

June 4, 2003

Mr. W. E. Cummins, Director  
AP600 & AP1000 Projects  
Westinghouse Electric Company  
P.O. Box 355  
Pittsburgh, PA 15230-0355

Dear Mr. Cummins:

As you are aware, the U.S. Nuclear Regulatory Commission (NRC) staff is preparing the draft safety evaluation report (DSER) for the AP1000 design certification application submitted by Westinghouse Electric Company (Westinghouse) on March 28, 2002. The staff expects to issue the DSER in June, 2003. As of this date, the staff has identified seven potential open items for DSER Chapter 18, "Human Factors Engineering" which is enclosed for your information. Please note that the staff's review of the application will continue during preparation of the DSER, which may result in changes to the potential open items identified in the enclosure, or the addition of other open items.

Six of the potential open items in the enclosure are new issues. The other potential open item has the original request for additional information number for reference. If the staff cannot resolve the potential open items before the issuance of the DSER, the items will be issued as a DSER open items and be tracked with a corresponding open item numbers.

Previously, Westinghouse committed to provide responses to all identified open items within 9 weeks after the issuance of the DSER. The staff will be prepared to review your responses to the open items and have conference calls and meetings with your staff, as appropriate, after the DSER is issued. If Westinghouse chooses to address some or all of these open items before the issuance of the DSER, the staff may not have sufficient time to evaluate every response to the potential open items that Westinghouse submits to the NRC and make changes to the DSER before the scheduled DSER issuance in June, 2003.

Please contact one of the following members of the AP1000 project management team if you have any questions or comments concerning this matter: Mr. John Segala (Lead Project Manager) at (301) 415-1858 or [jps1@nrc.gov](mailto:jps1@nrc.gov), Mr. Joseph Colaccino at (301) 415-2752 or [jxc1@nrc.gov](mailto:jxc1@nrc.gov), or Ms. Joelle Starefos at (301) 415-8488 or [jls1@nrc.gov](mailto:jls1@nrc.gov).

Sincerely,

*/RA/*

James E. Lyons, Director  
New Reactor Licensing Project Office  
Office of Nuclear Reactor Regulation

Docket No. 52-006

Enclosure: As stated

cc: See next page

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**Westinghouse AP1000  
Draft Safety Evaluation Report  
Potential Open Items  
Chapter 18  
Human Factors Engineering**

**(1) Open Item Number: 18.3.3.1-1**

Original RAI(s): 620.044

Summary of Issue: Criterion 5, "Risk-important human actions", states that the OER should identify risk-important human actions that have been identified as different or where errors have occurred. The human actions should be identified as requiring special attention during the design process to lessen their probability. The applicant does not address this item in discussing developing the OER. Therefore, this is Open Item 18.3.3.1-1.

**(2) Open Item Number: 18.11.3.4-1**

Original RAI(s): None

Summary of Issue: Criterion 3, "HED Documentation", states that HEDs should be documented in terms of the HSI component involved and how the characteristics depart from a particular guideline.

Westinghouse described their general approach to human engineering discrepancy (HED) resolution in WCAP-15860. Section 5 of WCAP-15860 provides a commitment to develop a procedure to ensure that all issues documented in the HFE issue tracking system are verified to be completely addressed in the final HSI. However, the staff believes that further detail is needed related to the process the applicant will use to identify, analyze, prioritize, evaluate, document, and determine and evaluate design solutions, etc. for HEDs using the HED resolution review criteria in NUREG-0711 as a template. Therefore, this is Open Item 18.11.3.4-1.

**(3) Open Item Number: 18.11.3.5-1**

Original RAI(s): None

Summary of Issue: Criterion 3, "Plant Personnel", states that participants in validation tests should represent an unbiased sample; be representative of actual plant personnel; reflect characteristics of the population of plant personnel; include shift supervisors, reactor operators, shift technical advisors, etc., and minimum and normal crew configurations. In support of the AP1000 design, Westinghouse submitted WCAP-14396 (Revision 3), "Man-In-The-Loop Test Plan Description." Section 2.4.3, "Subjects," addresses

Enclosure

the composition of the “target user population,” the test subject population. While this WCAP addresses preliminary or “engineering” tests, rather than final or “validation” tests, with validation tests addressed by WCAP-15860, the test subject selection criteria are applicable to test subjects for both test types. The applicant should amplify/clarify or explain how validation tests address this NUREG-0711 item. Therefore, this is Open Item 18.11.3.5-1.

