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

November 13, 2007
NOC-AE-07002223
10CFR50.90

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to Request for Additional Information on
Proposed Amendment for Alternate Radiological Source Term (AST) Methodology;
TAC Nos. MD 4996 & MD 4997

Reference: Letter from David W. Rencurrel to NRC Document Control Desk dated March 22, 2007, "Request for License Amendment Related to Application of the Alternate Source Term" (NOC-AE-07002127)

In the referenced letter, the STP Nuclear Operating Company (STPNOC) submitted a license amendment request to support application of an alternate source term (AST) methodology. This submittal responds to NRC questions regarding this request received by electronic mail on July 24, 2007.

There are no new commitments in this submittal. If you have any questions, please call Ken Taplett at 361-972-8416 or me at 361-972-7867.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 11/13/2007.
Date

David W. Rencurrel
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Attachment: STPNOC Response to Request for Additional Information

A001
NRR

STI: 32215955

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# STPNOC RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**South Texas Project (STP) Units 1 and 2 Nuclear Power Plant**
**License Amendment Request (LAR)**
**Request for Additional Information (RAI)**
**Regarding, "Request for License Amendments Related to**
**Application for the Alternate Source Term" (MD4996 and MD4997)**

The responses to the RAI questions were previously provided to the NRC in a "draft" form on September 12, 2007. The previous "draft" responses have been updated by the responses below.

**Discuss how Regulatory Commitment #8 is an appropriate corrective action for ensuring that the dosage limits in 10 CFR 50.67 are not exceeded.**

**Background: The STPNOC LAR states that Westinghouse Electric Company Nuclear Safety Advisory Letter NSAL-06-15, dated December 13, 2006, advised operators of Westinghouse plants that the single failure scenario for the steam generator tube rupture (SGTR) analysis may not be limiting. The STP current SGTR analysis and the SGTR analysis presented in the safety evaluation for the LAR assumes a failed open SG power operated relief valve as the limiting single failure as far as assumed total steam release. The LAR also states that an evaluation of NSAL-06-15 has resulted in a revised conclusion that the failed open MSIV results in the greater steam release at STP.**

**Due to the above non conforming condition, STP is currently operating under an administrative limit for reactor coolant system dose equivalent iodine that is lower than the Technical Specification limit. Regulatory Commitment #8 states that until a plant modification is completed for supporting the limiting single failure assumptions in the SGTR analysis, STP will maintain an administrative limit for reactor coolant system dose equivalent iodine so that the radiological dose limits for the SGTR analysis remain bounding.**

**NRC Administrative Letter 98-10 states that "Imposing administrative controls in response to an improper or inadequate TS is considered an acceptable short-term corrective action. The staff expects that, following the imposition of administrative controls, an amendment to the TS, with appropriate justification and schedule, will be submitted in a timely fashion." Administrative Letter 98-10 references NRC staff positions in Generic Letter 91-18, which has since been superceded by Regulatory Issue Summary (RIS) 05-020. RIS 05-020 states that "In determining whether the licensee is making reasonable efforts to complete corrective actions promptly, the NRC will consider safety significance, the effects on operability, the significance of the degradation, and what is necessary to implement the corrective action. The NRC may also consider the time needed for design, review, approval, or procurement of the repair or modification; the availability of specialized equipment to perform the repair or modification; and whether the plant must be in hot or cold shutdown to implement the actions."**

**In order to determine whether the licensee is making reasonable efforts to complete corrective actions promptly, and to determine if a Regulatory Commitment is appropriate, the NRC staff require the following:**

**NRC RAI #1**

**With respect to 10 CFR 50.67, discuss the dosage that a Control Room Operator and a person at the Exclusion Area Boundary (EAB) or Low Population Zone (LPZ) would currently receive during a SGTR with a failed open MSIV as the limiting single failure assumption, assuming that the RCS specific activity was at the TS 3.4.8, "RCS Specific Activity" limits.**

