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**Final Response to a Second Request for Additional Information Regarding ANP-10279
"U.S. EPR Human Factors Engineering Program" (TAC No. MD4252)**

Ref. 1: Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "Request for Review and Approval of ANP-10279, 'U.S. EPR Human Factors Engineering Program'," NRC:07:004, January 29, 2007.

Ref. 2: Letter, Getachew Tesfaye (NRC) to Ronnie L. Gardner (AREVA NP Inc.), "AREVA NP Inc. - Second Request For Additional Information Regarding ANP-10279, 'U.S. EPR Human Factors Engineering Program,' (TAC No. MD4252)" June 26, 2008.

Ref. 3: Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), "AREVA NP Inc. - Response to a Second Request for Additional Information Regarding ANP-10279 'U.S. EPR Human Factors Engineering Program (TAC No. MD4252)," NRC:08:071, September 24, 2008.

AREVA NP Inc. (AREVA NP) requested the NRC's review and approval of ANP-10279, "U.S. EPR Human Factors Engineering Program" in Reference 1. A partial response to the NRC's second request for additional information (reference 2) was provided in Reference 3. In the response AREVA NP Inc. requested a meeting with the NRC Human Factors Engineering review staff to discuss the current status of AREVA NP's HFE program for the U.S. EPR and to discuss the approach AREVA intends to take in order to respond to staff review questions. AREVA NP Inc. representatives and the NRC HFE reviewers met on October 23, 2008. The enclosed RAI responses are based on the discussion that took place during the meeting. A key element in the discussion was the Inheritance Implementation Plan, which forms the basis for a design ITAAC approach. Additionally, AREVA NP could support an audit of the overall implementation plans for the U.S. EPR HFE program beginning in April 2009.

AREVA NP is submitting responses to RAIs 7, 8, 25, 31, 32, 45 and 55. Also enclosed is the change to Table A-2 of ANP-10279 as stated in response to RAI 45.

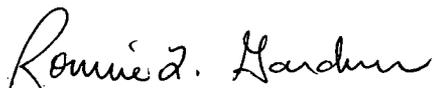
AREVA NP INC.
An AREVA and Siemens company

3315 Old Forest Road, P.O. Box 10935, Lynchburg, VA 24506-0935
Tel.: 434 832 3000 - Fax: 434 832 3840 - www.aveva.com

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The RAI response does not contain any information that AREVA NP considers to be proprietary. AREVA NP references the topical report ANP-10279 in its Final Safety Analysis Report (FSAR) for the U.S. EPR.

Sincerely,



Ronnie L. Gardner, Manager
Corporate Regulatory Affairs
AREVA NP Inc.

Enclosures

cc: J. Rycyna
G. Tesfaye
Docket No. 52-020

HFE Program Element (NUREG-0711)	Implementation Plan		Output Results	
	Explanation	Schedule	Explanation	Schedule
HRA	<p>Implementation plan enables design activities to address critical HAs, risk important tasks, and human error mechanisms to minimize the likelihood of human error and to provide for detection of and recovery capability for errors.</p> <p>See schedule for review availability.</p>	2Q CY2007	Results summary evaluates human-error mechanisms in the HFE design and integration of HFE and PRA and risk analysis programs.	Detailed Design
HSI Design	<p>Several smaller plans are part of HSI design implementation plan:</p> <ol style="list-style-type: none"> 1. Concept of operations 2. Hierarchy and navigation 3. Alarm management 4. Overall architecture <p>OL3 design allows us to put these together now.</p>	1Q CY2007	HSI design documented in final SDDs for PICS and SICS and within V&V output.	Detailed Design
	<p>Implementation plan describes how procedures are used during HIS design, the context of procedures, and the B&V process. It also provides design guidance on the use of Computer Based Procedures.</p>	4Q CY2009	N/A	N/A
Training Program Development	<p>Specific training objectives for U.S. EPR included in the DCD (COL applicant responsibility)</p>	2Q CY2009	See Simulator Design Activities	Detailed Design

Response to Request for Additional Information – ANP-10279
“U.S. EPR Human Factors Engineering Program Topical Report”
(TAC No. MD4252)

On October 23, 2008 a public meeting was held between AREVA NP and the NRC Human Factors Engineering (HFE) staff regarding responses to Topical Report ANP-10279 and FSAR Chapter 18 RAIs. A key issue in the meeting discussion was how AREVA NP intends to use predecessor plant HFE design information to satisfy the regulatory guidance in NUREG-0711.

