

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

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1.0 PURPOSE

The purpose of the audit was 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 U.S. Nuclear Regulatory Commission (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 NRC staff issued Bulletin 2012-01 to all holders of operating licenses and combined licenses for nuclear power reactors. The NRC staff issued RAI 08.02-25 and RAI 08.02-26, requesting NINA to address the issues described in Bulletin 2012-01. NINA provided its initial responses to these RAIs at various times in 2013 and 2014. The NRC staff found these responses unacceptable. On June 25, 2014, NINA re-issued and superseded the previous responses. The NRC staff identified a need to audit the analyses in support of the revised responses.

3.0 OBJECTIVES

The objective of the staff's audit was to:

- Review the assumptions, methodology of the calculated portions, and conclusions of the negative sequence relays (NSR) setting calculation, as it pertains to the responses of RAI 08.02-25 and RAI 08.02-26.

4.0 OBSERVATIONS AND RESULTS

The audit focused on STP's open phase condition NSR setting calculation. The calculation is documented in "Negative Sequence Relay Setting Calculation," STP-EC-14001, Revision 1, prepared by DP Engineering Ltd., Co, for STP, Units 3 and 4. The calculation described how the expected nominal setpoint and time delay were determined. The staff considers these settings as nominal values because the final design of the system has not been completed and final procurement information for the NSR is not available yet. The RAI responses list the expected nominal setpoint as 4.5 percent (design limit is 5 percent) and the expected nominal time delay as 2.5 seconds (design limit is 3 seconds).

The staff audited the NSR calculation and noticed the following observations:

1. The NSR calculation was not performed in accordance with Regulatory Guide (RG) 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation." As part of the staff's observations were in the assumptions of the setpoint drift term value, as-found and as-left tolerances, and the analytical limit value.
2. The NSR calculation is based on equipment that has not yet been procured.
3. The NSR calculation did not reference the disposition of an applicable Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21 report.

The staff recommended to NINA to revise the calculation, the RAI responses, and the final safety analysis report (FSAR) to address the issues described above. NINA agreed to do the following steps:

1. Remove specific setpoint and time delay values from the proposed Technical Specifications (TS) for the NSRs and reference the STP's Setpoint Control Program (SCP).
2. Remove Surveillance Requirement (SR) 3.3.1.4.8 (divisional functional test) and SR 3.3.1.4.9 (sensor channel calibration) from the proposed TS for the NSR. These devices will have the same SRs as the existing undervoltage and degraded voltage relays. The SRs include:
 - a. SR 3.3.1.4.1 (sensor channel check).
 - b. SR 3.3.1.4.2 (output channel functional test).
 - c. SR 3.3.1.4.3 (division functional test).
 - d. SR 3.3.1.4.4 (comprehensive functional test).
 - e. SR 3.3.1.4.5 (ECCS response time test).
 - f. SR 3.3.1.4.6 (sensor channel calibration).
3. Ensure nominal setpoint values (and time delay) are discussed in the FSAR Section 8.3.
4. The setpoint calculation will be included under the scope of work required by the existing inspections, tests, analyses, and acceptance criteria Table 3.4, Item 13. This will ensure that final confirmation of the NSR setpoint and time delays are under the STP's SCP.
5. Clarify the wording in the probabilistic risk assessment section of the RAI response as to why the NSRs are highly reliable.

5.0 CONCLUSION

The staff concluded that because the NSR calculation was not performed in accordance with the RG 1.105, Revision 3, these results cannot be used for the proposed TS.

The staff determined that issues identified during the audit need to be addressed. The RAI responses, the FSAR, and proposed markup of the TS need to be revised for the staff to be able to resolve the open items.

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. Calculation STP-EC-14001, Revision 1, "Negative Sequence Relay Setting Calculation," by DP Engineering.
4. Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation," issued December 1999.
5. NRO Office Instruction NRO-REG-108 (Revision 0), "Regulatory Audits."