

April 2, 2015

Mr. John W. Stetkar, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE NUCLEAR INNOVATION
NORTH AMERICA, LLC COMBINED LICENSE APPLICATION FOR THE
SOUTH TEXAS PROJECT NUCLEAR STATION, UNITS 3 AND 4

Dear Mr. Stetkar:

I am writing in response to a letter from the Advisory Committee on Reactor Safeguards (ACRS), dated February 19, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML15055A348). The letter addressed the U.S. Nuclear Regulatory Commission (NRC) staff's safety evaluation report for the combined license application (COLA) for South Texas Project, Units 3 and 4 (STP 3 and 4). The ACRS discussed the staff's evaluation during its 621st meeting on February 5, 2015. The ACRS Advanced Boiling-Water Reactor (ABWR) Subcommittee also previously discussed technical aspects of the COL and the staff's safety evaluation at meetings on the following dates: March 2, March 18, May 20, June 8, June 23–24, October 20, and November 30, 2010; February 8, March 8–9, April 6, April 21, June 21, and October 4, 2011; October 2, 2012; April 24, July 9, and November 22, 2013; and April 9, November 5, and December 3, 2014.

The ACRS's letter included the following conclusions and recommendations:

Conclusions:

1. There is reasonable assurance that STP Units 3 and 4 can be built and operated without undue risk to the health and safety of the public. The COLA for STP Units 3 and 4 should be approved following its final revision.
2. There is reasonable assurance that the ABWR design and the STP Units 3 and 4 site satisfy the requirements resulting from the Fukushima Near-Term Task Force recommendations.

Staff Response: The staff appreciates the Committee's efforts and agrees with its conclusions. The staff will document its evaluation in the final safety evaluation report for the STP 3 and 4 COL.

Recommendation 1: The final plant-specific turbine missile analyses should explicitly evaluate each turbine control and protection system including the turbine speed sensors, all component failure modes, all required support systems, and the measured material toughness properties for the STP Units 3 and 4 monoblock rotors.

Staff Response: The staff agrees that the final plant-specific turbine missile analyses should evaluate the turbine control and protection systems including the speed sensors and each of the

component failure modes. The analysis should use the actual, measured material toughness properties of the STP 3 and 4 rotors as described in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Subsection 3.5.1.3, "Turbine Missiles," issued March 2007. Section 3.5 of the applicant's final safety analysis report incorporates by reference Section 3.5 of Tier 2 of the ABWR Design Control Document (DCD). As a result, the applicant must fulfill the licensing and design requirements in DCD Subsection 3.5.1.1.1.3 and COL license information item 3.13 described in DCD Subsection 3.5.4.5. Subsection 3.5.4.5 of the COL Final Safety Analysis Report specifies that "A turbine system maintenance program will be submitted within 3 years following the receipt of a COL that includes a probability calculation of turbine missile generation and shows that the turbine meets the minimum requirements as given in Table 3.5-1 (COM 3.5-1)." This probability analysis will need to evaluate each turbine control and protection system and all component failure modes, including the condition that the primary overspeed trip system may be out of service during turbine generation. When completed, this analysis will be submitted to the NRC as part of the turbine maintenance program approval process.

Recommendation 2: Rather than imposing a requirement for weekly testing of turbine valves until the turbine missile analysis is submitted, the staff should incorporate a risk-informed analysis to determine the appropriate test frequency.

Staff Response: Subsection 3.5.1.1.1.3 of Tier 2 of the ABWR DCD requires the combined license applicant to submit for NRC approval, within 3 years of obtaining an operating license, a turbine system maintenance program, including probability calculations of turbine missile generation based on an NRC-approved methodology. Without an approved turbine maintenance program, the main steam control and stop valves; intermediate intercept and stop valves; and steam extraction nonreturn valves need to be tested weekly to ensure that the requirements of general design criteria 4 in Appendix A to Part 50 of Title 10 of the Code of Federal Regulations, are met. Imposing this weekly testing requirement is consistent with NUREG-0800, Section 3.5.1.3 when the licensee does not have an NRC-approved turbine missile analysis. This turbine valve test frequency has been implemented at current operating reactors. Some new reactor designs (e.g., U.S. EPR) also specify weekly valve testing in their Design Control Documents.

As stated previously, after the applicant receives a combined license, it will submit a turbine system maintenance program within 3 years, which will include a turbine missile generation probability analysis. The turbine missile probability analysis will form the basis for refining the inspection and testing frequencies that will be specified in the turbine maintenance program and for deleting the license condition imposing weekly testing. Therefore, the staff expects that the objective of the ACRS' comment (i.e., the determination of a more appropriate test frequency) will be achieved upon applicant submittal, and staff approval, of a plant-specific turbine missile analysis for STP 3 and 4.

Recommendation 3: The Standard Review Plan acceptance criteria regarding Charpy V-notch energy and fracture appearance transition temperature need to be updated to address differences between turbine rotors fabricated with shrunk-on discs versus monoblock rotors.

Staff Response: The staff agrees that monoblock rotors are different from shrunk-on-disc rotors and that clarifying guidance regarding the review of monoblock rotor material properties should be provided in NUREG-0800, Subsection 10.2.3, "Turbine Rotor Integrity." However,

even in the absence of specific guidance in NUREG-0800, Subsection 10.2.3, the staff notes that the applicant successfully provided an alternative methodology that was found to be acceptable by the staff for establishing material property acceptance criteria for monoblock turbine rotors. As such, new reactor applicants and existing plants installing replacement turbines can effectively obtain staff approval of such monoblock rotor designs. Nonetheless, the staff will consider developing specific guidance to address this issue during the next revision to this NUREG-0800 subsection.

Recommendation 4: Fire hazard analyses have not thoroughly evaluated the possibility of fire-induced spurious actuations that may result from heat or fire damage to digital instrumentation and control signal cabinets, when external connections to those cabinets are made via fiber optic cables. Staff consideration of this as a generic issue would be prudent.

Staff Response: The staff supports the ACRS's view that this issue should be evaluated generically. The staff also understands that this issue does not need to be addressed further in the STP license proceeding; as the staff previously explained to the ACRS, the STP 3 and 4 design is adequate. The existing staff and industry guidance does not address the evaluation of the possibility of fire-induced spurious actuations that may result from heat or fire damage to digital instrumentation and control signal cabinets when external connections to those cabinets are made through fiber optic cables. The staff also acknowledges the recent ACRS publication, NUREG-1635, Volume 11, "Review and Evaluation of the Nuclear Regulatory Commission Safety Research Program: A Report to the U.S. Nuclear Regulatory Commission" (ADAMS Accession Number [ML15007A146](#)). This NUREG recommends research projects that could address several fire-safety related issues, including the effects of heat on digital equipment. The staff will continue to discuss this issue with both internal and external stakeholders. The staff will update the ACRS with a progress report in the future.

We thank the ACRS for its time and valuable advice, and look forward to working with the Committee in the future.

Sincerely,

/RA/

Mark A. Satorius
Executive Director
for Operations

cc: Chairman Burns
Commissioner Svinicki
Commissioner Ostendorff
Commissioner Baran
SECY

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Executive Director
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