AUDIT REPORT
THE SOUTH TEXAS PROJECT, UNITS 3 AND 4, FUKUSHIMA MITIGATION STRATEGIES RECOMMENDATION 4.2 (MAAP CALCULATIONS) REPORT

NRC Audit Team:

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1.0 PURPOSE

The purpose of the audit was to confirm that the model, assumptions, and initial conditions used in the analysis developed by Nuclear Innovation North America, LLC. (NINA) were appropriate and conservative to develop the core cooling timeline during an extended loss of alternate current (AC) power station blackout event.

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

2.0 BACKGROUND AND AUDIT BASES

On September 20, 2007, South Texas Project (STP) Nuclear Operating Company submitted to the U.S. Nuclear Regulatory Commission (NRC), a Combined License Application (COLA) Final Safety Analysis Report to construct and operate two additional units (Units 3 and 4) based on the United States Advanced Boiling Water Reactor (ABWR) Certified Design Control Documents. The STP Nuclear Power Plant site is located in the county of Matagorda near Bay City, Texas. On January 24, 2011, NINA became the primary applicant for the license for these two units.

NINA submitted its COLA for Chapter 1E, "Fukushima Mitigative Strategies Recommendation 4.2," by letters, dated June 25, 2012 (ML121850710) and December 6, 2012 (ML12346A445). The NRC staff identified a need to audit the Modular Accident Analysis Program (MAAP) results to address Fukushima Near-term Task Force Recommendation 4.2 (ML121230021) regarding mitigation strategies.

3.0 OBJECTIVES

The objective of the staff's audit was to:

- Review the analysis results of the Modular Accident Analysis Program (MAAP) (see reference 1) which has been used to develop the core cooling timeline in the STP, Units 3 and 4, FLEX Integrated Plan.

4.0 OBSERVATIONS AND RESULTS

On August 20, 2014, the NRC staff performed an audit of the Toshiba/Westinghouse's MAAP results (see reference 1), which has been used to develop the core cooling timeline for Fukushima Mitigation Strategies, Recommendation 4.2 in the STP, Units 3 and 4, FLEX Integrated Plan. The MAAP code has been used by nuclear facility licensees to perform severe accident analyses and other thermal/hydraulic performance predictions.

The staff audited the report and had the following observations:

- The NRC staff noted an inconsistency on Page 2 of the report. The report stated that no operator action is required in the first two minutes. On a subsequent page, it was stated that the reactor core isolation cooling (RCIC) manual switchover took place 74 seconds after initiation of the event. The staff discussed the inconsistency with the applicant and confirmed that the RCIC switchover occurs automatically. The applicant agreed to revise the report to correct the inconsistency.

- The NRC staff confirmed that the MAAP calculation supports that the steam driven RCIC system can continue operating for at least 36 hours following event initiation. In addition, the staff confirmed that the Containment Overpressurization System (COPS) rupture disk is determined to open at 22 hours after event initiation.

- The NRC staff noted that when the RCIC system loses its ability to continue running, manual operation is necessary to depressurize the reactor pressure vessel (RPV) and begin injection into the RPV using the AC Independent Water Addition (ACIWA) system. The ACIWA system is powered by a diesel driven pump.

- The NRC staff noted from Figure 9 (RCIC) and Figure 10 (ACIWA) from the report (see reference 1) that two hour cycling (on-off) of the systems is occurring. The applicant stated that this was assumed in the model to maximize the time the systems can perform their cooling function. The staff agreed with the analysis and did not have any other issues.

5.0 CONCLUSION

Based on the review of the information and calculations provided by the applicant, the NRC staff confirmed the MAAP code is appropriate software for the timeline analysis. The model, assumptions, and initial conditions are reasonable and adequately represent the STP ABWR reactor building and safety systems.

The audit is considered to be complete, and there are no other outstanding issues.

6.0 REFERENCES

1. Toshiba/Westinghouse Calculation NSO-2013-000311/PSNN-2013-0513, Revision 001, issued August 8, 2013, “STP-3/4 MAAP Analysis for SBO Sequence Design Report.”

2. Nuclear Innovation North America, LLC, “STP 3 & 4 ABWR FLEX Integrated Plan,” Revision 2, June 19, 2014.

3. Interim Staff Guidance (ISG) JLD-ISG-2012-01, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” (ML12229A174) dated August 29, 2012.

4. Nuclear Energy Institute (NEI) 12-06, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide (ML12242A378).

5. NRO Office Instruction NRO-REG-108 (Revision 0), “Regulatory Audits.”