
NRC Project Number 740	)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

W. E. Cummins, being duly sworn, states that he is Vice President, Regulatory Affairs & Standardization, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.

W. E. Cummins
Vice President
Regulatory Affairs & Standardization

Subscribed and sworn to
before me this 27th day
of July 2007.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Patricia S. Aston, Notary Public
Murrysville Boro, Westmoreland County
My Commission Expires July 11, 2011
Member, Pennsylvania Association of Notaries

Patricia S. Aston
Notary Public

ENCLOSURE 1

Response to Request for Additional Information on Technical Report No. 59

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-TR59-COLP-011
Revision: 0

Question:

The response [to RAI-TR59-COLP-006] is unacceptable as it did not justify the limitation in scope that was identified in the RAI, for tasks that are covered in WCAP-16555.

The Implementation plan, WCAP-14651 in Section 1.1, Scope and Objective, states that the "Plan enables ...HFE design activities to address risk-important tasks..." The Plan is not limited to tasks having communication with the control room (CR) or those with an HSI. Section 2.2, Risk-Important Tasks, subsection on qualitative criteria for risk-important tasks, specifies 5 criteria used to identify risk-important tasks. None of these criteria limit the selection of tasks to the CR. Section 2.2, subsection on qualitative criteria for risk important MTIS states that risk-important MTIS are identified by examining risk-important SSCs. Again there is no limitation to the CR and certainly there is an expectation that most SSCs would be outside of the CR.

NUREG-0711 in Element 2 defines the overall scope of the HFE program to include local control stations (LCSs). Element 7, HRA, does not limit actions to the CR. And plant PRAs address many actions that are outside of the main control room, some of which are often risk-important. Some examples of risk important actions outside of the main control room with no HSI in the MCR in current plants are valve line-up errors, and manual containment venting. The related SSCs would likely be risk-important, and MTIS associated with them may also be important and need appropriate human factors attention.

Also, the W response to the RAI seems to imply that if "there is no HSI to verify and validate" there is no need to designate that activity as risk-important. An example, to show this is not always the case, is the Davis-Besse reactor vessel incident. The reactor vessel would be a risk-important SSC, and inspection of the vessel exterior would be an MTIS activity that seems worthy of appropriate planning at the design stage to address HF. This way accessibility can be assured and procedures and training provided to avoid the kinds of problems that occurred with reactor vessel leakage and corrosion. As another example, Class 1E battery chargers and inverters are on the AP1000 D-RAP Table and are in Table 3.3-1 but were eliminated, using this screening. It would seem that they should have appropriate HFE applied their instrumentation and procedures used for MTIS.

Please provide an updated response to the RAI.

Westinghouse Response:

We believe that the approach used in WCAP-16555 (in section 3.3) on MTIS is reasonable in that the reporting of HFE activities in other areas would be a duplication of other NRC requirements and review. Note that as discussed in the first example shown below (PRA risk important tasks outside MRC), the HRA evaluation did consider risk important operator actions even if they were performed outside the MCR.

The following discussion addresses the examples that were sited above.

PRA risk important tasks outside MCR – manual actions modeled in the PRA were reviewed in Section 3.2 of WCAP-16555. Table 3.2-2 identifies 22 manual actions that are risk important for the AP1000. Two of these actions are performed outside the MCR. All of these tasks will be included in the HFE.

Valve line up errors - The AP1000 is different in that its passive safety systems are greatly simplified in comparison with the active safety systems used in current plants. As a consequence, there are very few manual valves to lineup and those with PRA importance have been provided with MCR position indication. For example, the Passive Core Cooling System (PXS) has only three manual valves in its process flow paths and all three of them have MCR position indications. The Passive Containment Cooling System (PCS) has no manual valves in its process flow paths. As a result, all of the process valves in these PRA important passive safety systems have MCR position monitoring which will be subject to HFE review.

