

## ArevaEPRDCPEm Resource

---

**From:** Tesfaye, Getachew  
**Sent:** Tuesday, February 02, 2010 11:26 AM  
**To:** 'usepr@areva.com'  
**Cc:** Marble, Julie; Keefe, Molly; Junge, Michael; Steckel, James; Colaccino, Joseph; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 348 (4085, 4092), FSAR Ch. 18  
**Attachments:** RAI\_348\_COLP\_4085\_4092.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 18, 2009, and discussed with your staff on January 14, 2010. Draft RAI Questions 18-90 and 18-92 were modified 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:** 1124

**Mail Envelope Properties** (0A64B42AAA8FD4418CE1EB5240A6FED10DF74EADD5)

**Subject:** U.S. EPR Design Certification Application RAI No. 348 (4085, 4092), FSAR Ch. 18  
**Sent Date:** 2/2/2010 11:26:04 AM  
**Received Date:** 2/2/2010 11:26:05 AM  
**From:** Tesfaye, Getachew

**Created By:** Getachew.Tesfaye@nrc.gov

**Recipients:**

"Marble, Julie" <Julie.Marble@nrc.gov>  
Tracking Status: None  
"Keefe, Molly" <Molly.Keefe@nrc.gov>  
Tracking Status: None  
"Junge, Michael" <Michael.Junge@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

**Post Office:** HQCLSTR02.nrc.gov

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	777	2/2/2010 11:26:05 AM
RAI_348_COLP_4085_4092.doc		56314

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

Request for Additional Information No. 348(4085, 4092), Revision 0

02/02/2010

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)

18-90

Section 2.2.2 in the Human Factors Program Management Plan is titled "Assumptions". The subsections that follow are described as the operating philosophy of the plant. The Applicant states that these sections are subject to change based on analysis and evaluation during plant design. Therefore, staff does not perceive the descriptions in the following sections to represent a commitment to those features described. Staff requires information to clarify how and where changes to these assumptions will be documented. NUREG-0711, 2.4.1(2) discusses the identification of assumptions.

18-91

Staff requires clarification on the scope of the HFE Program; are HSI associated with non-I&C systems included in the scope of the HFE Program plan?

18-92

Section 3.2 of the Human Factors Program Management Plan and Figure 3-1 provide some discussion of the Organizational Placement and Authority for the HFE team. However, Figure 3-1 does not include information on authority of team members (per the caption). Staff requires more information on the authority of the team members, particularly the HFE EDL and the RTM for HFE and Control Rooms Design, as described in NUREG-0711, 2.4.2. Staff also inquires whether these generic positions represent individuals or whether a single individual may have more than one role.

18-93

The Applicant states that further assumptions and constraints are provided in Section 2.2 of Interim FSAR Rev 2.0 ( Staff notes that Interim FSAR Rev 2.0 does not appear to have a Section 2.2. Therefore any further assumptions or constraints present in that reference are not clearly identified for review and do not influence this analysis. Staff request that any remaining assumptions or constraints not included in the HFE IP be clearly identified or indication that the assumptions and constraints provided in the HFE IP are complete as presented.

Staff also requires clarification of the extent to which the information provided between Sections 2.2 and 2.2.2 could change during the design process.

18-94

Figure 2-1: FA3 MCR layout of the HFE IP is labeled in French; therefore, the constraints and assumptions provided in this figure are not clearly identified. Label the figure in English.

18-95

The Applicant's degree of commitment regarding the development of EOF is not clear. The first sentence of Section 2.3.2 of the HFE IP ["HFE design implementation for a new Emergency Operations Facility (EOF) and the Operational Support Center (OSC) or changes resulting from the addition of a U.S. EPR plant to an existing EOF and OSC."] is not clear. Please clarify and indicate what the COL scope is relative to "a new Emergency Operations Facility (EOF) and the Operational Support Center (OSC) or changes resulting from the addition of a U.S. EPR plant to an existing EOF and OSC."

In Section 2.3.1, the Applicant states the HFE Program applies to the design of the MCR, the TSC, the I&CSC, the RSS, and LCSs that provide computer-based HSI. The Applicant states that design of LCSs that provide non-computer based HSI (e.g., manual valves) will be accomplished concurrent with the applicable system and that a style guide developed by the HFE team provides HFE requirements for the design of the HSI portion of the LCS. Staff requests more information regarding the style guide that will be used to provide HFE requirements for the design of the LCS; specifically, staff requests to know which style guide will be used?

18-96

The Applicant states in Section 2.4 of the HFE Program Implementation Plan, that HSIs for non-I&C systems, such as manual valve operators, will follow guidelines established by the HFE team. Staff requires clarification on the scope of the HFE Program to clarify whether HSI associated with non-I&C systems are included in the scope of the plan.

Section 2.4 of the HFE Program Implementation Plan also states that design of manual valve operators will follow guidelines established by the HFE team. Staff request that a draft of these guidelines be provided for review.

