

## ArevaEPRDCPEm Resource

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**From:** BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]  
**Sent:** Wednesday, July 14, 2010 12:47 PM  
**To:** Tesfaye, Getachew  
**Cc:** DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); RYAN Tom (AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 408, FSAR Ch. 18  
**Attachments:** RAI 408 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 408 Response US EPR DC.pdf" provides a technically correct and complete response to Questions 18-165 and 18-166, it also provides a schedule for the remaining 4 questions since technically correct and complete responses to the 4 questions are not provided. Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the responses.

The following table indicates the respective pages in the response document, "RAI 408 Response US EPR DC.pdf" that contain AREVA NP's responses to the subject questions.

Question #	Start Page	End Page
RAI 408 — 18-165	2	2
RAI 408 — 18-166	3	3
RAI 408 — 18-167	4	5
RAI 408 — 18-168	6	6
RAI 408 — 18-169	7	7
RAI 408 — 18-170	8	8

A complete answer is not provided for 4 of the questions. The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 408 — 18-167	August 5, 2010
RAI 408 — 18-168	August 5, 2010
RAI 408 — 18-169	August 5, 2010
RAI 408 — 18-170	August 5, 2010

Sincerely,

Martin (Marty) C. Bryan  
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**From:** Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]  
**Sent:** Monday, June 14, 2010 3:58 PM  
**To:** ZZ-DL-A-USEPR-DL  
**Cc:** Marble, Julie; Bongarra, James; Junge, Michael; Eudy, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 408(4706,4715), FSAR Ch. 18

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 25, 2010, and on June 14, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. 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  
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**Response to**

**Request for Additional Information No. 408(4706, 4715), Revision 1**

**6/14/2010**

**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)**

**Question 18-165:**

**Follow-up to RAI 348, Question 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. EPRTM 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. EPRTM plant to an existing EOF and OSC."

AREVA responded: HFE Implementation Plan, Section 2.3.2 explains that EOF and OSC are the responsibility of the COL applicant. The portion of the sentence that states "to an existing EOF and OSC" refers to the existing facilities already associated with many COL applicants. The statement will be modified for clarification as follows:

"HFE design implementation for a new Emergency Operations Facility (EOF) and the Operational Support Center (OSC) or changes to an existing EOF and OSC resulting from the addition of a U.S. EPR plant are part of the COL applicant's scope...The US EPR FSAR will not be changed as a result of this question."

With respect to this response:

Staff request that FSAR be changed to include a COL information item indicating the COL Applicant's responsibility for this scope.

**Response to Question 18-165:**

A COL information item exists for the EOF in U.S. EPR FSAR Tier 2, Section 18.1.1.3 and U.S. EPR FSAR Tier 2, Table 1.8-2. These statements will be revised to include the OSC to be consistent with the HFE Program Management Plan and the response to Question 18-95.

**FSAR Impact:**

U.S. EPR FSAR Tier 2, Table 1.8-2 and Section 18.1.1.3 will be revised as described in the response and indicated on the enclosed markup.

**Question 18-166:****Follow-up to RAI 348, Question 18-101:**

"The relative schedule in figure 18.1-1 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."

AREVA responded:

"Using the term V&V for anything other than the final check creates confusion. U.S. EPR FSAR Tier 2, Figure 18.1-1 does not show "V&V Interim Checks." The figure correctly shows the HFE V&V in relation to the design process. Intermediate design verifications and validations are referred to as design evaluations and remain within their respective implementation plans."

Staff agree that use of the term V&V for anything other than the final V&V check creates confusion. However, AREVA is incorrect in their statement that Figure 18.1-1 of the FSAR Tier 2 document does not use this term. Figure 18.1-1 is titled "HFE PROGRAM MILESTONES;" Figure 18.1-1 uses the term "V&V interim checks" at 6 or more points on the figure. There may have been confusion with Figure 18.1-2, titled "HFE DESIGN CONTROL PROCESS," which is present on page 18.1-13, and which does not use the term. Staff's original RAI requesting clarification and definition of the term "V&V interim check" referred to Figure 18.1-1 "HFE PROGRAM MILESTONES" found on pages 18.1-11 and 18.1-12 of the U.S. EPR FINAL SAFETY ANALYSIS REPORT, Tier 2 document, in which the term is used 6 times.

Staff requests definition of the term and clarification of the Figure 18.1-1 if the term does not refer to the final V&V process.

**Response to Question 18-166:**

This question was addressed in the Response to RAI 240, Supplement 1, Question 18-36 submitted July 31, 2009. U.S. EPR FSAR Tier 2, Figure 18.1-1 was revised to remove the terminology "V&V Interim Checks."

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-167:****Follow-up to RAI 336, Question 18-71:**

The applicant's response to question 18-71, a.1, is acceptable, pending the inclusion of the response in a revision to the Task Analysis IP (or applicable FSAR section).

