



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

July 21, 2010

U7-C-STP-NRC-100173

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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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 supplemental response to an NRC staff question included in Request for Additional Information (RAI) letter number 401 related to Combined License Application (COLA) Part 2, Tier 2, Appendix 6C. This completes the response to this letter.

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

RAI 06.02.02-27 Supplement

There are no commitments in this response.

If you have any questions regarding this response, please contact me 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 7/21/10

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

jet

Attachment:

RAI 06.02.02-27 Supplement

STI 32707919

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

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RAI 06.02.02-27 Supplement**QUESTION:**

The staff reviewed Supplemental response #2 to RAI 06.02.02-11 and determined the response is not complete. The aluminum corrosion calculations and solubility data used to analyze chemical effects were based on boron-containing solutions. These analysis tools do not apply directly to boron-free BWR coolant. In addition, the analysis did not include all relevant chemical debris sources. Therefore, the staff requests the following information:

- Analysis of aluminum chemical effects using corrosion and solubility data applicable to the post-LOCA ECCS fluid at STP 3&4.
- If the pH is expected to vary with time during the postulated 30-day post-LOCA period, provide an analysis of the chemical effects based on the predicted transient or explain how your approach is bounding. (For example, addition of sodium pentaborate from the standby liquid control system would increase pH over some time period.)
- Discuss your plans to address chemical effects not considered in the initial analysis, such as:
 - o Constituents dissolved from concrete in the coatings zone of influence (ZOI), since the NRC coatings guidance assumes removal of the coating within the ZOI. Concrete dissolution generates elements that can form chemical precipitates, including precipitates containing aluminum (e.g., sodium aluminum silicate).
 - o Zinc, which corroded at a low rate in testing related to PWRs but would be expected to corrode at higher rates in neutral and acidic solutions. This may result in levels of zinc particulate, zinc corrosion products, and zinc in solution that could contribute to other chemical precipitates.
 - o Corrosion products (iron oxide) resulting from iron or steel corrosion prior to or following a LOCA
 - o Any other material present in containment that would be exposed to the post-LOCA fluid and has not been addressed by an integrated chemical effects analysis for the ABWR environment.
- If your analysis predicts the formation of chemical debris, discuss your plans for addressing the impact of this debris on the ECCS strainers and fuel assemblies (e.g., integrated strainer testing or a simplified approach that relies on significant clean screen area).

SUPPLEMENTAL RESPONSE:

In the response to RAI 06.02.02-27 provided in STPNOC letter No. U7-C-STP-NRC-100131 dated June 10, 2010, it was noted that a supplement would be provided documenting the results of bench top testing to establish the solubility of sodium aluminum silicate (NAS) under bounding, post-LOCA suppression pool conditions. This testing was expected to confirm that the small concentration of NAS predicted for the bounding case latent aluminum assumptions would not precipitate during the 30-day post-LOCA period.

This bench top testing has been completed and the results show that, for the quantity of NAS calculated to be produced post-LOCA from the bounding assumed quantity of latent aluminum, the NAS would be completely soluble in the suppression pool with no precipitate generated. A description of the bench top test, test conditions and results is provided below.

The testing was conducted under the supervision of the Westinghouse Electric Company (WEC) Science and Technology Center (STC). For that testing, NAS was exposed to simulated suppression pool fluid at three pH levels, each at three temperatures, for 24 hours. The fluid and NAS were contained within a fluorocarbon polymer reaction vessel. The vessel was shaken several times during the exposure to ensure good contact between the NAS and the fluid. The solutions were then filtered at temperature through a 0.45 micron filter. The filtered solutions were then acidified at temperature with concentrated hydrochloric acid. The solutions were then analyzed for cations.

The simulated suppression pool fluids were deionized (DI) water at pH 7, water adjusted to pH 5.3 with hydrochloric acid, and water containing 1070 ppm boron as sodium pentaborate adjusted to pH 8.9 with sodium hydroxide. Consequently, the testing covered the range of pH values inside primary containment for design basis LOCAs as provided in DCD Tier 2 Subsection 3I.3.2.3 as well as for the cases in which boron is injected to the reactor vessel (and would reach the suppression pool) from the Standby Liquid Control (SLC) system.

The bounding aluminum solubility results from the WEC solubility testing are shown in Table 06.02.02-27-1. The solubility limit reported for each pH was the minimum concentration measured for dissolution of NAS at 77°F, 122°F, and 194°F. Also shown in the table are the predictions of aluminum generated from corrosion/dissolution of aluminum considering post-LOCA exposure to concrete, as described in the June 10 RAI response. The aluminum concentration was calculated conservatively assuming a suppression pool water mass corresponding to the minimum allowable suppression pool water level. As shown in the table, the soluble aluminum measured in the bench top testing exceeds the aluminum concentration predicted from corrosion/dissolution. Therefore, there will be no precipitation of NAS for the bounding case latent aluminum assumptions.

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

Table 06.02.02-27-1 Aluminum Solubility vs. Predicted Aluminum from Corrosion

pH	Measured Aluminum Solubility Limit (ppm)	Predicted Aluminum from Corrosion (ppm)
5.3	0.040	0.003
7	0.040	0.005
8.9	0.45	0.018