August 3, 2009

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF ENGINEERING
REGULATORY AUDIT REPORT

Docket No.:	052-000020
Applicant:	AREVA NP, INC. AREVA BETHESDA OFFICE 1700 Rockville Pike, Suite 400 Rockville, MD, 20852
Applicant Contact:	Ronda Pederson Licensing Manager, U.S. EPR Design Certification AREVA NP, Inc. 3315 Old Forest Road, P.O. Box 10935 Mail Stop OF-34 Lynchburg, VA 24506-0935 Phone: 434-832-3694
Application and Section:	U.S. EPR AREVA FSAR SECTION 3.8
Audit Dates:	June 19, 2009
NRC Audit Reviewers:	Jim Xu, Lead Technical Reviewer (NRO/DE/SEB2) Getachew Tesfaye, NRC Project Manager (NRO/DNRL/NARP) Jay Patel, NRC Project Manager (NRO/DNRL/NARP) Joseph Braverman, NRC Contractor (BNL) Charles Hofmayer, NRC Contractor (BNL)
Approved by:	Sujit Samaddar, Branch Chief Structural Engineering Branch 2, NRO/DE

EXECUTIVE SUMMARY

AREVA NP, INC.
Docket No. 052-000020

The NRC staff performed an audit on June 19, 2009, to review the methodology that was proposed by AREVA for selecting the critical sections for the U.S. EPR structures that will be designed as part of design certification of the plant. In addition, the audit was intended to discuss AREVA's response to RAI 155, Question 03.08.04-1 relating to the design of the nuclear auxiliary building (NAB) and the radioactive waste processing building (RWPB).

The NRC staff successfully reviewed the methodology that AREVA will use to select which critical sections should be designed during design certification. AREVA made a presentation summarizing the methodology which consists of qualitative and quantitative criteria for the selection process. This led to the selection of various critical sections in the safety-significant structures located on the nuclear island (NI) basemat. Following the presentation, the staff reviewed a calculation which contained the details of how this methodology was applied in order to select the critical sections. The staff provided feedback to AREVA in some areas where additional considerations are warranted in order to ensure that an appropriate set of critical sections are selected. Toward the end of the audit, discussions were held regarding the staff's review of RAI 155, Question 03.08.04-1 which addresses the design criteria for the NAB and the RWPB structures. During these discussions, the staff provided the results of the staff's assessment of the response recently provided for this RAI and also provided the staff's position on the design requirements for such radwaste type structures.

Audit Scope/Summary:

The overall scope of the audit was to accomplish the following:

- Review the methodology that is being proposed by AREVA to select the critical sections for the U.S. EPR structures that will be designed as part of the design certification of the plant.
- Discuss RAI 155, Question 03.08.04-1 related to the design of the nuclear auxiliary building (NAB) and the radioactive waste processing building (RWPB).

Staff from NRC and BNL participated in the structural audit at AREVA Bethesda office. The individuals participating in the audit are listed in the Enclosure. AREVA staff explained the objectives and key points of the AREVA methodology for selection of critical sections for design. This was followed by a presentation of two examples of how this methodology was applied: one for the safeguard building (SB) - hardened structure and the other for the reactor building internal structure (RBIS). Then, the NRC and BNL staff reviewed AREVA Calculation Document No. 32-9108190-000, "U.S. Standard Plant DC General Design – Selection of Critical Sections," approved April 30, 2009. Portions of this calculation were reviewed to evaluate in greater detail how this methodology was applied to all of the safety-significant structures on the nuclear island (NI) basemat.

Observations and Findings

Throughout the presentations and review of the AREVA calculation, the NRC and BNL staff identified some concerns with the methodology being proposed for selection of the critical sections for design of the structures. The key issues with the methodology for selection of critical sections are listed below.

1. The current methodology is only applied to the NI structures. The scope for selection of the critical sections should consider all Seismic Category I structures.

2. The methodology refers to the selection of critical sections in "lieu of a complete design." This does not appear to be consistent with the need to use critical sections to represent an "essentially complete design."

3. The current methodology in several cases refers to selection of critical sections to address design basis accidents (DBAs) / loss of coolant accidents (LOCAs). AREVA indicated that this should be revised to consider all loads and load combinations that are part of the design basis of the plant.

4. In addition to using "qualitative" criteria and "quantitative" criteria, AREVA agreed that a third criterion which ensures that an adequate "representation of structural elements" throughout each of the Seismic Category I structures should also be included in the methodology.

5. For the AREVA calculation identified above, the critical sections which require approval from the NRC should be identified as Tier 2* not Tier 2.

6. For the AREVA calculation identified above, the qualitative criteria should also be applied to the fuel building because one of the functions of this building is to prevent release of radioactive material.

7. For the AREVA calculation identified above (Section 2.1), the qualitative criteria dealing with the "defense in depth" needs to be revised. The "safety margin" should not be considered to be part of the defense in depth, but rather is in addition to defense in depth.

8. The third criterion consisting of adequate representation of structural elements (see Item 4 above) should include other types of structural elements and locations not captured by the qualitative and quantitative criteria, such as structural steel members and major discontinuities (e.g., large openings in structural walls/slabs).

After the review of the selection methodology for critical sections, discussions were held on the staff's review of RAI 155, Question 03.08.04-1 which addresses the design criteria for the NAB and the RWPB structures. During these discussions, the staff explained the concerns that still remain with the RAI response recently provided. The staff also explained what the current staff position is on the design requirements for the radwaste type structures.

Action Items

AREVA indicated that they will address the above observations and incorporate them into the methodology for selection of critical sections. A draft of an updated description of the

methodology for selection of critical sections, including a summary of the methodology to be inserted into the EPR FSAR, will be provided to the NRC approximately at the end of July 2009.

Exit Meeting

On June 19, 2009, the NRC staff described the audit findings and action items during an exit meeting with AREVA personnel.

ENCLOSURE

1. PERSONS CONTACTED

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2. DOCUMENTS REVIEWED

Document No: 32-9108190-000
Document Title: U.S. EPR Standard Plant DC General Design Selection of Critical Sections (PROPRIETARY)

3. STANDARD REVIEW PLAN AND GUIDANCE USED

Section 3.8.4, “Other Seismic Category I Structures”