Manual containment venting - The AP1000 does have a manual containment vent capability. However this vent capability is not risk important and is not modeled in the PRA. The reason that containment venting is not risk important is based on improvements incorporated into the AP1000 design. These improvements include a:

- Very low core melt frequency due to use of simple, ac power independent passive systems.
- Very reliable passive containment cooling.
    - Simple, passive PCS with 2 fail safe air operated drain valves and 1 diverse motor operated drain valve. All of these valves are actuated by both the protection I&C system and the diverse actuation system.
    - If the PCS fails, air-only cooling provides at least 24 hours to align one of several alternate water supplies.
- Very reliable ADS to prevent high pressure core melts.
    - Six separate ADS stage 1/2/3 flow paths using motor operated valves of two different sizes powered by 1E batteries. Each valve is actuated by a PMS division and DAS.
    - Four separate ADS stage 4 flow paths using squib valves. Each of these valves is actuated by 2 PMS divisions and DAS, each with its own battery power supply.
- Very reliable In-Vessel Retention to prevent core concrete interaction. This passive feature relies on:
    - ADS valves to depressurize the RCS
    - Squib valves to drain the In-containment Refueling Water Storage Tank into containment (in case it was not injected into the RCS)
    - Passive containment cooling

Davis-Besse reactor vessel incident – The AP1000 reactor vessel integrity and inspectability has been improved compared with operating plants. This includes use of better material and construction as well as improved inspectability. Some of the specific features incorporated in the AP1000 to address the Davis-Besse incident include the elimination of the use of inconel 600 in the RCS pressure boundary welds and providing colder temperatures in the upper head (than Davis-Besse). Inspection ports and robotic cameras will provide improved inservice inspection (ISI) capability of the upper head. A detailed discussion of the AP1000 ISI features and capabilities for the reactor vessel including the upper head is provided in DCD section 5.2.4.

Note that the AP1000 design activity has a design for inspectability program which is discussed in DCD sections 5.2.4.2 (ASME Code Class 1 components) and 6.6.2 (ASME Code Class 2 and 3 components). As a result relief from ASME CODE, Section XI requirements should not be required for AP1000.

Class 1E battery chargers and inverters – During the development of the response to this RAI it was determined that these components do have some limited MCR interface. They have a trouble alarm. As a result, WCAP-16555, Table 3.3-1, will be modified to indicate that these components will not be screened out. The proposed change is shown in the attached markup of the table.

In addition to the above discussions, the AP1000 has made commitments for the Design Reliability Assurance Program (DCD section 17.4). One of those aspects is to include considerations for these components in the design phase (refer to DCD section 17.4.3).

Reference:

None

Design Control Document (DCD) Revision:
None

PRA Revision:
None

Technical Report (TR) Revision:
None

WCAP-16555, Table 3.3-1 Revision:

Table 3.3-1 – Risk Significant Components With Control Room Interfaces for MTIS

Component	Tag Number(s)	Type	CR Interface	D-RAP Table	Operator Activity	Plant MODE	Reference	Representative [Bounded by Component / Operator activity]
System: Class 1E DC Power and Uninterruptible Power System (IDS)								
19. Class 1E Batteries	IDSA-DB-1A/B	Battery	Yes	Yes	a. Verify terminal voltage	1,2,3,4,5,6	TS 3.8.1	Yes
	IDSB-DB-1A/B				b. Verify battery float current	1,2,3,4,5,6	TS 3.8.7	Yes
	IDSC-DB-1A/B				c. Verify pilot cell voltage	1,2,3,4,5,6	TS 3.8.7	Yes
	IDSD-DB-1A/B				d. Capacity test (8)			No
20. Class 1E Battery Chargers	IDSA-DC-1	Charger	~~No (1)~~**Yes**	Yes	**a. Verify voltage and current**	**1,2,3,4,5,6**	**IDS SSD**	**Yes**
	IDSB-DC-1							
	IDSC-DC-1							
	IDSD-DC-1							
21. Class 1E Inverters	IDSA-DU-1	Inverter	~~No (1)~~**Yes**	Yes	**a. Verify voltage and frequency**	**1,2,3,4,5,6**	**TS 3.8.4**	**Yes**
	IDSB-DU-1							
	IDSC-DU-1							
	IDSD-DU-1							
22. Class 1E ac and dc distribution	IDSA-DF-1	Misc	No (1)	Yes				
	IDSB-DF-1							
	IDSC-DF-1							
	IDSD-DF-1							
	IDSA-DK-1							
	IDSB-DK-1							
	IDSC-DK-1							
	IDSD-DK-1							
	IDSA-DD-1							
	IDSB-DD-1							
	IDSC-DD-1							
	IDSD-DD-1							
	IDSA-EA-1, 2							
	IDSB-EA-1, 2, 3							
	IDSC-EA-1, 2, 3							
	IDSD-EA-1, 2							