

ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Monday, October 04, 2010 5:33 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); PANNELL George (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 433, FSAR Ch. 18
Attachments: RAI 433 Response US EPR DC.pdf

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 433 Response US EPR DC.pdf," provides the schedule for a technically correct and complete response to the questions.

The following table indicates the respective pages in the response document, "RAI 433 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

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The schedule for a technically correct and complete response to these questions is provided below.

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RAI 433 — 18-219	October 29, 2010
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RAI 433 — 18-226	October 29, 2010
RAI 433 — 18-227	October 29, 2010
RAI 433 — 18-228	October 29, 2010
RAI 433 — 18-229	October 29, 2010

Sincerely,

Martin (Marty) C. Bryan
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]

Sent: Thursday, September 02, 2010 4:27 PM

To: ZZ-DL-A-USEPR-DL

Cc: Bongarra, James; Marble, Julie; Junge, Michael; Eudy, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource

Subject: U.S. EPR Design Certification Application RAI No. 433 (4930, 4910), FSAR Ch. 18

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 6, 2010, and discussed with your staff on August 26, 2010. Draft RAI Question 18-224 was deleted and Draft RAI Question 18-221 was 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: 2085

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Subject: Response to U.S. EPR Design Certification Application RAI No. 433, FSAR Ch. 18
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From: BRYAN Martin (EXTERNAL AREVA)
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Response to

Request for Additional Information No. 433(4830, 4910), Revision 1

9/2/2010

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 18 - Human Factors Engineering

Application Section: Ch 18

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

Question 18-215:

Follow-up to RAI 374, Question 18-148

The applicant did not satisfactorily address this question in its response to RAI 374, Question 18-148, dated May, 17, 2010. The question asked the applicant to describe how, for example, all functions necessary for achieving safe operation (and power goals) are identified, how all requirements of each function are identified, etc. The question asked the applicant to explain how all the six bullets (listed under, "The FRA plan establishes methods to ...") would be accomplished. The applicant's response points to "detailed work instructions" and includes excerpts from "the Plant-level work plan."

The staff requests for the applicant to describe how, for example, all functions necessary for achieving safe operation (and power goals) are identified and how all requirements of each function are identified, etc. In addition, the applicant is requested to indicate what "Plant-level work plan" is being cited or provide a description of the methods used to accomplish the six, bulleted items in section 1.5.5.

Response to Question 18-215:

A response to this question will be provided by October 29, 2010.

Question 18-216:**Follow-up to RAI 374, Question 18-149**

The applicant did not satisfactorily address this question in its response to 374, Question 18-149, dated May, 17, 2010. The question asked the applicant to describe the methods used to accomplish the activities identified in sub-section 1.5.2 of the Plan. For example, how, functional allocation (FA) will use the FRA to determine the requirements for plant control; how (i.e., what methods are used) FA will allocate control functions; and how FA will be used as input for the tasks analysis and PRA/HRA.

The applicant's response provides, what appears to be, an example checklist used by systems engineers to make an initial function allocation determination. Because the applicant, in its FRA/FA IP, states that the FA establishes "methods" to accomplish the four bullets listed under IP section 1.5.2, it is unclear if the example checklist is the only method used to accomplish the bulleted list or if there are others as well. The staff requests for the applicant to provide an additional explanation to resolve this discrepancy.

In addition, the applicant's response states that the implementation plan provides a "general approach" for integrating FRA/FA into the HFE design and that, "specific information concerning methodology [emphasis added] and personnel are found in the FRA/FA work plans." In order to satisfy regulatory criteria (i.e., NUREG-0711), the applicant should describe the methodology for accomplishing the FRA/FA in the FSAR or in the associated implementation plans (an implementation plan, by definition, is a methodology). Further, the applicant's current FRA/FA IP does not cite FRA/FA work plans nor include them in the reference section of the IP. The staff requests for the applicant to specify if there are additional guidance sources that the applicant expects to use in conducting the FRA/FA, then these sources should be cited and/referenced in the FSAR/IP.

