

August 7, 2012

Mr. J. A. Gresham, Manager
Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, PA 16066

SUBJECT: AUDIT PLAN FOR REVIEW OF TOPICAL REPORT WCAP-17524, "AP1000
CORE REFERENCE REPORT" AND SUPPLEMENTAL INFORMATION

Dear Mr. Gresham:

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared an audit plan related to the review of Westinghouse Topical Report, WCAP-17524, "AP1000 Core Reference Report" and supplemental information. The plan describes the scope and purpose of the audit, identifies the audit team, and describes the documents required by the NRC staff. The audit plan is enclosed.

The audit will take place in three phases, as previously discussed and coordinated with Westinghouse. Phase 1 which, for scheduling considerations, has already occurred, took place July 31 – August 1, 2012; Phase 2 will occur August 14-16, 2012; and Phase 3 (if required) will occur September 11, 2012. The audit team will issue a regulatory audit summary within 90 days after completing the audit.

If you have any questions or comments concerning this matter, please contact me at 301-415-6715 or via e-mail address at Bruce.Bavol@nrc.gov.

Sincerely,

/RA/

Bruce M. Bavol, Project Manager
Licensing Branch 4
Division of New Reactor Licensing
Office of New Reactors

Project No.: 0793

Enclosure:
As stated

cc w/encl: See next page

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**Audit Plan for Reviewing WCAP-17524 and Supplemental Information on Thermal
Conductivity Degradation
Topical Report WCAP-17524
Westinghouse Electric Company
Project No. 0793
July 31-August 1, August 14-16, and September 11, 2012**

A. Location:

This audit will be conducted in three phases and in two locations, as defined below:

Phase 1:

July 31, 2012 – August 1, 2012
Westinghouse Twinbrook Office in Rockville, MD

Phase 2:

August 14-16, 2012
Westinghouse Cranberry Office in Cranberry Twp, PA

Phase 3:

September 11, 2012
Westinghouse Twinbrook Office in Rockville, MD

B. Background

Westinghouse submitted topical report WCAP-17524-P, "AP1000 Core Reference Report," for U.S. Nuclear Regulatory Commission (NRC) staff review and approval on March 6, 2012. In the acceptance letter dated June 5, 2012 [Agencywide Documents Access and Management System Accession No. ML12144A201], NRC staff identified the following key areas as having potential scheduling impact:

- Fuel Thermal conductivity degradation (TCD)
- Impact of the Robust Protection Grid (RPG) on the ability to maintain post-loss-of-coolant accident (LOCA) fuel cooling in the presence of debris (GSI-191)
- Fuel assembly seismic structural response

The applicant supplied supplemental information on June 13, 2012 related to the impact of fuel thermal conductivity degradation on the large break loss-of-coolant (LBLOCA) peak cladding temperature.

The staff determined it is necessary to review the documents that support the analyses associated with the topical report and supplemental information in order to complete its review of WCAP-17524.

Enclosure

C. Regulatory Audit Bases

General Design Criterion 2, "Design Bases for Protection against Natural Phenomena"

General Design Criterion 10, "Reactor Design"

General Design Criterion 16, "Containment Design"

General Design Criterion 35, "Emergency Core Cooling"

Title 10 of the *Code of Federal Regulations* (10 CFR) 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for light Water Power Reactors"

D. Regulatory Audit Scope

The audit team will review documents, drawings, analysis, specifications and other relevant design information associated with Westinghouse Core Reference Report, WCAP-17524 and supplemental information. The following itinerary lists the audit topics for each portion of the audit:

Phase 1, July 31 – August 1, 2012:

- GSI-191 fuel assembly test results related to the new fuel assembly design
- Related GSI-191 test procedure
- Supporting documentation used in relation to fuel TCD degradation related to:
 - Supporting analyses related to supplemental information submitted to WCAP-17524 for LBLOCA
 - Supporting analyses for the burn-up dependent correlation discussed in the supplemental information to WCAP-17524 and comparison to the correlation in Chapter 4 of the DCD
 - Non-LOCA analyses relevant to the new advanced first core design addressing the impact of thermal-conductivity degradation. The impact could be, but not limited to, fuel pin pellet-cladding-interaction or internal gas pressure.
- Grid crush test results for the revised fuel assembly mid and intermediate flow mixer (IFM) grids
- Fuel structural response analysis to seismic and LOCA loads for burned conditions (see IN 2012-09)
- Supporting documentation and test data related to continued use of the WRB-2 and WRB-2M CHF correlations for the new fuel mid and IFM grid design.
- Supporting analyses used to develop FCEP reports regarding the fuel design changes reported in WCAP-17524

Phase 2, August 14-16, 2012:

- Nuclear design
 - Advanced First Core (AFC) impacts on shutdown margin (xenon distribution, limiting SDM determination, treatment of GRCAs, etc.)
 - Reactivity coefficients and peaking factor changes

- Follow-up items from July 31-August 1, 2012, audit

Phase 3, September 11, 2012:

- Follow-up items from previous audits

E. Information and Other Material Necessary for the Regulatory Audit

The staff requires access to knowledgeable personnel regarding the Westinghouse Core Reference Report fuel design changes and related analyses. Specific areas of personnel expertise is requested in the following areas: GSI-191 testing based on the new RPG design, TCD analysis as presented in the supplemental information, fuel seismic response analyses, CHF correlation applicability for the mid and IFM grid design, and nuclear design.

F. Team Assignments

Chris Van Wert, Reactor Systems Engineer, NRO (Audit Team Lead)
Y. Gene Hsui, Senior Reactor Systems Engineer, NRO
Shanlai Lu, Senior Reactor Systems Engineer, NRO
Amrit Patel, Reactor Systems Engineer, NRO
John Budzynski, Reactor Systems Engineer, NRO
Ben Parks, Reactor Systems Engineer, NRR
Bruce Bovol, Project Manager, NRO

G. Logistics

This audit consists of multiple dates, to cover different areas of review related to WCAP-17524. The audit will be conducted at the Westinghouse location identified above. The audit is scheduled to begin at 8:30 a.m. each day of the audit. Participating individuals will meet at the audit location.

H. Special Requests

Appropriate handling and protection of proprietary information shall be acknowledged and observed throughout the audit.

NRC may request an ad-hoc extension of the audit if findings during the ongoing audit reveal the need for additional time. Such an extension will be requested before the audit is adjourned by the NRC staff responsible for the audit.

I. Deliverables

The audit team will issue a regulatory audit summary within 90 days after completing the audit. The audit outcome will be used to identify any additional information to be submitted for making regulatory decisions. The audit will assist the NRC staff in the preparation and issuance of further RAIs for the licensing review of WCAP-17524.

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(Revised 07/03/2012)

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