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

February 28, 2006
NOC-AE-06001982

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

South Texas Project
Unit 1
Docket No. STN 50-498
Response to Request for Additional Information Regarding the 1RE12 Refueling Outage
Inservice Inspection Results for Steam Generator Tubing (TAC No. MC8622)

References:
1. Letter, S. M. Head to Document Control Desk, "1RE12 Refueling Outage Inservice Inspection Results for Steam Generator Tubing," dated October 12, 2005 (NOC-AE-05001938; ML052910372)
2. Letter, D. H. Jaffe to J. J. Sheppeard, "South Texas Project, Unit 1 - re: Discussions Concerning Foreign Objects Found in Steam Generators," dated May 27, 2005 (ML051380309)

Reference 1 submitted the summary report describing the results of the steam generator tube inservice inspection performed during refueling outage 1RE12. Reference 2 documented conference calls with the NRC in March and April 2005 on the same subject. On January 3, 2006, STP Nuclear Operating Company received an informal request for additional information regarding the referenced letter and conference calls. The response to that request is attached to this letter.

There are no commitments in this letter.

If there are any questions regarding this response, please contact John Conly at (361) 972-7336 or me at (361) 972-7206.

M A McBurnett

M. A. McBurnett
Manager, Nuclear Safety Assurance

jtc

Attachment: Response to Request for Additional Information

STI: 31988568

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(paper copy)

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RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1. In your October 12, 2005, submittal, you indicated that the wire remnants from a feedwater cable stabilizer migrated into steam generator D during cycle 10. Please verify that this occurred during cycle 10. The staff's records indicate that your steam generators were replaced during refueling outage (RFO) 9. Presumably, cycle 10 follows RFO 9. If this is the case, it is not clear why these fragments were not detected during RFO 10 in which you performed visual inspections and sludge lancing in all four steam generators. The staff also notes that its May 25, 2005, summary of a teleconference of your inspection activities during RFO 12 indicated that the stabilizing cable was damaged when a valve was manually closed during RFO 11.

Response:

The feedwater cable stabilizer wire migrated into Steam Generator D during cycle 11 prior to or during the shutdown for refueling outage 1RE11.

2. Please clarify the scope of your inspections. In the staff's May 25, 2005, summary of your RFO 12 inspections, it recorded that 20-percent of the tubes in steam generator D were examined full length with a bobbin coil. Based on your October 12, 2005, submittal, it appears that 1,374 tubes were examined from the top of the tubesheet on the hot-leg to the highest tube support plate on the hot-leg (i.e., the ninth tube support) with a bobbin coil probe. These same tubes were examined from the top of the tubesheet on the cold-leg to the highest tube support plate on the cold-leg (i.e., the ninth tube support) with a bobbin coil. Of these 1,374 tubes, 56 were also inspected in the U-bend region with a bobbin coil probe. Regarding the scope of your inspections, discuss whether any plug or secondary side inspections (other than the foreign object search and retrieval inspections) were performed. If so, discuss the results.

Response:

Attachment 3 to the staff's summary is a presentation provided to the NRC via e-mail on April 4, 2005. Page 13 of the presentation stated that as an additional work scope for Steam Generator D, STP Nuclear Operating Company (STPNOC) performed primary NDE inspection in the form of "full-length bobbin [inspection] of 20% [of the] entire population [of tubes]." The words "full-length" were used inaccurately. The plan, which was not intended for surveillance credit, was to inspect only the straight sections of the tubes for evidence of foreign material and wear from foreign material in the steam generator. The 56 tubes were bobbin inspected through the U-bend region as well as the straight runs for expediency only.