Further, the staff requests for the applicant to clarify how Functional Allocation accomplishes the four bullets listed under IP section 1.5.2. and also include any additional guidance sources in the FSAR or IP, cited in the text or in the references.

Response to Question 18-216:

A response to this question will be provided by October 29, 2010.

Question 18-217:

Follow-up to RAI 374, Question 18-150

The applicant did not satisfactorily address this question. In response to RAI 374, Question 18-150, dated May, 17, 2010, the applicant stated that, "The objectives for the FRA/FA implementation plan are changed to state: "The HFE design process is illustrated by Figure 1-1: HFE Process Integration. The figure illustrates the FRA/FA process within the framework of the overall HFE integration process. Outputs are used in task analysis and other HFE defined processes."

Figure 1-1 continues to illustrate that the FRA/FA only provides output to task analysis, i.e., there are no vectors from FRA/FA to any other "HFE process" illustrated in the figure. The staff requests for the applicant to reconcile this discrepancy accordingly.

Response to Question 18-217:

A response to this question will be provided by October 29, 2010.

Question 18-218:**Follow-up to RAI 374, Question 18-151**

In response to RAI, 374, Question 18-151, dated May, 17, 2010, the applicant indicated that, "The requirements management tool presents the functional requirements through a mapping function allowing visual observation of the relationships between objectives and functions. Section 1.6 of the FRA/FA Plan is revised to incorporate the standard NUREG-0711 definition for mapping functions."

- a. The applicant's response proposes to change section 1.6 of the IP "to incorporate the NUREG-711 definition of mapping functions". Since NUREG-0711 does not contain a definition for mapping functions, the staff requests for the applicant to provide an explanation of this proposed change to IP section 1.6.
- b. The applicant has indicated in its response that the FSAR will not be changed. The staff notes that the latest FSAR, Rev 2 (interim submission), uses the term "mapping" in two places, i.e., pages 18.3-4 and 18.3-5. When AREVA revises the FRA/FA IP to incorporate the "NUREG-0711 definition (i.e., the definition that AREVA provides in response to the first part of this supplemental question) the staff cautions the applicant to make certain that the meaning of the term "mapping" as currently on used on pages 18.3-4, 18.3-5 agrees with the definition AREVA proposes for use in the IP. Provide the requested information and address the potential discrepancy.
- c. In its response, the applicant introduced the term, "requirements management tool." With respect to an association with FRA/FA, the staff is not familiar with this term. The staff requests for the applicant to please identify where this term is explained in previously submitted documentation or provide an explanation for the term accordingly.

Response to Question 18-218:

A response to this question will be provided by October 29, 2010.

Question 18-219:

Follow-up to RAI 374, Question 18-156

The staff reviewed the applicant's response to RAI letter 374, question 18-156, dated May 17, 2010, and determined that the response was inadequate. AREVA's response to 18-156 was, "See response to Question 18-148. The staff determined that AREVA's response to Question 18-148 was inadequate. Also, AREVA's response to question 18-148 does not address how the requirements for each high-level function are identified or how functional requirements analysis will be verified, i.e., that all the high-level functions necessary for the achievement of safe operation are identified and that all requirements of each high-level function are identified.

The staff requests for the applicant to explain how the requirements for each high-level function are identified or how functional requirements analysis will be verified, i.e., that all the high-level functions necessary for the achievement of safe operation are identified and that all requirements of each high-level function are identified.

Response to Question 18-219:

A response to this question will be provided by October 29, 2010.

