ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Monday, June 21, 2010 2:22 PM
To: 'usepr@areva.com'
Cc: Bongarra, James; Marble, Julie; Junge, Michael; Eudy, Michael; Steckel, James; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 421 (4779,4784), FSAR Ch. 18
Attachments: RAI_421_COLP_4779_4784.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on June 15, and discussed with your staff on June 17, 2010. No change is 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,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 1579

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From: Tesfaye, Getachew

Created By: Getachew.Tesfaye@nrc.gov

Recipients:
"Bongarra, James" <James.Bongarra@nrc.gov>
Tracking Status: None
"Marble, Julie" <Julie.Marble@nrc.gov>
Tracking Status: None
"Junge, Michael" <Michael.Junge@nrc.gov>
Tracking Status: None
"Eudy, Michael" <Michael.Eudy@nrc.gov>
Tracking Status: None
"Steckel, James" <James.Steckel@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"ArevaEPRDCPEm Resource" <ArevaEPRDCPEm.Resource@nrc.gov>
Tracking Status: None
'"usepr@areva.com'" <usepr@areva.com>
Tracking Status: None

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Request for Additional Information No. 421(4779, 4784), Revision 1

6/21/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 18 - Human Factors Engineering
Application Section: FSAR Chapter 18

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

18-174

HSI IP, Revision 3 has removed reference to both Flammanville -3 and Olkiluoto-3 as being predecessor plants. Revision 3 contains a new statement, “The Human System Interface (HSI) design for the US EPR plant is based on operating experience, and outputs from the human factors engineering (HFE) program analysis.” This statement is unclear with respect to what specific “operating experience” is being referred to by AREVA. The staff requests for the applicant to clarify this statement accordingly. In addition, the Inheritance Plan indicates that Olkiluoto -3 is a predecessor plant and the staff requests for the applicant to reconcile this discrepancy.

18-175

NUREG-0711 11.4.1.2.1(3) states:

(1) The sample should reflect a range of situational factors that are known to challenge human performance, such as:

- Operationally difficult tasks—the sample should address tasks that have been found to be problematic in the operation of NPPs, e.g., procedure versus situation assessment conflicts. The specific tasks selected should reflect the operating history of the type of plant being validated (or the plant’s predecessor).
- Error-forcing contexts—Situations specifically designed to create human errors should be included to assess the error tolerance of the system and the capability of operators to recover from errors should they occur.
- High-workload conditions—the sample should include situations where human performance variation due to high workload and multitasking situations can be assessed.
- Varying-workload situations—the sample should include situations where human performance variation due to workload transitions can be assessed. These include conditions that exhibit (1) a sudden increase in the number of signals that must be detected and processed following a period in which signals were infrequent and (2) a rapid reduction in signal detection and processing demands following a period of sustained high task demand.

- Fatigue and circadian factors—the sample should include situations where human performance variation due to personnel fatigue and circadian factors can be assessed.
- Environmental factors—the sample should include situations where human performance variation due to environmental conditions such as poor lighting, extreme temperatures, high noise, and simulated radiological contamination can be assessed.

Section 3.2.3 of the Validation & Verification Implementation Plan, Rev. 2 states that the performance shaping factors identified in this criterion will be included in the scenarios. However, Section 3.2.9 of the Validation & Verification Implementation Plan, Rev. 2 states that until start-up and operations, it is not valid to attempt to assess environmental conditions in a simulated environment because the results are not reliable, and are too artificial; and that therefore, the only environmental variable that will be simulated will be loss of AC power. The staff requests for the applicant to clarify this inconsistency. In addition, please specify if all factors identified in the criterion, including environmental factors, will be included in the scenarios.

18-176

NUREG-0711 11.4.1.2.2 states the results of sampling should be combined to identify a set of scenarios to guide the subsequence analyses. A given scenario may combine many of the characteristics identified by operational event sampling.

