Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

October 14, 2010
U7-C-STP-NRC-100233

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
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached is a response to an NRC staff question included in Request for Additional Information (RAI) letter number 364 related to Combined License Application (COLA) Part 2, Tier 2, Appendix 6C.

The Attachment addresses the response to the RAI question listed below:

RAI 06.02.02-31

No COLA changes are required as a result of this response.

There are no commitments in this response.

If you have any questions regarding this response, please contact Scott Head 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 10/14/2010

MA McBurnett

Mark McBurnett
Vice-President, Oversight and Regulatory Affairs
South Texas Project Units 3 & 4

jet

Attachment: RAI 06.02.02-31

D091
NRO

STI 32766460

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

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RAI 06.02.02-31

QUESTION:

Please provide an assessment of the potential for chemical effects from concrete debris generated by erosion from a LOCA jet. The response to RAI 06.06.02-27 concluded that sodium aluminum silicate would not precipitate based on solubility, but it is not clear to the staff that the 302 ft2 of flat surface area assumed in the analysis (based on the assumption that coatings are removed) is bounding for STP 3 & 4. Please include one or more illustrations to show the locations of coatings and concrete considered in the analysis.

RESPONSE:

The concrete inside the STP 3&4 containment is covered by steel plate, except for the upper drywell floor, which is covered by a qualified coating system. A review was conducted of the STP 3&4 upper drywell spatial relationship of piping systems relative to the drywell floor. The results show that there are two potential breaks of concern relative to the removal of qualified coatings and exposure of concrete: the main steamline (MSL) break, and the feedwater line (FWL) break.

For the MSL break, a review of the STP 3&4 MSL piping elevation relative to the drywell floor was conducted. It was determined that the lowest elevation for the MSLs (which is the closest distance to the drywell floor) was at the containment penetration, and consequently, the containment penetration elevation was the limiting break location with respect to removal of qualified coatings and potential exposure of the concrete substrate. The lowest point of the MSL piping is 13.1 feet above the drywell floor with a resultant L/D of 5.61, in which L is the distance from the pipe to the drywell floor and D is the diameter of the pipe. Testing performed in support of GSI-19 (e.g. WCAP-16538-P) has shown that qualified coatings will remain intact for L/D values of at least 4 to 5 (Reference "NRC Staff Review Guidance Regarding Generic Letter 2004-02 Closure in the Area of Coatings Evaluation" dated March 2008). Therefore, it is likely that no concrete will become exposed as a result of a MSL break. Even though there is expected to be no exposed concrete, the STP 3&4 analysis assumed a conservative value of 302 ft^2 of exposed concrete, which is based on the destroyed qualified coatings assumption used in the BWROG Utility Resolution Guideline (URG), NEDO-32686.

For the FWL break, a review of the STP 3&4 FWL piping elevation relative to the drywell floor was conducted. Similar to the MSLs, the containment penetration represented the limiting break location. The lowest point of the feedwater piping is 4.9 feet above the drywell floor with a resultant L/D of 2.67. The following paragraphs explain why, for an L/D of 2.67 for a FWL break, an assumed concrete exposure of 302 ft^2 is conservative.

Westinghouse testing of subcooled jet impingement on bare concrete surfaces from a fluid supply of 2250 psig and about 550°F is summarized in WCAP-7391 (proprietary). This testing, which was performed with subcooled water at pressures approximately twice those of the

ABWR, showed no observable concrete damage at an L/D ratio of 3.2. The jet impingement pressure loading from the test conditions is compared to that of the ABWR using the ANSI/ANS 58.2-1988 jet expansion model. The model was used to calculate a stagnation pressure at PWR conditions (fluid conditions of 2250 psia and 540°F and an L/D = 3.2) and compared to a stagnation pressure at ABWR conditions (fluid conditions of 1070 psia and 540°F and an L/D = 2.67). The use of slightly more subcooled conditions is conservative as it provides for the jet to remain intact longer and results in a slightly higher stagnation pressure at a given value for L/D. The results of these calculations are summarized below;

For PWR conditions:

$$\text{Stagnation Pressure}|_{P = 2250\ \text{psia},\ T = 540°F\ \text{and}\ L/D = 3.2} > 171\ \text{psig}$$

For ABWR conditions:

$$\text{Stagnation Pressure}|_{P = 1070\ \text{psia},\ T = 540°F\ \text{and}\ L/D = 2.67} = 58\ \text{psig}$$

This calculation demonstrates that the stagnation pressure of the ABWR jet at the closest concrete surface to a FWL break location is about ⅓ of the calculated value for a PWR jet tested which resulted in no concrete damage. Based on this comparison of calculated stagnation pressures, the assumed value of 302 ft^2 of exposed concrete for a FWL break is conservative.

There is no COLA change required as a result of this response.