AREVA NP presented information in the meeting that informed the staff of the key role that the HFE Inheritance Implementation Plan plays in integrating the various elements of the program. The staff was informed that much of the U.S. EPR Functional Analysis and Task Analysis will be based on the work done for predecessor designs and the inheritance implementation plan will provide the approach that will be used to effectively utilize the information from those efforts to align it with the corresponding U.S. regulatory guidance and identify any gaps. To complete the U.S. EPR Human Factors Engineering design, an integration of the predecessor design data will take place and any gaps between the predecessor data and U.S. regulatory guidance will be reconciled.

Responses to the RAIs in this submittal are consistent with the discussions that took place at the October 23, 2008 meeting between AREVA NP and the NRC HFE staff.

RAI 7: Open -P. 5-27, Section 5.4.4: *"For the U.S. EPR, the process for defining and allocating plant functions is not relevant to the HSI design as the HSI design has evolved to a high level of detail. Implementation of a process of FRA and FA would be equivalent to reverse engineering for the sake of creating documentation."* Please explain the rationale for these statements.

Also, this section continues by saying, "...AREVA NP will extract... a list of functions that have been automated for the OL3 plant. AREVA NP will then compare that list of functions to the list derived for the U.S. EPR from system and function activities and capture the differences. The completed FA would then consist of those functions which are allocated identically for OL3 and the U.S. EPR and a list of gaps." Was an FRA and FA completed for OL3? What is meant by "...the list derived for the U.S. EPR from system and function activities"...i.e., what are the U.S. EPR system and function activities?

Evaluation: AREVA's response did not fully clarify the staff's concern.

Follow-up RAI:

To clarify AREVA's use of OL3 design analyses for functional requirements analysis and function allocation, the staff submitted RAI 7. AREVA's response described the process for FRA and FA used by the OL3 designers. The staff does not find this response fully acceptable.

It is acceptable to use experience with predecessor plants as a basis for functional requirements analysis and function allocation, when little change is expected in the design and operation of the plant design being reviewed. However, since the OL3 is not an operating plant, the existing design cannot be justified on the basis of operating experience. Therefore, the acceptability of this approach rests on analyses performed in support of the design of the predecessor plant (OL3). Since these have not been reviewed by the staff, they should be submitted or made available to the NRC for review as part design certification. To follow up on the original RAI, please describe how functional safety requirements and functional allocation per NUREG-0711, Section 4 will be addressed. Sections 5.2 and 5.3, 5.4.4 and Table A-2 of the TR seem to indicate that this will not be produced for the US EPR since it was done for OL3. The OL3 design has not been reviewed and approved by the staff and there is no operating experience with either OL3 or any other EPR plant. The actual results of the FR and FA analyses for OL3 may very well be acceptable, but will need to be submitted and reviewed if AREVA proposes to use them. AREVA should provide this information.

Response 7:

An implementation plan describing how information inherited from predecessor designs will be integrated into the U.S. EPR design process is under development and will be available for NRC inspection in 2Q CY2009. This inheritance implementation plan will specifically address

activities which apply to the U.S. EPR evaluation and implementation of functional requirements (FR) and functional allocation (FA) analyses as recommended in NUREG-0711 guidance.¹

Summaries of FR and FA analyses for the U.S. EPR, utilizing those conducted for the predecessor designs, succeed the completion of the inheritance implementation plan.

¹ The term "requirements" as used here and elsewhere in ANP-10279 refers to requirements that are established as part of the design process. The term requirements is used in this context as a term-of-art. These are not "regulatory" requirements. There are no regulatory requirements in NUREG-0711, only guidance.