NUREG-0711 11.4.3.2.4 (1) also states:

(1) The operational conditions selected for inclusion in the validation tests should be developed in detail so they can be performed on a simulator. The following information should be defined to provide reasonable assurance that important performance dimensions are addressed and to allow scenarios to be accurately and consistently presented for repeated trials:

- description of the scenario and any pertinent "prior history" necessary for personnel to understand the state of the plant upon scenario start-up
- specific initial conditions (precise definition provided for plant functions, processes, systems, component conditions and performance parameters, e.g., similar to plant shift turnover)
- events (e.g., failures) to occur and their initiating conditions, e.g., time, parameter values, or events
- precise definition of workplace factors, such as environmental conditions
- task support needs (e.g., procedures and technical specifications)
- staffing objectives
- communication requirements with remote personnel (e.g., load dispatcher via telephone)

- the precise specification of what, when and how data are to be collected and stored (including videotaping requirements, questionnaire and rating scale administrations)

- specific criteria for terminating the scenario.

The staff requests for the applicant to provide a sample of the set of scenarios that will be used in the applicant's Validation & Verification Implementation Plan. The applicant's response regarding these scenarios should include the following information:

a. The sample set to include at least 4 different scenarios.
b. The sample set should be representative of the variety scenarios that will be generated.
c. This sample set of scenarios should include the level of detail that is needed to implement the scenario stated in NUREG 11.4.3.2.4(1).
d. The scenarios should include all information outlined in the numbered list contained in sections 3.6.3.5 of the V&V IP R. 2, page 72, and section 4.3.1, (4.3.1.2 thru 4.3.1.13) of same.
e. The method used to combine the elements listed in the V&V IP to create the set, written at a level of detail that it may be replicated and repeated.

18-177

NUREG-0711 11.4.1.2.2 (2) states:

The scenarios should not be biased in the direction of over representation of the following:

- Scenarios for which only positive outcomes can be expected

- Scenarios that for integrated system validation are relatively easy to conduct administratively (scenarios that place high demands, data collection or analysis are avoided).

- Scenarios that for integrated system validation are familiar and well structured (e.g., which address familiar systems and failure modes that are highly compatible with plant procedures such as “textbook” design-basis accidents)

The staff request for the applicant to provide the sampling method that will be used to develop the set of sample scenarios to be used for Verification and Validation in order to demonstrate how sampling bias will be avoided.

18-178

NUREG-0711 section 11.4.2.3.2 states that the criteria for the HFE Design Verification Review Criteria should be identified.

Human Factors Engineering Design Verification is discussed in Section 3.5.2 of the V&V IP R. 2. In it, the applicant states that designs are compared to HFE guidelines and

those deviations from accepted HFE guidelines, standards, and principles are documented as HEDs. The staff requests for the applicant to identify the document or documents that contain all these accepted guidelines, standards, and principles. (This may be NUREG-0700 or the EPR HFE Style Guide. If another document is used, then please provide a brief justification or rationale.)

18-179

NUREG-0711 section 11.4.2.3.2(4) states that HEDs, should be documented by the applicant in terms of the HSI component involved and how its characteristics depart from a particular guideline. However, the staff cannot find this information in the V&V IP. The staff requests the applicant to identify where this commitment can be found.

18-180

NUREG-0711 section 11.4.2.3.2(2) states that the characteristics of the HSI components should be compared with the HFE guidelines. In addition, for each guideline a determination should be made whether the HSI is acceptable or discrepant from the guideline. However, the staff does not find commitment and process to compare each guideline to the HSI in the V&V IP. The staff request for the applicant to identify where this information can be found.

18-181

Section 3.6.2.3 of the V&V IP R. 2 states that the simulators used in HFE V&V activities are described in section 3.8. However, the staff finds that section 3.8 refers to the final plant HFE/HSI design check; but, it does not provide a description of the simulators. The staff requests for the applicant to correct this reference to indicate that the descriptions of the simulators are found in section 3.9.