Question 18-220:**Follow-up to RAI 374, Question 18-160**

In response to RAI 374, Question 18-160, dated May, 17, 2010, the applicant indicated that the EPR Plant-level FRA Work Plan explains how the plant-level and system-level FRAs are performed concurrently. AREVA's response continues by stating that the gap analysis is a reconciliation process for the end point of the plant-level function process and the start of the system-level function process. The response also provides a figure to graphically depict the gap analysis process and a procedure for doing the analysis

The staff finds that the applicant's response does not explain how the plant-level and system-level FRAs are performed, concurrently. The procedure included in the applicant's response indicates that, system process functions are derived from [emphasis added] the Plant-level FRA (PFRA). Subsequently, the applicant compares the system process functions to plant-level functions to establish appropriate relationships between the two. The process described appears to occur serially and it does not seem possible for it to occur concurrently. For example, it is unclear how can system-level functions be identified concurrently with identifying higher-level plant-level functions on which the system-level functions are dependent upon. The staff requests for the applicant to provide a description for how the two FRAs are performed, concurrently.

Response to Question 18-220:

A response to this question will be provided by October 29, 2010.

Question 18-221:

On November 17, 2009, the staff issued RAI 328, Question 18-67 which focused on scenario assignment and crew/participant training and selection. With respect to the applicant's proprietary response to this RAI on March 4, 2010, the staff requests that the first 3 full paragraphs (not the bulleted information) on page 88 be incorporated by the applicant into the V&V IP.

Response to Question 18-221:

A response to this question will be provided by October 29, 2010.

Question 18-222:

NUREG-0711 11.4.2.1 states:

- (3) Information Sources—The inventory should be based on the best available information sources. Equipment lists, design specifications, and drawings describe HSI components. These descriptions should be compared by directly observing the components, both hardwired and computer-generated, to verify that the inventory accurately reflects their current state.

The applicant's FSAR section 18.10.3.1 states that the HSI inventory will be created by 'filtering certain portions of the I&C input/output database.

The staff requests for the applicant to clarify what is meant by 'filtering' a database. This FSAR section also states that accuracy of the HSI inventory will be confirmed by comparing the HSI design specifications to predecessor designs. Please specify why the predecessor design is a best source of information regarding the HSIs in the current design given that there may be design differences between the two. In addition, the staff notes that within the applicant's response to RAI LETTER 240 indicates that the predecessor plant information is no longer the basis for the EPR design (i.e., removed from Section 18.1.5.1 of the FSAR interim markup). Therefore, the staff also requests for the applicant to clarify which predecessor plant information will be used for this comparison. In addition, please update the FSAR accordingly.

Response to Question 18-222:

A response to this question will be provided by October 29, 2010.

Question 18-223:

NUREG-0711 11.4.2.2.2 states:

- (1) Criteria Identification—The criteria for Task Support Verification which come from task analyses of HSI requirements for performance of personnel tasks that are selected from operational conditions should be defined.

The criteria for Task Support Verification are the HSI requirements identified by task analysis. The staff notes that section 18.10.3.2 of the FSAR discusses HSI Task Support Verification (TSV). This section of the FSAR states that a dynamic TSV is performed when the HSI and simulator designs have evolved to the point that the simulator represents the complete HSI inventory. The staff requests for the applicant to clarify what a 'dynamic' TSV is. In addition, please clarify if there is also a 'static' TSV and define it accordingly. The staff also notes that section 18.10.3.2 of the FSAR states that the HRA results are an input to the TSV. Please specify what aspects of the HRA results will be used in TSV.

Response to Question 18-223:

A response to this question will be provided by October 29, 2010.

Question 18-225:

Section 4.2.3.5 of the V&V IP states that HSIs 'may' be evaluated with checklists based on the HSI style guide or NUREG-0700. The staff requests for the applicant to specify which methods will be used to evaluate the HSIs.

Response to Question 18-225:

A response to this question will be provided by October 29, 2010.

Question 18-226:

NUREG-0711 11.4.3.2.5.2 states:

- (2) Plant Performance Measurement—Plant performance measures representing functions, systems, components, and HSI use should be obtained.