RAI 8: *Open -P. 5-29, Section 5.4.5: "The operating procedures for the U.S. EPR are based on the work developing procedures for the OL3 EPR and other precursor plants. The completed operating procedures constitute an analysis of the tasks that operators should perform to safely operate the plant. The operating procedures should satisfy the required safety objectives to be considered completed. The completed plant procedures are subjected to a separate verification process to evaluate their technical effectiveness. For the U.S. EPR, the task analysis (TA) will consist of verification (see Section 5.4.11) that controls and displays are available and are organized to be compatible with the intended operations, including safety objectives as a subset, as defined in the procedures."*

It appears that AREVA NP will use OL3 operating procedures as the basis for determining operator tasks for the U.S. EPR. However, it is the output from task analysis that is used as an input to developing procedures. Also Section 5.4.9 states, "...AREVA NP will produce operational guidelines for the development of plant-specific normal operating, abnormal operating, alarm response, and EOPs..." From this statement, it appears that AREVA NP will develop U.S. EPR-specific "generic guidelines." Please explain how these guidelines will be used to determine operator tasks. Also, how will AREVA NP account for any operator tasks that are not contained in procedures? Has a task analysis been completed for OL3? Has/will AREVA NP use the OL3 task analysis to determine operator tasks required for the U.S. EPR?

Evaluation: *AREVA's response did not fully clarify the staff's concern.*

Follow-up RAI:

In the original RAIs, the staff requested clarification of AREVA's TA plans in RAI 8. AREVA's response did not completely address the staff's request. Table A-2 notes that a TA will not be produced for EPR based on completed operating procedures for OL3. The OL3 design has not been reviewed and approved by the staff and there is no operating experience with either OL3 or any other EPR plant. AREVA should describe how task analysis per NUREG-0711, Section 5, will be addressed.

Response 8:

An implementation plan describing how information inherited from predecessor designs will be integrated into the U.S. EPR design process is under development and will be available for NRC inspection in 2Q CY2009. This inheritance implementation plan will specifically address activities which apply the guidance for task analysis (TA) meeting the intent of NUREG 0711 Section 5.4 review criteria.

A TA summary for the U.S. EPR, utilizing those conducted for the predecessor designs, succeeds the completion of the inheritance implementation plan.

RAI 25: New - *With respect to plant technical requirements, Section 5.3.2 indicates that "The Olkiluoto 3 (OL3) EPR reference design provides the starting point for development of design inputs for the U.S. EPR." Please identify specifically in what ways the OL3 plant provides the starting point for the U.S. EPR and what documentation is available for review of the basis for these starting points. The FSAR, Section 18.3.2, mentions an FRA (Functional Requirements Analysis) report that may provide useful information for the review. Please provide.*

Response 25:

The U.S. EPR is the third EPR to begin detailed design activities. A basic premise of the EPR is to standardize the designs to the extent practical.

The control room layout of the U.S. EPR takes extensive advantage of design studies performed for the U.S. EPR predecessor plant designs. A significant level of detail related to the U.S. EPR control room layout is provided by mockup studies and basic task analyses (e.g., generic operator roles, responsibilities, actions assumed prior to development of procedures) completed for the predecessor designs. The plant safety systems are the same for the U.S. EPR.

Similarly, detailed human factors engineering (HFE) requirements imposed on the design of the HMI platform were collected for predecessor designs before the specification for the human machine interface (HMI) platform was developed. These requirements are analogous to those described in ANP-10279, Sections 2.2.5, 2.2.6, and 2.2.7, but comprise a more exhaustive and complete list.

The U.S. EPR HFE and Control Room Design Team has reviewed processes and design results related to FRA performed by AREVA NP partners on the U.S. EPR predecessors and discussed them with these partners. An implementation plan describing how FRA information inherited from predecessor designs will be integrated into the U.S. EPR design process is under development and will be available for NRC inspection in 2Q CY2009. Given the standard design of the EPR, operator actions will be very similar if not identical for various events. Some variability will occur due to differences in U.S. operating staff roles and responsibilities which will be accounted for in the HMI design and control room layout.

An FRA summary for the U.S. EPR, utilizing those conducted for the predecessor designs, succeeds the completion of the inheritance implementation plan.

RAI 31: New OER is discussed in Section 5.4.3 of the TR and Section 18.2 of the FSAR. Information on the overall process, sources of information reviewed, screening for issues, and issue documentation is provided. Table A-2 indicates that the OER implementation plan is complete and will be summarized in the DCD/FSAR. That does not appear to be the case. It is not clear what the current status of the OER is and whether any OER items have been incorporated into the issues tracking system. Section 5.4.3 mentions PWR and PWR predecessor systems. Please identify and discuss the EPR predecessor plants in the context of NUREG-0711 Section 3.4.1 (1). In addition, please clarify the current status of the OER and indicate when the results will be available for review.

