

November 22, 2006

Ms. Andrea Sterdis, Manager
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SUBJECT: WESTINGHOUSE AP1000 COMBINED LICENSE PRE-APPLICATION
TECHNICAL REPORT 59 - REQUEST FOR ADDITIONAL INFORMATION (TAC
NO. MD1435)

Dear Ms. Sterdis:

By letter dated April 6, 2006 (DCP/NRC1731), you submitted AP1000 Technical Report 59, "Execution and Documentation of the Human Reliability Analysis/Human Factors Engineering Integration," and WCAP-16555, "AP1000 Identification of Critical Human Actions and Risk Important Tasks," which provided information and documentation on the human reliability analysis and human factors engineering integration. This information is to be used to closeout combined license information item 18.7-1. The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the application and has determined that additional information is required. Our questions are provided in the Enclosure. We discussed these issues with your staff on November 2, 2006. Your staff indicated that you would attempt to provide your response by December 15, 2006.

Please contact me at (301) 415-1313, if you have any other questions on these issues.

Sincerely,

/RA/

Steven D. Bloom, Senior Project Manager
AP1000 Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Project No. 740

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

WESTINGHOUSE AP1000 DOCUMENT NO. APP-GW-GLR-011, REV 0

TECHNICAL REPORT 59 - EXECUTION AND DOCUMENTATION OF THE HUMAN

RELIABILITY ANALYSIS/HUMAN FACTORS ENGINEERING INTEGRATION

WCAP-16555 - AP1000 IDENTIFICATION OF CRITICAL HUMAN ACTIONS AND RISK

IMPORTANT TASKS

PROJECT NUMBER 740

TR59-1 Sections 2 through 5 of WCAP-14651, "Integration of Human Reliability Analysis with Human Factors Engineering Design Implementation Plan," Revision 2, describe the four major aspects of the plan:

1. Section 2 - Probabilistic Risk Assessment (PRA)/Human Reliability Analysis (HRA) Identification of Critical Human Actions and Risk-Important Tasks
2. Section 3 - Task Analyses for Critical Human Actions and Risk-Important Tasks
3. Section 4 - Re-Examination of Critical Human Actions and Risk-Important Tasks
4. Section 5 - Validation of HRA Performance Assumptions

Westinghouse report APP-GW-GLR-011 states that WCAP-16555, Rev. 0, provides information to close combined license (COL) information item 18.7-1. It also states that WCAP-16555 provides the results of an evaluation of the AP1000 PRA to identify critical human actions and risk important tasks. This evaluation by Westinghouse was performed to implement the initial steps of the HRA/human factors engineering (HFE) integration plan described in WCAP-14651. Closure of COL item 18.7-1 is based on completion of the methodology described in WCAP-14651. However, WCAP-16555 only addresses the information of Section 2 of the implementation plan. Sections 3, 4, and 5 are not addressed in the submittals. Please explain the basis for requesting closure of the full COL item.

TR59-2 WCAP-16555, Sec. 3.1, under PRA criteria, states that: Tables 3-1 and 3-2 show risk achievement worth / risk reduction worth (RAW/RRW) values; Table 3-1 shows the top 10 sequences for core damage frequency (CDF); and Table 3-2 shows the top 10 sequences for large release frequency (LRF). However, the tables do not present this information. Please provide the top 10 sequences for CDF and LRF as noted in Section 3.2, as they will provide the context for the risk important operator actions.

TR59-3 WCAP-16555, Section 3.2, provides a two column cross-reference between the various CDF and LRF criteria and the tables in Attachment A of the WCAP.

Information is not provided to address certain of the noted criteria, and the reasons are explained in footnotes. Footnote (1) states that fire CDFs were calculated for human actions (HAs) unique to the fire event, but not for other HAs. How were the other HAs included in the fire PRA? Also, footnote (1) justifies this approach by noting that the other HAs are in the baseline internal PRA and that fire PRA has a lower CDF, which will make the other HAs less important in the fire PRA. This is not always the case, as the human error probabilities may very well be different in the fire PRA and the sequences and cutsets, in which the HA appears, will likely be different in the fire PRA, leading to possibly-higher RAW values and also possibly-higher, resulting, CDF values. Please supplement Tables A-5 and A-6 to address this issue.

