Regulatory Audit Plan for Topical Report WCAP-17137-P, "Westinghouse Stability Methodology for the ABWR"

Audit Dates to be Determined

Nuclear Innovation North America, LLC. and Westinghouse Electric Corporation

Docket No. PROJ0772

Location: Westinghouse Electric Corporation Office
Rockville, MD 20852

Applicant Contact: Jim Tomkins, NINA

Purpose:

The purpose of the audit is for the U.S. Nuclear Regulatory Commission (NRC) staff to discuss review issues related to the review of topical report WCAP-17137-P, as identified in Attachment 1, and any supporting documentation. The review is intended to ensure that the method adequately predicts ABWR stability performance and that assumptions made are consistent with the regulations.

The expected outcome of the audit is for the staff: (1) to gain a better understanding of the Westinghouse ABWR Stability methodology, including margins to account for uncertainties, (2) to develop requests for additional information in areas not adequately covered in the topical report documentation, and (3) to identify supplemental information that should be added to the topical report which the staff will rely on to make its safety finding.

This audit follows the guidelines in Office of New Reactors (NRO) Office instruction NRO-REG-108 (Revision 0), "Regulatory Audits."

Background:

By letter dated November 1, 2010, South Texas Project Nuclear Operating Company (STPNOC) submitted for the NRC staff, review Topical Report (TR) WCAP-17137, "Westinghouse Stability Methodology for the ABWR," Revision 0 (ML103080623).

Regulatory Audit Scope:

The primary scope of this audit is to review the design calculations and other supporting documents that form the basis of the applicant's ABWR Stability methodology. The NRC staff must have sufficient information to ensure that acceptable risk and adequate assurance of safety can be documented in the NRC staff's safety evaluation report (SER) Regulatory Audit Bases.

Regulatory Bases:

a. 10 CFR Part 50, Appendix A, "General Design Criteria" 10, "Reactor Design."

b. 10 CFR 50, Appendix A, General Design Criteria 12, "Suppression of reactor power oscillations"

Audit Team:

The NRC Office of New Reactors staff from the Reactor Systems, Nuclear Performance & Code Review Branch (SRSB) and its consultant from Oak Ridge National Laboratory will comprise the audit team.

- James Gilmer, NRC, NRO/DSRA/SRSB, Technical Reviewer
- James Steckel, NRC, Project Manager
- Jose March-Leuba, ORNL

Information and Other Materials Necessary for the Audit:

Calculation Documentation and supporting references.

Logistics:

The audit will consist of two parts: (1) applicant identification of primary and supporting documents and making them available for NRC review at least three weeks prior to a face-to-face meeting, and (2) a face-to-face meeting at Westinghouse's Rockville, Maryland, office, with the date and time to be determined after Westinghouse has had sufficient time to review the issues and determine the appropriate personnel needed to address the issues.

The NRC requests that the documentation remain available for access until the audit summary report is issued. The face-to-face meeting is anticipated to require two days, between 9:00 a.m. and 5:00 p.m. A concluding exit teleconference at 4:30 p.m. will occur each day to provide the applicant with the summary of the preliminary audit findings. The NRC staff will have an internal meeting between 4:00 p.m. and 4:30 p.m. each day to summarize the preliminary findings.

The audit issues to be discussed are listed in Attachment 1. Any supporting information that addresses the issues should be made available for review prior to the audit so that the discussions can be most effective.

Deliverables:

A summary report of the audit will be prepared and issued in accordance with NRO-REG-108 (Reference 1) within 45 days following the completion of the audit.

References:

1. NRO Office Instruction NRO-REG-108 (Revision 0), "Regulatory Audits."

2. Letter dated November 4, 2010, STP Nuclear Operating Company to the U.S. NRC, "Submittal of Stability Topical for ABWR" (ML103080622).

3. Topical Report WCAP-17137-P, “Westinghouse Stability Methodology for the ABWR,” Revision 0, October 31, 2010 (ML103080621).

4. Acceptance for the Review of Topical Report WCAP-17137-P, Revision 0, “Westinghouse Stability Methodology for the ABWR,” (ML103500298).

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Attachment 1

Audit Issues for Topical Report WCAP-17137-P, "Westinghouse Stability Methodology for the ABWR"

To license POLCA-T for DIVOM calculations, the NRC staff will need the following:

1. Applicability of Westinghouse CPR correlation to oscillatory conditions. What experimental data exists to verify that the W CPR correlation predicts periodic dryout-rewet caused by power-flow oscillations?

2. POLCA-T benchmark calculations against oscillatory dryout-rewet conditions. i.e., use FRIGG boundary conditions (flow, power ….) and calculate CPR.

3. Details of a POLCA-T DIVOM calculation:

    a. Radial power distribution.

    b. The 20 channels chosen for further analysis.

    c. Plots of power oscillation imposed as a boundary conditions (with DR=1.3).

    d. Plots of flow oscillations that develop.

    e. Pressure data to verify that the channel pressure drop remains constant.

4. A comparison of DIVOM slope calculated by:

    a. POLCA-T.

    b. RAMONA-3.

    c. Generic BWROG.

To license POLCA-T for HCOM calculations, the NRC staff will need the following:

1. POLCA-T benchmark data against reactor operating data (TIPS, gamma scans….) to verify that it develops a good, steady state 3D power distribution.

2. Review the model to generate LPRM signals.

3. Review the LPRM to OPRM assignments.

4. How are the power oscillations excited in ABWR?

5. A sample calculation with sufficient detail to perform an audit of the calculation by hand.