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March 7, 2011
U7-C-NINA-NRC-110040

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Units 3 and 4
PROJ0772
Response to Request for Additional Information

Reference: Request for Additional Information re: South Texas Project Nuclear Operating Company Topical Report (TR) WCAP-17065P, Revision 0, "Westinghouse ABWR Sub-compartment Analysis Using GOTHIC", December 2, 2010

This letter provides supplementary responses to the following RAI questions from the reference:

RAI-6
RAI-8

There are no commitments in this letter.

If you have any questions on this response, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 3/7/11

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

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Attachment:

1. RAI-6 Supplement 1
2. RAI-8 Supplement 1

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MRO

STI 32832232

cc: w/o attachment except*
(paper copy)

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RAI-6 Supplement 1

QUESTION:

In Appendix A of the applicant's report on the ABWR subcompartment methodology using GOTHIC, the applicant provides input data. The applicant should confirm which case Table A-1, Table A-2; and Table A-3 correspond to in the applicant's analysis. The staff noted that the forward and reverse loss coefficients change with each case. Please explain the discrepancy between the ABWR DCD loss coefficients and the cases provided in Table A-1, Table A-2, and Table A-3. Also provide an explanation for how the applicant arrived at the values it used for each volume in the analysis for each case in Table A-1, Table A-2, and Table A-3 and the relationship to the volume data provided in the ABWR DCD.

SUPPLEMENTAL RESPONSE:

The original response to this RAI was transmitted to the NRC in STPNOC Letter No. U7-C-NINA-NRC-110003 dated January 31, 2011. In that response, it was noted that a typographical error was discovered in Section 5, List Item 1 in WCAP-17065-P in which the word "without" should be removed from the second sentence in the Item 1 description. However, no markup of WCAP-17065-P was provided in that response. This supplemental response provides that markup with gray shading showing the change from Rev 0 of WCAP-17065-P.

WCAP-17065-P Markup

5 GOTHIC BENCHMARK MODEL DESCRIPTION AND RESULTS

1. DCD Volume Model – These models are based on the volume data provided in the DCD. DCD flow path loss coefficients are used for flow paths ~~without~~ including the additional mechanical losses given in the DCD.

RAI-8 Supplement 1

QUESTION:

During an audit of STP's topical report on ABWR subcompartment analysis using GOTHIC the NRC staff identified areas which required clarification. The staff requests that the applicant specify the following information:

1.) Please clarify in the report specifically what approval is being sought; and what, if any, limitations are considered appropriate. Please address, at a minimum, the general scope of the approval with respect to breaks, break locations, correlations and loss coefficients and the role of the currently unapproved mass and energy release code reference in the report.
2.) Please specify what version of the GOTHIC code is being used for this specific application?
3.) Please describe the procurement methodology for GOTHIC.
    a. Is it procured as safety related?
    b. Was it developed under a program meeting 10 CFR 50, Appendix B and 10 CRF Part 21?
    c. Describe the procurement chain for Qualification of NAI as an Appendix B supplier.

SUPPLEMENTAL RESPONSE:

The original response to this RAI was transmitted to the NRC in STPNOC Letter No. U7-C-STP-NRC-100261 dated December 28, 2010. In that response, it was noted that Westinghouse will update WCAP-17065-P to clearly address the scope and limitations for the approval being sought. In addition, the report would be updated to address the use of the GOBLIN code to generate the required ABWR short-term mass and energy release input for the subcompartment pressurization analyses. This supplemental response provides the markup to address these items with gray shading showing the change from Rev 0 of WCAP-17065-P.

WCAP-17065-P Markups

1 INTRODUCTION AND BACKGROUND

The code that was used by General Electric (GE) to perform the ABWR subcompartment design analyses for the design control document (DCD) (Reference 3) is not available to Westinghouse or Toshiba. Therefore, an alternative code/methodology is required to address potential future ABWR design changes.

An ABWR subcompartment design analysis methodology that uses the GOTHIC code is described in this report. Westinghouse is planning to use GOTHIC for future containment analysis work. Using a single code for containment analyses will simplify code maintenance and user qualification activities. Furthermore, TMD has modeling limitations that do not exist in GOTHIC.

The GOTHIC code qualification report (Reference 4) compares model results to a number of tests that represent conditions similar to those that would be observed in a typical subcompartment analysis. This provides a significant level of confidence that GOTHIC is a suitable tool for performing subcompartment analyses. To provide an additional level of confidence, Westinghouse performed a benchmark comparison to the approved TMD subcompartment analysis methodology using GOTHIC and TMD models of the ABWR steam tunnel subcompartment configuration that is described in the ABWR DCD.

The purpose of this report is to ~~document and demonstrate~~ obtain NRC approval for the Westinghouse implementation of the GOTHIC subcompartment analysis methodology for the ABWR as described in Section 2 of this report. This methodology will be used to analyze breaks located in subcompartments outside of the primary containment (i.e. secondary containment and the steam tunnel system). This document provides:

2 SUBCOMPARTMENT MODELING METHODOLOGY

This section describes the ABWR subcompartment modeling methodology for which approval is being sought. This section describes the input development method to be used for Westinghouse ABWR subcompartment analyses.

2.1 CONTROL VOLUMES

6.1 STEAM TUNNEL MODEL DESCRIPTION

Breaks are postulated to occur in the reactor building steam tunnel, the control building steam tunnel, and the lower turbine building. Main steam line break ~~M~~mass and energy releases for these sample analyses are calculated using the Westinghouse boiling water reactor (BWR) loss of coolant accident (LOCA) mass and energy release code GOBLIN, as described in Reference ~~6~~. Although the Reference 6 methodology for mass and energy release is not yet approved for short-term releases nor is such approval being sought with this report, it is used to demonstrate the application of the subcompartment methodology for which approval is being sought. In practice, any USNRC approved BWR short-term mass and energy release methodology can be used with these models.

The feedwater line break case shown in Section 6.3 is also provided to demonstrate an application of the subcompartment methodology for a liquid line break. Because no flow occurs from the vessel, due to the presence of check valves between the break and the vessel, just the pump side of the FWLB mass and energy releases from Reference 7 are used as input for this case.

7 CONCLUSIONS

The GOTHIC code qualification report (Reference 4) provides a comparison of the code results to
subcompartment test data. The good comparison that is presented in the report demonstrates that the code contains the required modeling capabilities needed to perform ABWR subcompartment design analyses.

A benchmark transient comparison with the U.S. NRC approved subcompartment analysis code TMD further qualifies the application of the GOTHIC subcompartment design analysis methodology for the ABWR. The GOTHIC model results compare very well to the TMD benchmark analysis results.