**Response to Question 18-167:**

A description of how Maintenance Tests Inspections and Surveillance activities are addressed during task analysis was added to the revised Task Analysis Implementation Plan, Section 3.0, which was included in the Response to RAI 369, Supplement 1, submitted May 10, 2010. As a result of the response to Question 18-71, a.1, additional modifications will be included in the next revision of the Task Analysis Implementation Plan in Section 3.0 and Section 4.1. The following information will be included in the next revision of the Task Analysis Implementation Plan:

“The TA includes maintenance, test, inspection, and surveillance (MTIS) activities. The TA includes operations and maintenance performed at the operator interface in the main control room (MCR), the remote shutdown system (RSS), and local control stations. The analysis is directed to the full range of plant operating modes, including startup, normal operations, abnormal operations, transient conditions, low power, and shutdown conditions. The analysis addresses personnel tasks during periods of maintenance, plant systems, and equipment, including the human system interface (HSI) equipment. The initial TA does not address system maintenance requirements and procedures because they have not been prepared at this phase of the project. As the maintenance and surveillance procedures become available, they are implemented with the proposed MCR operator interfaces.

Systems must be adequately maintained and run to minimize downtime. TA is used to identify maintenance demands and to define the need for maintenance support tools and systems of work. Optimal work design reduces errors that lead to unscheduled downtime, encourages optimal work, and builds optimal HSI design.

Operating modes during maintenance, tests, and inspections are a result of system functional analysis, using the U.S. EPR FSAR as the basis. These operating modes are analyzed (equal to the rest of operating modes) during the allocation of function and task analysis phases.

Requirements about information, controls, displays, alarms, and communications are an output of the TA process. When these requirements are established, they are used to provide specific HSI design recommendations for these situations.

The maintenance of safety-related systems is regulated by technical specifications for frequency and components. The TA may provide or identify information and controls that are not consistent with expected new staffing. For example, a task may require the operator to perform a maintenance task at the plant overview panels (POP), while the surveillance procedure requires an operator at the motor control center (MCC) or at a local panel.

TA to evaluate the performance of maintenance tasks is similarly performed, but additional steps could be performed to account for a larger amount of usual prerequisite tasks. The

number of tasks is dependent on the level of detail of the TA and/or the maintenance procedures.”

<b>Document Number</b>	<b>Commitment Date</b>
U.S. EPR Task Analysis Implementation Plan #118-9101668-002	8/5/2010

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-168:****Follow-up to RAI 336, Question 18-71:**

The applicant's response to question 18-71, a.2, is acceptable in terms of the definition of "problematic tasks." However, the applicant's response states that the concept (of problematic tasks] is discussed in response to RAI 328, questions 18-62 and 18-70. The staff does not understand the relevance of the applicant's responses to these two questions to the concept of problematic tasks. Please explain. In addition, the information provided in the applicant's response to the original and supplemental questions should be included in a revision to the Task Analysis IP (or applicable FSAR section).

**Response to Question 18-168:**

The response to Question 18-62 provides basis information and addresses "problematic tasks" as a subset of operationally difficult tasks, which is consistent with the response to Question 18-71, a.2.

Problematic tasks are linked to the Response to Question 18-70 because it addresses how the Operational Support Center (OSC) methodology takes into account historically problematic personnel tasks identified during operating experience review. The response to Question 18-70 also describes how outputs of Task Analysis are used as an input to OSC for Human Factors Engineering Verification and Validation.

The response to Question 18-71, a.2 will be included in the next revision of the Task Analysis Implementation Plan.

Document Number	Commitment Date
U.S. EPR Task Analysis Implementation Plan #118-9101668-002	08/05/2010

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-169:****Follow-up to RAI 336, Question 18-71:**

The applicant's response to question 18-71, b., indicates that the IP document provides a guideline level of detail for the more specific steps of accomplishing a task analysis which are provided in the applicant's TA Work Plan, a document available for staff audit. This is an acceptable approach for addressing the staff's question related to providing a greater level of detail explaining how task analysis is performed. The applicant also provided in its response, an excerpt from a TA Work Plan on operational sequence diagrams, which describes the use of this technique as applied to the EPR task analysis and also states that a sample TA worksheet is provided in response to RAI 18-75. This is an acceptable response to the staff provided that the applicant includes the excerpt from the TA Work Plan in the IP, citing it as an example of a TA technique used to perform the EPR TA.

**Response to Question 18-169:**

The response to Question 18-71, b will be included in the next revision of the Task Analysis Implementation Plan.

Document Number	Commitment Date
U.S. EPR Task Analysis Implementation Plan #118-9101668-002	08/05/2010

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-170:****Follow-up to RAI 336, Question 18-72:**

The staff agrees with the applicant's technical responses to this question.