Section 3.6.4.7 of the V&V IP R.2 indicates that simulator logs and a chronometer will be used to collect system performance measures, and then compared to recommendations from guidelines. It further states that this level of evaluation will be deferred until the simulator is installed at the plant site. The staff requests for the applicant to clarify the intent of these statements. In addition, specify if validation of plant measures will be deferred until the ISV simulator is installed at the plant site. Section 3.6.4.2 states that identification of operator error and error rates will not be performed during simulator evaluation. The staff notes that at other points in the V&V IP Rev. 2, error rates and types are indicated as performance measures. The staff requests for the applicant to specify how and when error rates and identification of errors will be performed.

Response to Question 18-226:

A response to this question will be provided by October 29, 2010.

Question 18-227:

NUREG-0711 section 11.4.3.2.5.2 states:

- (1) A hierarchal set of performance measures should be used which includes measures of the performance of the plant and personnel (i.e., personnel tasks, situation awareness, cognitive workload, and anthropometric/physiological factors). Some of these measures could be used as "pass/fail" criteria for validation and the others to better understand personnel performance and to facilitate the analysis of performance errors. The applicant should identify which are in each category.

Section 4.3.2.2 of the V&V IP R.2 states that an acceptance criterion is that 'required actions' are completed within the required time. The staff requests for the applicant to specify how 'required actions' are defined. In addition, specify if 'required actions' include risk-important human actions.

Response to Question 18-227:

A response to this question will be provided by October 29, 2010.

Question 18-228:

NUREG-0711 11.4.3.2.5.3 states:

- (1) Criteria should be established for the performance measures used in the evaluations. The specific criteria that are used for decisions as to whether the design is validated or not should be specified and distinguished from those being used to better understand the results.

Section 4.6 of the V&V IP discusses the acceptance criteria for the Plant level measures. These are defined primarily in terms of operator response times. The staff requests for the applicant to clarify that the response of the plant will also be examined.

Response to Question 18-228:

A response to this question will be provided by October 29, 2010.

Question 18-229:

NUREG-0711 11.4.3.6.2.5 states:

- (1) If possible, participants who will operate the integrated system in the validation tests should not be used in the pilot study. If the pilot study must be conducted using the validation test participants, then:
 - the scenarios used for the pilot study should be different from those used in the validation tests, and
 - care should be given to provide reasonable assurance that the participants do not become so familiar with the data collection process that it may result in response bias.

Section 4.5.1.3 of the V&V IP R.2 states that personnel used during the pilot testing are not to the same personnel as used in the integrated validation tests. The staff notes that this section goes on to state that if a pilot test participant is used in integrated validation tests that certain steps will be taken. The staff requests for the applicant to clarify if participants, used in the pilot testing, will be allowed to participant in the integrated validation tests.

Response to Question 18-229:

A response to this question will be provided by October 29, 2010.

Question 18-230:

NUREG-0711 11.4.2.3.2 states:

- (1) **Criteria Identification**—The criteria for this verification are the HFE guidelines. The selection of guidelines used in the review depends upon the characteristics of the HSI components included in the scope of the review, as defined in the HSI characterization. It also depends upon whether the applicant has developed a style guide (design-specific HFE guideline document). When a style guide is used by the applicant, its acceptability should be reviewed by the staff. The procedures involved are described in (NUREG-0711) Section 8.4.5. The HFE guidelines contained in NUREG-0700 may be used to support the staff's review of the guidance contained in an applicant's style guide. When an NRC reviewed style guide has been used, it can provide the criteria for HFE design verification.

When no style guide is available, the guidelines in NUREG-0700 can be used for the HFE design verification. However, since not all of these guidelines will be applicable to each review, the selection of guidelines should be based on the characteristics of the HSI components being evaluated. A subset of guidelines appropriate to the specific design implementation should be identified based on the HSI characterization.

In FSAR Section 18.10.3.3, the applicant states that design requirements are derived from a style guide and NUREG-6393, "Integrated System Validation: Methodology and Review Criteria." The staff requests for the applicant to specify how NUREG-6393 will be applied to determine design requirements.

Response to Question 18-230:

A response to this question will be provided by October 29, 2010.