- TR59-4 WCAP-16555, Section 3.2, Footnotes 2, 3, 4, 5, & 6 all state that RAW/RRW importance values could not be calculated for certain HAs in the flooding, shutdown, and focused PRAs, but they do not explain why they cannot be calculated. Please provide this explanation. Reasons are then given to justify why not calculating these importance values is acceptable, but these are not consistent with the implementation plan. Please explain why this is acceptable. Also, the HRA/HFE integration plan specifies that the risk-important HAs will be defined using the RAW/RRW values. Please provide the necessary RAW/RRW values values and the resultant risk important HAs that result when an HA exceeds the threshold of the RAW/RRW
- TR59-5 WCAP-16555, Section 3.2.1, refers the reader to the AP600 PRA for HRA calculations for the HAs in question here in the AP1000 plant. Please explain why the AP1000 HRA is not used.
- TR59-6 WCAP-16555, Section 3.3, risk important HAs for maintenance, test, inspection, and surveillance (MTIS) provides a list of activities. Item 3 in the list notes that, "[t]he SSCs [Structures, Systems, and Components] in this table are reviewed to determine if they require any control room support for their MTIS activities. SSCs that do not require such support should be eliminated from further consideration." Item 4 in the list states, "[o]nly activities that require support from the control room are considered."
- This does not seem appropriate. WCAP-14651, the HRA/HFE implementation plan, on page 2-4 in the section on MTIS, does not give this restriction and generally states that, "[t]he set of MTIS tasks identified through the expert panel process are defined to be risk-important and examined in task analysis procedures, HSI (human-system interface) design, and V&V [verification and validation] activities." This implies that both control room and outside control room risk-important tasks can and should benefit from such added analysis. Please modify the scope or justify the more limited scope.
- TR59-7 WCAP-16555, Section 3.3, risk-important HAs for MTIS, provides a nine-step process for selection of the risk-important MTIS activities. Item 8.h of the list states, "[r]epresentative – indicates (yes/no) if the component MTIS activity is included in the "representative list." If no, then the component MTIS activity that

bounds it is listed.” Item 9 of the list states, “Table 3.3-2 lists the “representative” MTIS activities which are screened from Table 3.3-1.”

For the items with a “No” in Table 3.3-1, it is not clear which are the corresponding representative components in Table 3.3-2. Further, many of the risk important items, listed in Table 3.3-1 with a “No,” would seem to be able to benefit separately from the “...task analysis procedures, HSI design, and V&V activities” of WCAP-14651, beyond those of the representative component. For example, see component #3, chemical and volume control system letdown containment isolation valves, which has 3 “No” entries and one “Yes” entry. Please clarify how the results of the HFE processes that were executed for the representative MTIS activities will be applied to the similar MTIS activities that were screened out.

TR59-8 WCAP-16555, Table A-1, has basic event LPM-MAN02, Failure to recognize the need for depressurization during a medium loss-of-coolant accident, with a RAW value of 2.89, just below the acceptance criteria of 3.0. It also has a long procedure, high stress, and a 15 minute performance time with only 20 minutes available. These would seem to make this item fit the qualitative criteria for a risk-important item on page 2-4 of WCAP-14651. Please re-evaluate and elaborate on the rationale for your conclusion.

TR59-9 A few of the risk important basic events in Table 3.2-2 are somewhat generic, such as item 15, REC-MANDAS, “Failure to detect the need to perform an activity by using the cues provided by diverse actuation system, or the probability to perform an activity by using the controls that are DAS related.” Please explain how the required HFE activities could be performed for such a generic human action.

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