ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Tuesday, February 02, 2010 11:12 AM
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Cc: Keefe, Molly; Walker, Jacqwan; Marble, Julie; Junge, Michael; Steckel, James; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 336 (4016, 4043), FSAR Ch. 18
Attachments: RAI_336_COLP_4016-4043.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 5, 2009, and discussed with your staff on January 14, 2010. No changes were made to the draft RAI as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
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Hearing Identifier: AREVA_EPR_DC_RAIs
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Request for Additional Information No. 336 (4016, 4043), Revision 1

02/02/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 18 - Human Factors Engineering
Application Sections 18.5 and 18.8

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

18-71

Additional information is needed in the following two areas:

a. Criterion 1 of NUREG-0711 section 5 states that the scope of the review of the task analysis should include:

- Selected representative and important tasks from the areas of operations, maintenance, test, inspection and surveillance
- Full range of operating modes, including startup, normal operations, abnormal and emergency operations, transient conditions, and low-power and shutdown conditions
- HAs that have been found to affect plant risk by means of PRA importance and sensitivity analyses should also be considered risk-important. Internal and external initiating events and actions affecting the PRA level I and II analyses should be considered when identifying risk-important actions.
- Where critical functions are automated, the analyses should consider all human tasks including monitoring of the automated system and execution of backup actions if the system fails.

1. The implementation plan does not contain a list of which risk-important tasks will be analyzed, nor does it describe the MTIS activities which will be included in the task analysis. Without a description of how these activities will be included, the staff cannot make a safety determination. Please provide information as to how the MTIS activities will be included in the task analysis.
2. The applicant expands the minimum scope described in NUREG-0711 to include tasks identified as ‘problematic’ during OER and HRA. Staff requires more information on the definition of ‘problematic’ tasks.

b. Criterion 2 of NUREG-0711 Section 5 states: Tasks should be linked using a technique such as operational sequence diagrams. Task analyses should begin on a gross level and involve the development of detailed narrative descriptions of what personnel have to do. The analyses should define the nature of the input, process, and output needed by and of personnel.

This level of detail has not been included in the task analysis implementation plan. Please provide, at a minimum, a set of plant scenarios by name, (start-up, normal operations, LOCA, SGTR, etc.). In addition, for a sample of these named scenarios, provide the tasks associated with each function, the estimated time requirements, and sufficient detail to analyze the tasks during implementation. This example set will be used to exemplify the level of detail which will be provided during implementation. The process provided in Section 4.2.1 may be sufficient to derive the task narratives. For the remaining tasks to be described, staff requires the process that will be followed.

18-72

Criterion 2 of NUREG-0711 Section 5 states:

Tasks should be linked using a technique such as operational sequence diagrams. Task analyses should begin on a gross level and involve the development of detailed narrative descriptions of what personnel have to do. The analyses should define the nature of the input, process, and output needed by and of personnel.

Section 3.0 of the task analysis implementation plan discusses the methodology to be used for conducting the U.S. EPR task analysis. The report says that a sampling process similar to the Operational Conditions Sampling (OCS) process described in V&V will be used to select the functions to be subject to task analysis.

a. Describe OCS and identify the guidelines used to determine tasks and provide examples of the functions and asks to be analyzed.
b. Specify which HFE task analysis methodology they plan to use, i.e., operational sequence analysis, hierarchical task analysis, etc.
c. In section 3.0, the Applicant states that a process “similar” (and thus not exact) to the process used in verification and validation will be used. However, section 4.1 states that "the identification of tasks will be derived from those functions following the guidelines set for OCS." This implies an exact match, and thus contradicts the earlier statement. The contradiction needs to be resolved. Describe the OCS and clarify the process for identification of tasks.
d. The staff notes that sequencing of tasks is not equivalent to linking tasks using a task analysis methodology. Therefore, staff requests information as to how tasks will be linked and interact with one another.

18-73

Section 4 of NUREG-0711, Criterion 4 states “The task analysis should address issues such as:

- the number of crew members
- crew member skill
- allocation of monitoring and control tasks to the (a) formation of a meaningful job, and (b) management of crew members' physical and cognitive workload.”

a. The task analysis implementation plan states that following the assignment of the workload values referenced in section 4.2.3, an operator workload analysis is

performed on selected sets of tasks to evaluate the physical and cognitive demands on the operator based on the HSIs assigned, the allocation of the function, and the staffing levels. The applicant continues to say that the allocation of monitoring and control tasks to the formation of a meaningful job and management of crew member's physical and cognitive workload is addressed.

