AUDIT REPORT FOR AREVA INC.

TOPICAL REPORT ANP-10332P, REVISION 0

"AURORA-B: AN EVALUATION MODEL FOR BOILING WATER REACTORS;

APPLICATION TO LOSS OF COOLANT ACCIDENT SCENARIOS"

PROJECT NO. 728/DOCKET N0. 99902014

CAC NO. MF3829/EPID: L-2014-TOP-0004

BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) staff conducted an audit on May 16-18, 2017, in support of the review of AREVA Inc. (AREVA) Topical Report (TR) ANP-10332P, Revision 0, "AURORA-B: An Evaluation Model for Boiling Water Reactors; Application to Loss of Coolant Accident [(LOCA)] Scenarios." The AURORA-B LOCA evaluation model (EM) proposed by AREVA is intended to conform to the required and acceptable features for emergency core cooling system EMs prescribed in Appendix K to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.

AREVA submitted TR ANP-10332P to the NRC for review in February 2014 and the NRC staff initiated its review in August 2016. The NRC staff has completed its initial review of the TR and is currently performing a more detailed technical review to support preparation of a draft safety evaluation (SE) and accompanying requests for additional information (RAI) questions.

The audit was held in accordance with NRR procedures described in Office Instruction LIC-111, "Regulatory Audits."

PURPOSE

The audit was intended to clarify the NRC staff's understanding of the technical content of the AURORA-B EM submitted by AREVA and facilitate the development of a draft SE and high-quality RAI questions.

AUDIT SCOPE

The audit scope covered a wide variety of NRC staff questions concerning the information presented in TR ANP-10332P and its references. Specific topics the NRC staff requested that AREVA address during the audit were included in a proprietary attachment to the audit plan. Additional supporting documents were reviewed during the audit as well, which generated further discussion.

During the audit, the NRC staff also discussed with AREVA the current status of the review of related TR ANP-10300P, which considers the application of AURORA-B to anticipated transients and certain accidents other than LOCA. The NRC's lead reviewer for ANP-10300P, Kevin Heller, participated in this discussion via teleconference.

NRC AUDIT TEAM

John Lehning, Technical Reviewer (NRC)
Jonathan Rowley, Project Manager (NRC)
Lap-Yan Cheng, Contractor (Brookhaven National Laboratory)
Upendra Singh Rohatgi, Contractor (Brookhaven National Laboratory)

AREVA PARTICIPATING PERSONNEL

Tim Guidotti	Tom Ellger	Kenneth Carlson
Kevin Quick	Caleb Sarka	Michael Bunker
Robert Schnepp	Mark Stricker	Joo Seok Baek
Alan Meginnis	Hong Tang	

AUDIT SUMMARY

The audit proved valuable in allowing the NRC staff and AREVA to make progress on a number of technical and logistical issues involved with the review of TR ANP-10332P, Revision 0.

Review Logistics

From a logistical standpoint, the most significant NRC staff observation from the audit was the potential for slippage of the current review schedule. Specifically, the TR ANP-10332P, Revision 0, **[**

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The NRC staff noted that it is AREVA's decision whether to **[**

]. The NRC staff emphasized the importance of AREVA **[**

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Technical Discussions

The NRC staff held technical discussions with AREVA personnel during the audit, the focus of which was the resolution of two sets of draft questions the staff provided to AREVA in written form prior to the audit. Following audit discussions with AREVA, the NRC staff expected that **[**

]. Discussion during the audit covered the most significant issues identified in the review to this point. The NRC staff noted, however, that the review remains ongoing and that further RAI questions may be generated as the review of ANP-10332P progresses. Furthermore, **[**

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For a majority of the questions that were not fully resolved during the audit, a path forward to successfully resolve the question was identified based upon the NRC staff's review of draft responses supplied by AREVA during the audit. As appropriate, the NRC staff identified where modifications to AREVA's draft responses would help to resolve the question. A handful of items were identified for which a clear path forward could not be defined during the audit and for which further review and technical discussion was recommended.

A brief description of two significant technical issues discussed during the audit follows:

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Significant discussion occurred on this topic during the audit. The NRC staff's review of sensitivity studies indicated the potential for variations in the **[**

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The NRC staff agreed to perform a more thorough historical review of the regulatory positions taken on this issue for previously approved Appendix K LOCA EMs. **[**

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Document Reviews

Most of the audit team's effort was applied to technical discussions with AREVA personnel. However, a review of several documents supporting ANP-10332P was accomplished during the audit, primarily by contractor personnel. As one takeaway from these document reviews, contractor personnel identified that the **[**

]. AREVA agreed to investigate the issue further and **[** **]**.

ATTACHMENTS

Further information concerning the NRC staff's audit supporting the review of TR ANP-10332P is provided in the following attachments:

1. AURORA-B LOCA: NRC Staff Post-Acceptance Review Feedback and Questions, AREVA's Response Approach, and NRC Staff Audit Comments

2. Brookhaven National Laboratory, Trip Report for Regulatory Audit of AREVA Topical Report ANP-10332P, Revision 0 (TO0013)