

June 6, 2014

MEMORANDUM TO: John Segala, Chief
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

FROM: Michael Eudy, Project Manager /RA/
Licensing Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: AUDIT REPORT FOR THE MAY 8 – JUNE 14, 2013, AUDIT OF
AREVA'S FUKUSHIMA CONTAINMENT ANALYSIS USING GOTHIC
TO SUPPORT THE SAFETY REVIEW OF THE U.S. EPR DESIGN
CERTIFICATION

By letter dated December 11, 2007, as supplemented by letters dated February 7, 2008, and February 20, 2008, AREVA Inc. (AREVA) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a standard design certification (DC) of the U.S. EPR, pursuant to title 10 of the *Code of Federal Regulation* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

On May 8 through June 14, 2013, the NRC conducted an audit at the AREVA's secure on-line Electronic Reading Room (ERR) to review the AREVA documents pertaining to the AREVA's Fukushima containment analysis using GOTHIC to support the safety review of the U.S. EPR design certification application. The purpose of the audit was to review AREVA's containment analysis using GOTHIC to support Fukushima event mitigation in response to the Fukushima Near-Term Task Force (NTTF) Recommendation 4.2, Station Blackout (SBO).

No audit issues were identified and no requests for additional information were requested. Enclosed is a summary report of the audit along with the audit plan.

CONTACT: Michael Eudy, NRO/DNRL
301-415-3104

Docket No.: 52-020

Enclosure:
Final Audit Report

cc: See next page

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| DATE | 05/ /2014 | 05/29/2014 | 06/06/2014 | 06/06/2014 |

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FINAL AUDIT REPORT

APPLICANT: AREVA, INC.

PROJECT: EPR DESIGN CERTIFICATION

SUBJECT: AUDIT REPORT FOR THE MAY 8 – JUNE 14, 2013, AUDIT OF AREVA'S FUKUSHIMA CONTAINMENT ANALYSIS USING GOTHIC TO SUPPORT THE SAFETY REVIEW OF THE U.S. EPR DESIGN CERTIFICATION

BACKGROUND:

The U.S. Nuclear Regulatory Commission (NRC) staff planned to audit the applicant's (AREVA, Inc.) containment analysis using GOTHIC to support Fukushima event mitigation in response to the Fukushima Near-Term Task Force (NTTF) Recommendation 4.2, Station Blackout (SBO) Request for Additional Information (RAI) submitted to all applicants. The GOTHIC computer code is a state-of-the art program for modeling multiphase, multi-component fluid flow. GOTHIC is rapidly becoming the industry-standard code for performing both containment design basis accident analyses and analyses to support equipment qualification. NRC considers the use of this code acceptable for making regulatory decisions.

AUDIT APPROACH:

The approach of the audit is to review the Fukushima containment analysis and supporting calculations. The objective is to gain in-depth understanding of the containment analysis and supporting assumptions and uncertainties used to verify information, and/or to identify information that will require docketing to support the basis of the licensing or regulatory decision. Performing this audit will help the NRC staff conduct its review of the applicant's response to RAI 563, Question 19-356 more efficiently.

DOCUMENTATION REVIEWED:

The staff reviewed the following documentation at the AREVA Electronic Reading Room:

- AREVA Calc 32-7012451-001 "US EPR Containment FLEX Coping Strategies"
- AREVA Calc 51-7012450-000, "US EPR Containment FLEX Analytical Input Summary"
- AREVA Calc 32-7012585-000, "US EPR Makeup Flow Requirements Modes 5 and 6"
- AREVA Calc 32-9095906-000, "Containment Building Ventilation System (CBVS) Pressure Loss Calculation"
- GOTHIC Run computer outputs

AUDIT SUMMARY:

The information presented in the documents provided the staff with a better understanding of the U.S. EPR Fukushima containment analysis and supporting calculations. This information will support the safety review of the applicant's response to RAI 563, Question 19-356 more efficiently. No new RAI is resulted from this audit.

Enclosure

AUDIT PLAN

BACKGROUND/PURPOSE:

The U.S. Nuclear Regulatory Commission (NRC) staff is preparing to audit the applicant's (AREVA, Inc.) containment analysis using GOTHIC to support Fukushima event mitigation in response to the Fukushima Near-Term Task Force (NTTF) Recommendation 4.2, Station Blackout (SBO) Request for Additional Information (RAI) submitted to all applicants. The GOTHIC computer code is a state-of-the art program for modeling multiphase, multi-component fluid flow. GOTHIC is rapidly becoming the industry-standard code for performing both containment design basis accident analyses and analyses to support equipment qualification. NRC considers the use of this code acceptable for making regulatory decisions. The purpose of the audit is to review the Fukushima containment analysis and supporting calculations. The objective is to gain in-depth understanding of the containment analysis and supporting assumptions and uncertainties used to verify information, and/or to identify information that will require docketing to support the basis of the licensing or regulatory decision. Performing this audit will help the NRC staff conduct its review of the applicant's response to RAI 563, Question 19-356 more efficiently.

REGULATORY AUDIT BASIS:

1. Staff Requirements Memo (SRM)-SECY-12-0025, "Proposed Orders and Requests for Information in Response to lessons learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," February 17, 2012
2. Title 10 of the *Code of Federal Regulations* (10 CFR) 52.79, "Contents of applications; technical information in final safety analysis report"

REGULATORY AUDIT SCOPE OR METHODOLOGY:

The staff proposes the audit take place via the AREVA Electronic Reading Room. The staff may seek to return to the Electronic Reading Room over a period of 30 days during the course of the audit, as necessary. Specifically, the staff will be auditing the following information:

1. GOTHIC model development and Fukushima event analysis calculation(s) and supporting documents; and
2. GOTHIC output files

AUDIT LOGISTICS:

Audit Dates: May 8 – 31, 2013

Audit Team: Shie-Jeng Peng, Technical Reviewer
Tanya Ford, Project Manager

Audit Location: The documents to be audited will be placed in the AREVA Electronic Reading Room for the staff to access and review.

Deliverables: A regulatory audit summary will be placed on the docket within 90 days of completing the audit. The audit outcome will be used to identify any additional information needed for making regulatory decisions in support of the staff's safety review of the U.S. EPR Design Certification application.

AUDIT AGENDA

(May 8 – 31, 2013)

May 8, 2013*:

2:00 P.M – 3:00 P.M.

Audit Entrance Meeting – Introduction and overview of Fukushima containment analysis and supporting documents provided in the Electronic Reading Room (*this discussion will take place via telephone conference call between the NRC staff and AREVA*).

May 9 – 29, 2013:

(Periodic Phone Calls)

During the audit, the staff requests that the applicant be available for periodic discussions regarding documents being reviewed in the AREVA Electronic Reading Room. The staff will coordinate periodic phone calls with AREVA, as needed and based on availability, to discuss the information being reviewed throughout the audit.

May 30, 2013*:

2:00 P.M – 3:30 P.M.

Audit Exit Meeting – Discussion and review of any audit findings or needs for additional requests for information (*this discussion will take place via telephone conference call between the NRC staff and AREVA*).

** Note that the dates and times provided above are proposed and may change based on availability of the staff and AREVA.*

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cc:

(Revised 05/20/2014)

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