Staff further request clarification on the distinction being made between HSI systems in Section 2.4. The distinction is worded as those HSI associated with I&C system and those associated with non-I&C systems; however, the examples given appear to distinguish between control room and non-control room. LCS may contain I&C systems. Therefore, staff request clarification of what is meant in this case by 'other LCS'.

18-97

The commitment in section 2.5 refers to 10 CFR 55, which is labeled Reference 4, and is used to define licensed control room operators. However, Reference 4 of Section 7.0 is 10 CFR 50.55, "Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses." Please correct the reference in Section 7.0.

Staff requests clarification of how personnel who perform tasks that impact plant safety beyond those categories defined will be identified, as indicated in Section 2.5.

18-98

Figure 3-1 represents the organizational structure, communications and support linkages for HFE with respect to the other project divisions (I&C, LCS design, etc.). However, the caption to Figure 3-1 states that no authority is applied in the figure. Staff requests clarification of the relative authority and relationships of the HFE EDL and the RTM for HFE and Control Room Design.

18-99

More information is required to understand the job descriptions and assignments of team members with respect to team member skills and qualifications and assignment to the various HFE element activities. Please link team member qualifications to job descriptions and assignments of the HFE elements.

18-100

Staff requests information to clarify how work plans that determine design changes are input and tracked via the HED system (Section 4.1 of the HFE IP).

18-101

Staff notes that with respect to the relationship between HFE program design documentation and general design documentation, Interim FSAR Rev 2 references Section 2.0 the HFE Program Management Plan, but then cites Interim FSAR Rev 2.0 (as noted in Letter, Sandra M. Sloan (AREVA NP Inc.) to Document Control Desk (NRC), "Response to U.S. EPR Design Certification Application RAI No. 240, Supplement 1," NRC:09:080, July 31, 2009). Staff request clarification and removal of this circular reference.

In Section 4.3 of the HFE IP, the Applicant states that it will use system interface documents, produced by system discipline engineers, to coordinate between disciplines for systems, structures and components whose requirements cross multiple engineering disciplines. The Applicant states that the HFE team integrates the I&C system designs with control room layout and design. Staff requests information to clarify how the HFE team incorporates information from I&C, as well as other engineering disciplines. Staff requests more information regarding the cross discipline reviews; specifically staff request clarification of how the HFE team insures that its requirements are met.

The relative schedule in this figure illustrates "V&V interim checks" are used at multiple stages to check design, that documentation of various aspects such as PICS/SICS, control room design documentation, and HSI Design are revised during the process. Staff notes that 'iterative V&V' is not a NUREG concept. Its use in Figure 18.1-1 is more consistent with "man in the loop" testing or "testing phase". As used by Staff, V&V is an endpoint and final validation of the system design. Staff request clarification and definition of the term 'V&V interim check.'

18-102

The Applicant states that reviews of the subcontractor QAP will occur during the pre-award evaluation, prior to placement of the subcontractor on the Approved Suppliers List. It is not clear from the text whether subcontractors will be reviewed periodically

after this initial assessment. Please summarize how often subcontractors will be assessed with respect to HFE requirements after being placed on the ASL.

The Applicant states that reviews of the vendor program are performed in accordance with Regulatory Guides 1.28 and 1.144. Staff notes that Regulatory Guide 1.144, has been withdrawn and replaced. Please clarify to what guidance will be used to perform vendor reviews.

18-103

The HFE Tracking Database will be used throughout the development cycle to identify and track outstanding HFE issues. Issues that 'meet or exceed' the threshold established by the design team are entered into the HFE Tracking Database. Deviations from the standard design are 'escalated' to a design review and issue resolution process.

Staff requests clarification of what is meant by 'escalation' of the design review process.

Staff also request definition of the threshold for entry of an issue into the HFE Issue Tracking Database.

18-104

Section 4.5.6 of the HFE IP discusses the use of design analyses to assess OER, FA/FRA, Task Analysis (including staffing and qualifications), and HRA. The data generated by these analyses will be maintained in data structures. Descriptions of the analyses and evaluations used to address each programmatic element are included and reviewed as appropriate in each element's Implementation plan.

Staff requests specification (name) of the data structure where data from the OER, FA/FRA, Task Analysis and HRA will be stored. Staff requests information on who and how this data will be maintained.

18-105

Interim FSAR Rev 2 (as noted in Letter, Sandra M. Sloan (AREVA NP Inc.) to Document Control Desk (NRC), "Response to U.S. EPR Design Certification Application RAI No. 240, Supplement 1," NRC:09:080, July 31, 2009) states that the U.S. EPR program is described in Section 18.1, Section 2.0 of the U.S. HFE Program Plan, which is indicated as Reference 2. However, Reference 2 is Interim FSAR Rev 2. Staff requests that this circular reference and other circular citations to Interim FSAR Rev 2 occurring in other sections be removed and corrected.