Response 31:

The U.S. EPR predecessors include OL3 and FA3, currently being designed and constructed. Validation and operation of the completed EPR will occur in the future. In turn, the OL3 and FA3 EPRs reference the French N4 plants and German Konvoi plants as predecessor designs. The four-loop PWR N4 plants evolved from many of the concepts in use at PWR plants operating in the U.S., and the U.S. EPR is an evolution of such plants. The U.S. EPR human factors engineering (HFE) and Control Room Design Team has reviewed summaries of the operating experience review (OER) analyses performed by AREVA NP partners on U.S. EPR predecessors and discussed them with the partners.

An implementation plan describing how information inherited from predecessor designs will be integrated into the U.S. EPR design process is under development and will be available for NRC inspection in 2Q CY2009. This inheritance implementation plan will specifically address activities which satisfy the incorporation of OER. The OER implementation plan referred to in Table A-2 of ANP-10279 is available for inspection; collectively, the amalgamation of both the OER implementation plan and the implementation plan describing the use of inherited information will specifically address activities which apply to the U.S. EPR evaluation and implementation of OER analyses as recommended in NUREG-0711 guidance.

RAI 32: New *Task analysis is discussed in Section 5.4.5 of the report. Like functional requirements analysis and function allocation, AREVA plans to use the OL3 information in lieu of conducting analyses for the U.S. EPR. As noted earlier, it is acceptable to use experience with predecessor plants as a basis for task analysis, when little change is expected in the design and operation of the plant design being reviewed. However, since the OL3 is not an operating plant, the existing design cannot be justified on the basis of operating experience. Therefore, the acceptability of this approach rests on analyses performed in support of the design of the predecessor plant (OL3). AREVA further states that "For the U.S. EPR, the TA will consist of verification (see Section 5.4.11) that controls and displays are available and are organized to be compatible with the intended operations, including safety objectives as a subset, as defined in the procedures." Such an activity is not task analysis, it is task support verification. Additional information is needed before this approach can be found acceptable. Please identify; what methodology was used to perform task analyses consistent with the scope identified, where the staff can review the results of the OL3 task analyses, and how the task analysis results was used to develop the procedures for OL3.*

Response 32:

See the response to RAI 8.

The inheritance implementation plan discussed in response to RAI 8 will identify the methodology used to perform task analyses and how the results were used to develop OL3 procedures.

A TA summary for the U.S. EPR, utilizing those conducted for the predecessor designs, succeeds the completion of the inheritance implementation plan.

RAI 45: New FSAR Section 18.9.1, Objectives and Scope (of Training Program Development), mentions an implementation plan for the training program, but it is not specifically listed in the references. Please provide this plan for NRC review.

Response 45:

In the U.S. EPR FSAR, references include only those available in the public domain.

An implementation plan for the training program will be developed. The implementation plan describes training program scope, including:

- Categories of personnel to be trained.
- Specific plant conditions, operational activities (e.g., operations, maintenance, testing and surveillance), and HSIs which effect training scenarios and methods.

The U.S. EPR training program implementation plan includes a description of the process for providing design input to the COL applicant for training development. The training program is derived from predecessor plants.

AREVA NP will update ANP-10279, Table A-2 to reflect the expected completion date of the implementation plan for training program development, 2Q CY2009.

RAI 55: New *Section 2.2.8 states that "Alarm signals include logic so that only operationally relevant conditions are alarmed (e.g., the alarm logic for "low discharge pressure" downstream of a pump will produce an alarm only if the pump is supposed to be running)." Are any other types of alarm logic employed?*

Response 55:

While design goals and bases described in ANP-10279, Section 2.2.8 are similar among EPR platforms, the specific logic to be utilized for individual alarms will be determined for the U.S. EPR later in the design process. The ability to filter (inhibit), suppress, and provide dynamic priority coding of alarms is part of the logic described in the specification for the U.S. EPR human machine interface (HMI). This design concept is intended to reduce unnecessary process information that is not relevant to a given plant condition or system line-up.