1. Describe how the formation of a meaningful job will be assessed, and how the management of crew member's physical and cognitive workload will be evaluated.
2. Also, provide information on the approach to definition of cognitive workload and the techniques that will be used to assess cognitive workload.

b. In section 4.4 of the task analysis implementation plan, the applicant continues to state that for tasks where there is a concern about the successful completion of the task, a task timeline is created. While the time to perform the task is defined as part of the task description, overall timelines for the tasks and sequences of tasks is used to determine if the tasks can be successfully completed to meet response requirements if the tasks overlap in a time creating operator workload.

1. Provide a description of the task timeline and an example of what it will look like.
2. How will the timeline be used to address issues of operator workload and response timing.

18-74

Section 5 of NUREG-0711, Criterion 5 states:

The task analysis results should be used to define a minimum inventory of alarms, displays, and controls necessary to perform crew tasks based on both task and instrumentation and control requirements.

Section 4.4 of the task analysis implementation plan discusses workload analysis and adequacy of staffing assumptions but provides very little detail to describe the identification of alarms, displays and controls.

The staff is requesting the process for identifying a minimum inventory of alarms, displays and controls necessary to perform crew tasks based on both task and instrumentation and control requirements.

18-75

a. NUREG-0711 section 5 provides criteria to use during the review of an applicant's task analysis. AREVA submitted the "U.S. EPR Task Analysis Implementation Plan" (118-9101668-000) to provide a methodology for performing and analyzing task analysis for the U.S. EPR design. However, in Table 1-1 of the implementation plan, the applicant states that it plans to use a separate task analysis process to identify required staff knowledge, skills and attributes for the personnel training programs that differ from the

task analysis used to assess interface needs. In addition table 1-1 show that a separate task analysis will be used to develop procedures.

Additionally, the U.S. EPR Verification and Validation Implementation Plan identifies using a "limited scope" task analysis for the verification and validation process.

Based on these discrepancies, it is unclear to the Staff how AREVA plans to use the U.S. EPR task analysis, and how the training program task analysis, the procedures development task analysis and, the limited scope task analysis and the full task analysis are related, if at all.

b. Section 5 of NUREG-0711, criterion 6 states:

The task analysis should provide input to the design of HSIs, procedures, and personnel training programs.

There is not enough information provided for the Staff to perform a detailed evaluation of this criterion.

Provide detailed information as to how the task analysis results will be used as input into the HSI design, procedures and training programs.

c. In section 1.5 of the implementation plan, the applicant says that the sequencing of tasks provides the steps for the plant operating procedures and defines the activities that plant personnel should be trained to execute. The bases for the task sequencing become training objectives and questions for the training program.

In Section 4.3 of the task analysis implementation plan, the applicant says that during the HSI design phase, evaluations are performed to assess the HSI design, procedures, as well as verify operator workload is at an acceptable level.

Provide detailed information describing the evaluation process for developing procedures, and training programs including who conducts the evaluations, and how the results are dispositioned.

18-76

a. Section 5 of NUREG-0711 Criterion 3 states:The task analysis should be iterative and become progressively more detailed over the design cycle. It should be detailed enough to identify information and control requirements to enable specification of detailed requirements for alarms, displays, data processing, and controls for human task accomplishment.

The U.S. EPR task analysis implementation plan has a process for identifying the plant and system/component level functions, but it does not identify the type or level of detail expected to be derived in each iteration of the plan.

Provide what information will be derived from each iteration, and how that information will be used in the next iteration.

b. Sections 4.1.1 and 4.1.2 of the implementation plan provide a brief summary of how the applicant plans to conduct each iteration of the task analysis. The analysis is broken into two parts, a "high-level" analysis and a "lower level" analysis. First, the high level analysis is used to identify plant-level tasks used to perform plant-level functions.

   Staff requests clarification on what is meant by "high-level" and "lower level" analysis and how these terms map to the plant and systems analysis. It is not clear whether "high level" analysis relates specifically to plant level analysis, and "lower level" refers exclusively to systems level, or whether "high level" and "lower level" will be performed for both plant and system level analyses. Provide clarification as to how these concepts are related.

18-77

The FSAR should contain all information (either directly or by reference) the staff uses in its evaluation. Provide a reference in the FSAR to the submitted Procedure Development Implementation plan (document no. 118-9101665-001) in DCD Section 18.8.

