January 4, 2007

ORGANIZATION: General Electric Nuclear Energy (GE)

PROJECT: Economic Simplified Boiling Water Reactor (ESBWR) Design Certification Review

SUBJECT: SUMMARY OF EXIT MEETING HELD ON DECEMBER 15, 2006, TO DISCUSS STAFFS AUDIT OF TRACG LOSS-OF-COOLANT ACCIDENT ANALYSES

The Nuclear Regulatory Commission (NRC) held an audit with General Electric Nuclear Energy (GE) from December 11-15, 2006, at GE Headquarters in Wilmington, North Carolina. The purpose of the audit was to discuss GE's Loss-of-Coolant Accident analysis and the proprietary TRACG code application as presented in Chapter 6.2 and Chapter 6.3 of the Design Control Document (DCD). A list of attendees is provided in Enclosure 1.

A nonproprietary summary of the meeting is provided in Enclosure 2. Non-proprietary meeting slides are provided in Enclosure 3. These slides can be accessed through the Agencywide Documents Access and Management System (ADAMS) that provides text and image files of NRC's public documents. The slides mentioned above may be accessed through the ADAMS system under Accession No. ML063540147. If you do not have access to ADAMS or if there are problems in accessing the handouts located in ADAMS, contact the NRC Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737 or by e-mail to pdr@nrc.gov.

/RA/

Shawn Williams, Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosures: As stated

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ADAMS ACCESSION NO: ML063540379

OFFICE	DNRL/PM	SNPB/ABC	SCVB/BC	DNRL/BC
NAME	SWilliams	R.Landry	R.Dennig	MShuaibi
DATE	12/20/06	1/4/07	1/4/07	1/4/07

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December 11-15, 2006 Meeting Attendance List

Name	Affiliation
Shawn Williams	NRC
Martha Barillas	NRC
Mike Snodderly	NRC
Peter Yarsky	NRC
Veronica Klein	NRC
Hanry Wagage	NRC
Allen Notafrancesco	NRC
Jack Tills	Sandia National Laboratory
David Hinds	GE
Wayne Marquino	GE
Frostie White	GE
Chester Cheung	GE
Charles Heck	GE
John Sorensen	GE
Jens Andersen	GE
Jim Kinsey	GE
Javier Escawilla	GE
Mike Cook	GE
Jennifer Bowie	GE
Sylvia Wang	GE

Summary of December 11-15, 2006, Audit

The purpose of the audit was to discuss General Electric's (GE's) Loss-of-Coolant Accident (LOCA) analysis and the proprietary TRACG code application as presented in Chapter 6.2 and Chapter 6.3 of the Design Control Document (DCD). GE's nonproprietary meeting slides are provided in Enclosure 3.

The Containment and Ventilation Branch staff reviewed GE's containment peak pressure analysis using TRACG as the computer modeling code. The staff presented their draft confirmatory proprietary peak containment pressure analysis using MELCOR as the modeling code that was performed under a contract with Sandia National Laboratories. The discussion between GE and the NRC staff included comparing input decks to the two models and comparing the results. Outstanding Request for Additional Information (RAIs) associated with Chapter 6.2 and GEs proposed responses was also discussed by the staff.

The Nuclear Performance and Code Review Branch staff reviewed GE's TRACG code, related topical reports and discussed outstanding RAIs associated with Chapter 6.3 and GE's proposed responses. The staff plans to issue a separate audit report for their review of the TRACG code for LOCA application.

The following preliminary observations were identified by the staff:

1. The amount of noncondensibles in the gravity driven cooling system airspace is sensitive to whether a single pipe node or a double pipe node is used in modeling the ESBWR containment. GE may be required to justify why a double pipe nodalization would not be more appropriate to use in their bounding peak pressure calculations.

2. GE should update the TRACG LOCA application to the ESBWR considering the modeling changes that have been made since the original approval. GE indicated that they would provide this as an Appendix to Chapter 6.

3. GE should address the sensitivity of TRACG reactor pressure vessel level calculations to the drywell pressure.

4. GE should provide their radiolysis gas generation profile and the associated assumptions.

5. Concerning decay heat generation, GE should:

   (a) Provide a list of the conservative assumptions applied to the calculation of the decay heat for the ESBWR.

   (b) If an increase in core average exposure is applied to ensure conservatism in the decay heat, verify that the plutonium fission, and hence fractional decay heat contribution, was not artificially increased and provide the irradiation time and exposure assumptions for the analysis.

(c) Provide a justification of the application of the same decay heat curve to both small and large break LOCAs.

(d) Provide a description of the heat sources considered in the decay heat analysis.

(e) Provide a description the distribution of the decay heat in the TRACG core model.

(f) Provide a comparison of the ESBWR specific design values for the hydraulic control unit valve deenergization and stroke time, instrument and logic delay time, and control blade insertion time to those values assumed in the calculation of the decay heat curve.

(g) Provide an explanation of the reference to the 1979 ANS standard in Table 6.3-11 of the DCD Rev. 2

(h) Provide a section in the next revision to the DCD that describes the assumptions in the shutdown power calculation that ensure that the power is conservative for a full spectrum of LOCAs for the ESBWR.

6. At the conclusion of the TRACG LOCA audit on December 20, 2006, the staff identified the following additional preliminary observations:

(a) The TRACG-04P code used to perform the ESBWR LOCA analyses provided in Revision 2 of the DCD has not undergone a Level 2 review, as required by internal GE processes for complete qualification.

(b) Clarification is needed on the worst single failure analyzed in the LOCA analysis and whether the SLCS is susceptible to a valve failure that could lead to nitrogen injection into containment.

(c) Clarification is needed on the location of the ESBWR SLCS injection line check valve to determine the consequences of a double-ended break in the line downstream of the check valve.

(d) GE has not addressed all the open items contained in the TRACG SER issued during pre-application.

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