In Section 6.2 of the HFE IP, the Applicant states that HFE requirements will be documented in implementation plans, SDRD, and HFE guidelines such as the HSI style Guide. This section also provides the high level HFE guidance for the HSI design. Source information for these guidelines is not provided. Sections 6.2.1 thru 6.2.9 provide the high level HFE guidance for environmental aspects of the design (e.g., Mechanical Properties and Dimensions of the Work Environment). With the exception of Section 6.2.4 (Ambient Conditions in the Control Rooms) which cites ASHRAE

guidance, sources and standards are not listed for these guidelines. Please provide standards and sources of HFE requirements.

18-106

Staff note that the distinction between prototypes (paper based) and mockups (virtual or computer aided drawings) provided in the HFE IP do not appear to be consistent with their use in the V&V IP. Staff further requests that clarification be made between prototypes and mockups to resolve this inconsistency between plans.

Staff request information regarding facilities, techniques, and equipment beyond simulation, mockups, and prototypes to be used in the HFE program.

18-107

Interim FSAR Tier 2, Revision 2 (as noted in Letter, Sandra M. Sloan (AREVA NP Inc.) to Document Control Desk (NRC), "Response to U.S. EPR Design Certification Application RAI No. 240, Supplement 1," NRC:09:080, July 31, 2009), Section 18.1, "Human Factors Engineering Program Management Implementation Plan" describes the Human Factors Program. In addition, AREVA submitted the "Human Factors Engineering Implementation Plan" (document No. 118 - 9110637 - 000). However, the FSAR does not reference the Human Factors Engineering Program Management (HSI) Implementation Plan, specifically. Reconcile the inconsistency between the FSAR and the HSI Plan.

18-108

Section 6.3 of NUREG-0711 "Applicant Submittals" states:

The applicant should provide for staff review an implementation plan for staffing and qualification analysis.

AREVA submitted Technical Document 117-9015723-001, "Initial Staffing Assumptions for the U.S. EPR," and document number 117-9039988-001, "Concept of Operations: Design of the U.S. EPR Control Rooms." Both documents contain information associated with the Staffing and Qualifications assessments, however, neither the Concept of Operations document, nor the Initial Staffing Assumptions document are referenced in the U.S. EPR FSAR or included on the docket. The Staff is using these documents to assess the applicant's approach to staffing and qualifications program development and make a safety determination. Provide a reference to each document in the next revision of the FSAR.

18-109

Criterion 3 of NUREG-0711, section 6.4 states:

The Staffing analysis should be iterative; that is, initial staffing goals should be reviewed and modified as the analyses associated with other elements are complete.

In Section 18.5.1 of the U.S. EPR FSAR, and the "Initial Staffing Assumptions for the U.S. EPR" (technical document 117-9015723-001) information is provided that describes the iterative

process, however, it is not clear how changes based on the analyses of the other elements will be addressed. Describe the process that will be used to address changes to staffing and qualifications based on the iterations of the staffing analysis.

18-110

NUREG-0711, Section 6.4 Criterion 2, states “The Staffing analysis should determine the number and background of personnel for the full range of plant conditions and tasks including operational tasks (normal, abnormal and emergency) plant maintenance, and plant surveillance and testing. The scope of personnel that should be considered is identified in the HFE Program Management element. (Section 2.4.1, Criterion 5)”

To help address this criterion, AREVA has submitted Technical Document 117-9015723-001, "Initial Staffing Assumptions for the U.S. EPR." In section 2.0, the document lists several documents that should be used as guidance when addressing staffing issues. Included in this document list is Regulatory Guide 1.8, "Qualifications and Training of Personnel for Nuclear Power Plants," Rev.3, (May 2000). In addition, "Concept of Operations: Design of the U.S. EPR Control Rooms," references ANSI/ANS-3.1-1999, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants." Clarify for the staff the intended use of these guidance documents when addressing staffing issues.

18-111

NUREG-0711 Section 18.6, Criterion 4, states “The basis for staffing and qualifications should be modified to address these issues:

- Operating Experience Review
- Functional Requirements Analysis and Function Allocation
- Task Analysis
- Human Reliability Analysis
- HSI Design
- Procedures Development
- Training Program Development.”

Section 18.5.1 of the U.S. EPR FSAR references the operating experience review in section 18.2 which identifies staffing level related aspects of operating plants with similar designs under various conditions and operating modes. The Staff reviewed section 18.2 of the FSAR and found that it does not provide any additional information into staffing levels for the U.S. EPR design. Additionally, AREVA submitted the initial staffing assumptions document which says that the “objective of the OER is to identify and analyze HSI design-related problems and the HFE issues associate with previous plant instrumentation and control (I&C) designs that are similar to the U.S. EPR.” Further, “the results of the OER are used as a direct input to the design process to ensure that the HSI design is keeping with the MCR staffing goals”. However, it is unclear to the staff how the OER data will actually be used as input into the staffing analysis.

Provide information describing how the OER data will be used as input to the staffing and qualifications analysis.