18-78

The staff requests clarification for the following items in Section 4.0 of the Procedure Development Implementation Plan:

a. It states (fourth bullet) that "data obtained from the design and development of other EPRs" is used as inputs into the TA, but the IP does not describe what type of data this is. Please provide clarifying information to address this discrepancy.
b. Sec. 4.0 of the Procedures IP states that Ref. 6 is the EPR Technical Bases Document for EPGs but in Section 7.0, "References," the reference number [6] is listed as the U.S. EPR V&V Plan. Please address this discrepancy.
c. Information describing high level goals for the computer procedure system was found in the Concept of Operations document (no. 117-9039988-001) but a reference to this document was not included.
d. The IP provides multiple technical bases documents as input to procedures. Specifically, the U.S. EPR Technical Basis Document (for Emergency Procedure Guidelines), and the U.S. EPR EOP Technical Bases Document (Section 5.0). Provide information describing:

    1. Whether, these documents are the same document. If the documents are the same, the IP should be revised to reflect the correct document
    2. If they are different documents, provide clarification on the differences, and the relation of each document within the process

18-79

In section 5.0 of the IP it states that the B&W Owners Group Technical Bases document is used to develop the US EPR EOPs. The US EPR specific analysis will be incorporated into this document, and guidance will be developed to account for design differences between the US EPR and currently operating B&W plants. The staff requests clarification for the following:

a. Is the process described in Section 5.0 used to solely develop the EOPs for the US EPR? If so, what process is used for development of the US EPR GTGs? If not, provide clarifying information for what will be developed.

b. Overall, the process described in the procedure development implementation plan regarding if and how the US EPR GTGs are developed and how they relate to what is described in the IP is unclear. Provide clarifying information to address these issues.

18-80

The procedure development IP (document 118-9101665-001) provides information on some aspects of the procedure writer's guides. Some questions remain related to these writer's guides.

a. Are there multiple writers' guides or just one? If multiple, list them and describe the purpose of each one.
b. How will readability and accuracy be addressed in the writer's guide development process?
c. Will writer's guides be developed for only those procedures mentioned within the scope of the IP (those listed in Section 3.0), or will writer's guides be developed for computer procedures as well?
d. What will be the process to ensure that the electronic procedures and paper procedures have the same format?
e. Lastly, have writer's guides been developed for the U.S. EPR? If so, are they available for review? If not, when will writer's guides be available for staff review?

18-81

The implementation plan does not address whether electronic procedures will also include the elements listed in NUREG-0711 criterion 4 in Section 9.4. Clarify this issue.

18-82

The staff requests clarification for the following items with regard to the Babcock & Wilcox EOP Technical Basis Document described in the Procedure Development Implementation Plan:

a. A reference to the Babcock & Wilcox EOP Technical Basis Document was not provided in the IP, yet this is an integral part of the procedure development process. Please include in the list of references in section 7.0 of the IP.
b. In Figure 4-1 of the IP, are the Legacy Procedures Analyses the same as the B&W EOP Technical Basis Document? Also in Fig. 4-1, will staffing considerations have input to the procedure process?
c. In Section 5.0, of the IP it states that the B&W Owners Group EOP Technical Basis Document will be modified "using the same approach and guideline structure approved for operating plants." The phrase "approved for operating plants" is unclear. Provide information to clarify this aspect.

18-83

Neither the implementation plan nor the FSAR provide a description of how the US EPR GTGs and EOPs will provide entry conditions to the operators. Provide clarifying information describing how the GTGs and EOPs provide entry conditions.

18-84

Describe how the transition from electronic to paper procedures will be conducted.

Will an analysis for the loss of the electronic procedures be conducted? If so, describe the strategy/process.

18-85

Clarify the process used (prior to the ISV) to verify all procedures.

18-86

In Figure 4-1 of the IP, it appears that changes that are identified in the initial procedure evaluation are input back into the TA (denoted by a solid black line). A dashed line above that line is drawn but has no designation. Clarify what the dashed lines are communicating in this Figure.

18-87

Procedures should be maintained throughout the development and V&V processes. Provide clarifying information in the IP describing the plan for procedure maintenance during the HFE process.

18-88

In Section 18.8.2.3, the FSAR summarizes the NUREG-0711, section 9.4, criterion 9. The FSAR states that “Adequate space is provided at appropriate workstations in the MCR and RSS for operators…”; it does not address adequate space for lay down of procedures at the local control stations. Describe procedure use at local control stations.

Also, this aspect of procedure use is not addressed in the IP. Add this information to the IP.

18-89

The IP does not describe how the operators can easily access the necessary procedure through the US EPR electronic procedure system. Are there multiple VDU stations in the MCR that the operators can use to access electronic procedures, all of the stations, only one or two? At the individual stations what is the functionality of the electronic procedure system that ensures the operators will be able to navigate to, and through, the procedures?

In general, provide detailed information describing how the operators will interface with the electronic procedure system within MCR, RSS, and LCSs.