STPNOC Response

STP has analyzed the consequences of a postulated SGTR accident assuming the main steam isolation valve (MSIV) on the ruptured SG fails open. The pertinent assumptions are:

a. The MSIV on the ruptured SG fails open and remains open throughout the event.
b. The branch line steam valves downstream of the main steam header remain open.
c. No operator actions are assumed to isolate the ruptured SG steam release paths to the condenser.
d. The ruptured SG blows down through the main steam header, the steam system branch lines (moisture separator re-heater, gland steam condenser, steam trap drains), and into the condenser.
e. The condenser vents to the atmosphere via the condenser blowout panels and then releases to the interior of the turbine building and then to the atmosphere.
f. The ruptured SG blows down.
g. The release path of the ruptured steam generator means that the nature of the reactor coolant system (RCS) flow (flashed or not flashed) has no impact on the isotopic release. Without a direct path to the environment, there is no difference in flashed RCS when all the steam must travel through the condenser to be released. The only exception to this assumption is a small ruptured SG power-operated relief valve (PORV) release, which was modeled as both a direct RCS release and a SG release.
h. The iodines experience a decontamination factor (DF) of 100 due to plate-out in the steam header, the steam piping, and the condenser. Postulating a release through the condenser is not a usual assumption. The use of a DF of 100 for iodines released via the steam piping and the condenser is on the order of the plate-out effect used for iodines released into a similar steam environment in the containment building during a LOCA.
i. The release is assumed to be from the SG PORVs in the Isolation Valve cubicle (IVC) for the Control Room/Technical Support Center (CR/TSC) doses. This assumed release point is close to the probable release point (the Turbine Building). Also, the PORV to CR/TSC atmospheric dispersion factors have already been calculated and are presented in Section 4.1 of the STP AST Submittal.
j. The RCS specific activity is at the TS 3.4.8, "RCS Specific Activity" limit of 1.0 $\mu$ci/gm

dose equivalent iodine (DEI).

k. The radiological source terms and analytical models used are those described in Sections 4.2 and 4.6 of the STP Alternate Source Term (AST) Submittal (except for the accident timing and steam releases).

The results are given in Table 1.

Table 1

Accident Doses
(REM TEDE)

| | Accident Initiated Spike | | Pre-existing Spike | |
|---|---|---|---|---|
| | Results | Limits | Results | Limits |
| EAB (worst 2 hour) | 1.79 | 2.5 | 1.05 | 25 |
| LPZ | 1.97 | 2.5 | 0.73 | 25 |
| Control Room | 6.65 | 5 | 2.03 | 5 |
| TSC | 6.51 | 5 | 1.98 | 5 |

The regulatory limit for the Control Room and the TSC is exceeded in the Accident-induced iodine spike case.

The planned plant modification will make the secondary plant perform as described in WCAP-10698-P-A, "SGTR Analysis Methodology to Determine the Margin to Steam Generator Overfill", the STP licensing basis methodology for analyzing the effects of the SGTR accident. The total steam release (PORV, gland seal system, and drains to the condenser) in this scenario would then be bounded by the current steam releases assumed in Section 4.6 of the STP submittal.

As a compensatory measure to mitigate this new SGTR single failure scenario, STP put in place lower limits on the RCS allowable dose equivalent (DE) I-131. The steady-state TS limit of 1.0 $\mu$Ci/gm was reduced to 0.09 $\mu$Ci/gm and the transient limit was reduced from 60 $\mu$Ci/gm to 5.0 $\mu$Ci/gm.

The impact of the current administrative limit on RCS DE I-131 of 0.09 $\mu$ci/gm would be to lower the CR dose for the accident-induced spike to about 0.80 rem TEDE (= 6.43 * 0.09 $\mu$ci/gm/1.0 $\mu$ci/gm + 0.22, using the detailed analysis results), with a similar reduction for the TSC dose.

Table 2 provides RCS data for cycles with fuel failures. The data illustrates that both units have operated well under the TS limits, even with fuel failures.

Table 2

Historical RCS DE I-131
(μCi/gm)

| Cycle | Peak, Steady-state | Peak Transient | EOC, Steady-state |
|---|---|---|---|
| U1C1 | 3.E-03 | 1.E-01 | 2.E-03 |
| U1C7 | 2.E-03 | 6.E-02 | 2.E-03 |
| U1C9 | 1.E-03 | 1.E-02 | 1.E-03 |
| U2C1 | 2.E-03 | 2.E-02 | 2.E-03 |
| U2C7 | 4.E-03 | 7.E-02 | 1.E-03 |
| U2C11 | 3.E-03 | 5.E-03 | 3.E-03 |

From the above, the maximum steady-state DE I=131 value has been a factor of 250 below the TS limit of 1.0 μCi/gm and the maximum transient value has been a factor of 600 below the TS limit of 60 μCi/gm. These factors are greater than the increase in steam releases postulated for this scenario.