However, the TA IP should incorporate the technical details of the response (including the cited references) into the appropriate section(s) of the TA IP or provide a pointer, if appropriate, to where the various TA techniques as applied to the EPR TA are described in detail in other IPs (e.g., the OCS technique is described in section "x" of the V&V IP).

**Response to Question 18-170:**

The response to Question 18-72 will be included in the next revision of the Task Analysis Implementation Plan.

Document Number	Commitment Date
U.S. EPR Task Analysis Implementation Plan #118-9101668-002	08/05/2010

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

# U.S. EPR Final Safety Analysis Report Markups

**Table 1.8-2—U.S. EPR Combined License Information Items**  
**Sheet 52 of 54**

Item No.	Description	Section	Action-Required by COL Applicant	Action-Required by COL Holder
17.6-7	A COL applicant that references the U.S. EPR design certification will describe the relationship and interface between Maintenance Rule Program and the Reliability Assurance Program.	17.6.6	¥	
17.6-8	A COL applicant that references the U.S. EPR design certification will describe the plan or process for implementing the Maintenance Rule Program as described in the COL application, which includes establishing program elements through sequence and milestones and monitoring or tracking the performance and/or condition of SSC as they become operational. The Maintenance Rule Program will be implemented by the time that fuel load is authorized.	<del>17.6.7</del> 17.6.8	¥	
17.6-9	A COL applicant that references the U.S. EPR design certification will describe the program for Maintenance Rule implementation.	17.6	¥	
18.1-1	A COL applicant that references the U.S. EPR design certification will execute the NRC approved HFE program as described in this section	1.8		¥
18.1-2	A COL applicant that references the U.S. EPR design certification will be responsible for HFE design implementation for a new Emergency Operations Facility (EOF) <u>and/or Operational Support Center (OSC)</u> and changes resulting from the addition of the U.S. EPR to an existing EOF <u>and/or OSC</u> .	18.1.1.3	¥	
18.5-1	A COL applicant that references the U.S. EPR design will confirm that actual staffing levels and qualifications of plant personnel specified in Section 13.1 of the COL application remain bounded by regulatory requirements and results of the staffing and qualifications analysis.	18.5	¥	
18.8-1	<del>A COL applicant that references the U.S. EPR design certification will describe how HFE principles and criteria are incorporated into the development program for site procedures.</del>	18.8	¥	

18-165



3. For the U.S. EPR, the SICS platform concept involves extensive use of the qualified display system (QDS)—a series of touch-screen capable, seismically qualified, 1E supplied visual display units (VDU). The QDS is an AREVA NP product and development activities have been identified for the QDS to support these needs. Because the QDS will replace many conventional indications and controls and to maintain divisional separation requirements, each control QDS is assigned to manage a respective electrical division or mechanical train.
4. To minimize differences between HMI platforms in the control rooms, local control stations (LCS) which allow for communication with computer-based HMIs (e.g., turbine-generator and emergency diesel generator controls) will be integrated with the PICS. LCSs will follow guidelines established by the HFE and Control Room Design Team.

Other assumptions and constraints related to standard features of EPR control rooms, HSI design operating philosophy, and the concept of operations are described in Section 18.7.2 of this FSAR and in Section 2.2 of Reference 2.

The U.S. EPR HFE design process addresses the applicable review criteria specified in NUREG-0711 (Reference 1).

### 18.1.1.3 Applicable U.S. EPR Facilities

The HFE program scope includes the design of the MCR, the Technical Support Center (TSC), and the remote shutdown station (RSS). The design of LCSs is typically accomplished concurrent with the applicable system and follows guidelines established by the HFE and Control Room Design Team (see Section 18.1.2). In addition, the Instrumentation and Control Service Center (I&CSC), the central location for maintaining the digital I&C systems for the plant, is included in the application of the HFE program. A COL applicant that references the U.S. EPR design certification will be responsible for HFE design implementation for a new emergency operations facility (EOF) and/or Operational Support Center (OSC) and/or changes resulting from the addition of the U.S. EPR to an existing EOF and/or OSC. The HFE and Control Room Design Team provides guidance to that design. Execution of the HFE program guidance described herein provides reasonable assurance that HFE principles are both comprehensively and properly applied for the design of the EOF. This HFE guidance also provides a level of consistency for all HSI facilities in the U.S. EPR.

18-165 →

### 18.1.1.4 Applicable Human System Interfaces, Procedures, and Training

The scope of the HFE program includes HSIs, procedures, and training associated with monitoring and controlling U.S. EPR plant processes and equipment through the system functions. These system functions include those required during the various normal operating modes as well as those required during tests, inspections, surveillances, and maintenance, and during abnormal, emergency, and accident