

AUDIT REPORT
THE SOUTH TEXAS PROJECT, UNITS 3 AND 4, OPEN PHASE RISK ANALYSIS REPORT

NRC Audit Team:

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1.0 SUMMARY

On June 17-18, 2014, the U.S. Nuclear Regulatory Commission (NRC) conducted an audit at the Westinghouse Twinbrook office in Rockville, Maryland. The audit was conducted to verify that the responses to Request for Additional Information (RAI) 08.02-25 and RAI 08.02-26 are supported by the analysis and other supporting documentation developed by Nuclear Innovation North America, LLC. (NINA) for the South Texas Project (STP), Units 3 and 4 combined license application, to address the issues described in NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," (ML12074A115).

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 July 27, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Bulletin 2012-01, "Design Vulnerability in Electric Power System" (ML12074A115). The NRC staff issued Request for Additional Information (RAI) 08.02-25 and RAI 08.02-26 requesting NINA to address the issues described in the bulletin. NINA provided its initial responses to these RAIs at various times in 2013 and 2014. The NRC staff found these responses unacceptable. On May 15, 2014, NINA re-issued and superseded previous responses. In its response, NINA included a probabilistic risk assessment (PRA) section evaluating the risk to the plant from an electric power system open phase condition. It evaluated a four different plant response case assuming specific plant conditions. It also discussed the results of the evaluation.

The NRC identified a need to audit the risk analysis report referenced in the PRA section to support completing the review of the RAI response. Specifically, the audit would allow the NRC staff gain a better understanding of the analysis underlying the RAI response and confirm the staffs understanding of STP's RAI response. It would also allow the staff to identify additional information necessary for the applicant to supplement its RAI response in order for the staff to reach a licensing decision.

3.0 OBJECTIVES

The objectives of the staff's audit were to:

- Review the assumptions, calculations, and conclusions of the Open Phase Condition Risk Analysis as they pertain to the responses to RAI 08.02-25 and RAI 08.02-26.

4.0 OBSERVATIONS AND RESULTS

The audit focused on STP's open phase condition risk analysis report. This report is documented as "Open Phase Condition Risk Analysis," Revision 1, Prepared for South Texas Project 3 and 4, prepared by ETRANCO, Inc., dated June 14, 2014. The report quantitatively evaluated four scenario cases involving the open case condition. The analysis focused on the delta risk caused by the postulated open phase condition. The applicant stated that this delta risk was captured by analyzing the reliability of the injection function in time to reverse the event. The quantitative analysis reported Conditional Core Damage Probabilities (CCDPs) and Core Damage Frequencies (CDFs) for each case.

The staff audited the report and had the following observations:

1. The report did not provide a basis for selecting the four cases evaluated.
2. The report did not discuss the reliability of the negative sequence relays and where the reliability data was obtained.
3. The source of the loss of offsite power CDF was not provided.
4. The scenario case evaluating the addition of the negative sequence relays used a wrong failure rate data and did not evaluate the performance of the electrical safety bus under-voltage relays.
5. The CCDPs and CDFs results do not explicitly model the scenarios up to core damage since containment cooling was not explicitly modeled.
6. Scenario case three was not provided in the RAI response.

The staff recommended to NINA to revise the report to address the issues described above and proposed to NINA two options for closure of staff's questions related to the probabilistic analysis discussed within the responses to RAI 08.02-25 and RAI 08.02-26 relative to the design proposed for mitigating a loss of phase condition: (1) continue to address the NRC staff's detailed questions on the probabilistic analysis report, or (2) revise its submittal providing a qualitative discussion of the risk associated with the proposed design.

5.0 CONCLUSION

The staff concluded that because the CCDPs and CDFs did not explicitly model the scenarios up to core damage, these results cannot be used for comparison against the Commission Goals for new reactors or the staff's risk metrics described in Regulatory Guide 1.174.

The staff determined that issues identified during the audit need to be addressed and the RAI response revised to reflect the changes for the staff to be able to reach a licensing decision based on the RAI response.

No licensing or regulatory decisions were made during this audit.

6.0 REFERENCES

1. NRC Bulletin 2012-01, "Design Vulnerability in Electric Power System," issued July 27, 2012.
2. NRC Information Notice 2012-03, "Design Vulnerability in Electric Power System," issued March 1, 2012.
3. NRO Office Instruction NRO-REG-108 (Revision 0), "Regulatory Audits."
4. Open Phase Condition Risk Analysis, Revision 1, Prepared for South Texas Project 3 and 4 by ETRANCO, Inc., issued June 14, 2014.