Table 3 illustrates the historical margin in terms of the current administrative DE I-131 limits. Historically, STP has been at least a factor of 23 below the revised steady-state limit (U2C7) and a factor of 50 below the transient limit (U1C1).

Table 3

Historical RCS DE I-131 in Perspective of Revised DE I-131 Limits
(factor below revised limits)

| Cycle | Peak, Steady-state | Peak Transient | EOC, Steady-state |
|---|---|---|---|
| U1C1 | 30 | 50 | 45 |
| U1C7 | 45 | 83 | 45 |
| U1C9 | 90 | 500 | 90 |
| U2C1 | 45 | 250 | 45 |
| U2C7 | 23 | 71 | 90 |
| U2C11 | 30 | 1000 | 30 |

Based on the radiological analysis of the SGTR with the MSIV single failure and past plant performance, the current administrative limit is effective in limiting accident doses to within regulatory limits (with respect to either 10 CFR 50.67 or 10 CFR 100) until the plant modification is implemented.

**NRC RAI #2**

**In further detail, discuss the proposed plant modification stated in Regulatory Commitment #8 so that the SGTR accident analysis performed for the LAR will be consistent with the plant response to this event after the modification is completed.**

STPNOC Response

The components affected by the proposed modification are the moisture separator re-heater temperature control throttle valves. The purpose of these valves is to control steam flow to the moisture separator re-heater to control the temperature of the steam going to the main generator low pressure turbine. These valves are normally open at power and fail open on a loss of instrument air.

The current plant response to a steam generator tube rupture (SGTR) event results in a reactor trip. The reactor trip initiates an automatic main turbine trip which subsequently initiates a signal to close the temperature control throttle valves to the moisture separator re-heaters. The throttle valves are maintained shut by instrument air pressure. However, the accident analysis assumes a loss of offsite power concurrent with the SGTR. Under a loss of offsite power condition, instrument air is powered by the non-Essential Safety Features Technical Support diesel generator, which is not credited in the safety analysis. Therefore, the moisture separator re-heater temperature control throttle valves are assumed to fail open under spring pressure. This results in a radiological release path from the ruptured steam generator via the failed open main steam isolation valve (MSIV) (limiting single failure) through the main steam header, the steam system branch lines, into the condenser which vents to atmosphere.

STP has identified options for modifying the plant such that the steam lines to the moisture separator re-heater will isolate. STP is evaluating the best option to use. Final approval of the modification and issuance of the design change package requires a shutdown of the main turbine to validate associated control circuitry design. Following the modification, a failed open SG power-operated relief valve (PORV) will remain the limiting single failure as far as assumed total steam release. This scenario is consistent with the generically accepted SGTR methodology developed in WCAP-10698-P-A. This methodology is part of the STP Licensing Basis.

The proposed modification will preclude the need for amendment to the TS to resolve the non-conforming condition. Time is needed to evaluate and complete the design modification including review and approval, and to procure the parts for the modification. A plant shutdown is required to complete validation of the modification. Following approval of the design change package, a plant shutdown will again be required to implement the modification because the moisture separator re-heater temperature control throttle valves must be closed to complete the modification and test the valves.

Until a modification is completed, STP has a non-safety balance-of-plant (BOP) diesel generator that automatically starts on a loss of offsite power. Although not credited in the accident analysis, the BOP diesel generator provides power to the instrument air compressors. This feature

provides a defense-in-depth measure to provide additional assurance that the moisture separator re-heater temperature control throttle valves should remain close under the current plant design during a SGTR accident.

**NRC RAI #3**

**Discuss any expected timelines associated with completing the plant modification so that the SGTR accident analysis performed for the LAR will be consistent with the plant response to this event after the modification is completed.**

STPNOC Response

Final approval of the modification and issuance of the design change package requires a shutdown of the main turbine to validate associated control circuitry design. This validation is planned during the Unit 1 outage in the Spring of 2008. The modification is planned to be implemented in Unit 2 during the 2008 Fall outage and to be implemented in Unit 1 during the 2009 Fall outage.