**(4) Open Item Number: 18.11.3.5-2**

Original RAI(s): None

Summary of Issue: Criterion 6, “Test Design”, states that tests used for V&V should address such characteristics as ensuring that important characteristics of scenarios are balanced across crews; detailed, clear, and objective procedures are available to conduct the tests; testing administration personnel are appropriately trained; participant training should be “high-fidelity,” and not focused on training to perform validation scenarios; level of training should result in performance that is at/near the level of performance expected of actual plant personnel; and pilot testing should be conducted to assess the adequacy of the test design before conducting integrated testing.

WCAP-15860, in combination with WCAP-14396 (Revision 3), “Man-In-The-Loop Test Plan Description,” Section 2.4, “General Test Plan,” address the aspects of this criterion. While WCAP-14396 (Revision 3) addresses preliminary or “engineering” tests, rather than final or “validation” tests, with validation tests addressed by WCAP-15860, elements of the general test plan should be applicable for both test types. The applicant should indicate the applicability of the general test plan to validation tests or provide further detail on this criterion in DCD Tier 2 Section 18.8.11 or in WCAP-15860. Therefore, this is Open Item 18.11.3.5-2.

**(5) Open Item Number: 18.11.3.5-3**

Original RAI(s): None

Summary of Issue: Criterion 7, “Data Analysis and Interpretation”, states that validation test data should be analyzed through a combination of quantitative and qualitative methods; for pass/fail performance measures, failed indicators must be resolved before the design can be validated; the degree of convergent validity should be evaluated; data analyses should be independently validated for correctness; inference from observed performance to estimated real-world performance should allow for margins of error (i.e., allow that actual performance may be more variable than observed test performance).

WCAP-15860, in combination with WCAP-14396 (Revision 3), "Man-In-The-Loop Test Plan Description," Section 2.4, "General Test Plan," address the aspects of this criterion. While WCAP-14396 (Revision 3) addresses preliminary or "engineering" tests, rather than final or "validation" tests, with validation tests addressed by WCAP-15860, elements of the general test plan should be applicable for both test types. The applicant should indicate the applicability of the general test plan (e.g., Section 2.4.2, "Measures and Analysis,") to validation tests or provide further detail on this criterion in DCD Tier 2 Section 18.8.11 or in WCAP-15860. Therefore, this is Open Item 18.11.3.5-3.

**(6) Open Item Number: 18.11.3.5-4**

Original RAI(s): None

Summary of Issue: Criterion 8, "Validation Conclusions", states that the statistical and logical bases for determining that performance of the integrated system is and will be acceptable should be clearly documented. Limitations of validation tests and their potential effects on validation conclusions should be clearly documented.

WCAP-15860, in combination with WCAP-14396 (Revision 3), "Man-In-The-Loop Test Plan Description," Section 2.4, "General Test Plan," address the aspects of this criterion. While WCAP-14396 (Revision 3) addresses preliminary or "engineering" tests, rather than final or "validation" tests, with validation tests addressed by WCAP-15860, elements of the general test plan (e.g., 2.4.6, "Use of Results," 2.4.8, "Documentation,") should be applicable for both test types. The applicant should indicate the applicability of the general test plan (e.g., DCD Tier 2 Section 2.4.2, "Measures and Analysis,") to validation tests or provide further detail on this criterion in DCD Tier 2, Section 18.8.11 or in WCAP-15860. Therefore, this is Open Item 18.11.3.5-4.

**(7) Open Item Number: 18.11.3.6-1**

Original RAI(s): None

Summary of Issue: For Section 18.11.3.6, "Human Engineering Discrepancy Resolution", Westinghouse described their general approach to human engineering discrepancy (HED) resolution in WCAP-15860. Section 5 of WCAP-15860 provides a commitment to develop a procedure to ensure that all issues documented in the HFE issue tracking system are verified to be completely addressed in the final HSI. However, the staff believes that further detail is needed related to the process the applicant will use to identify, analyze, prioritize, evaluate, document, and determine and evaluate design solutions, etc. for HEDs using, the HED resolution review criteria in NUREG-0711 as a template. Therefore, this is Open Item 18.11.3.6-1.

AP 1000

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