During 1RE12, all plugs in Steam Generator D were visually inspected and all plugs were found to be satisfactory. The results were documented in the same fashion as a normal inspection for surveillance credit (i.e., in accordance with EPRI PWR Steam Generator Examination Guidelines). For secondary side inspections during 1RE12, a general visual inspection of the upper regions on all four steam generators was performed, which included the feedring spray

cans and sludge collectors. A minimal amount of wire was identified and subsequently removed from Steam Generator D at the sludge collector and feedring spray cans. In addition to these inspections, one spray can end cap was removed in Steam Generator D to gain access inside the feedring and a visual inspection was performed with a boroscope. No debris was found inside the feedring during boroscope inspection.

3. Technical Specification 6.9.1.7.c indicates that the nondestructive examination techniques utilized for each degradation mechanism should be provided to the U.S. Nuclear Regulatory Commission. Please discuss the what forms of degradation you consider your tubes to be currently susceptible to (e.g., wear at tube supports, loose part wear, wear at anti-vibration bars, cracking in bulged or overexpanded tubes, etc) and what techniques (e.g., bobbin, rotating probe) were used to inspect for those degradation mechanisms.

Response:

The only relevant degradation mechanism considered for the (non-periodic) 1RE12 inspections was tube wear from loose parts. The following have been identified as potential damage mechanisms for the South Texas Project steam generators:

- Small radius U-bend ODSCC
- Dings ODSCC
- Transition zone ODSCC
- Sludge pile, tube support plate, freespan, and U-bend ODSCC

These potential damage mechanisms have not been observed in the steam generators and would normally be addressed during a Technical Specification periodic inspection for surveillance credit as defined by the degradation assessment for those outages. The next scheduled surveillance credit inspection for Unit 1 is 1RE13 scheduled for Fall 2006.

Both bobbin and rotating probes were utilized for inspections during 1RE12. The bobbin coil ET technique complied with EPRI-published examination technique specification sheet (ETSS) 96001.1 for detection of loose parts wear. The MRPC ET technique complied with EPRI-published ETSS 21998.1 for measurement of the depth of loose part wear.

4. During RFO 10, the eddy current probes and guide tubes became contaminated with cobalt coming from the tubes' inside surface. The cobalt was suspected to have come from the unusually high particulate corrosion product release from the reactor core during shutdown. Please discuss whether similar contamination was observed this outage.

Response:

Conditions from contamination on the primary side of the steam generators similar to 1RE10 were not experienced during 1RE12. All four reactor coolant pumps were operated during the 1RE12 shutdown cleanup to reduce particulate contamination in idle loops. This was done as a

preventive action resulting from the experience in 1RE10 when only two reactor coolant pumps were operated during the cleanup. In 1RE12, when Steam Generator D primary side was opened due to the emergent scope, primary surfaces were characterized as very clean. Contamination levels were low, doses on the steam generator platforms and eddy current areas due to contamination were very low, and eddy current probes lasted much longer than in 1RE10.

5. Please discuss whether the dings and other non-flaw signals have changed since the preservice inspection (i.e., such that there is a service-induced component to the indications). If so, discuss the cause (and magnitude) of the change and the implications. Small changes that are considered within the repeatability of the testing method need not be discussed.

Response:

Changes to non-flaw signals were observed in Unit 2 steam generators during 2RE10 and were addressed in a STPNOC letter dated November 11, 2004 (ML043230294). Similar changes have not been observed during inspections on Unit 1 steam generators.

6. You indicated that you had not identified any active degradation mechanisms in your steam generator based on the Electric Power Research Institute definition of active degradation mechanism which excludes loose part wear. The staff has found the industry's definition of active degradation mechanism to be misleading since tubes could have degradation that is progressing (or present on the tubes) and such degradation could be classified as "not active" (refer to ML010320218 and ML012200349). As a result, please confirm that other than the three volumetric indications attributed to wear from loose parts that you did not find any service induced indications (i.e., those not attributable to manufacturing) during your inspections.

Response:

STPNOC confirms that other than the three volumetric indications attributed to wear from loose parts, STPNOC did not find any service-induced indications (i.e., those not attributable to manufacturing) during the inspections of 1RE12.

7. For future reference, please provide the following information regarding the design of your replacement steam generators: the heat transfer surface area, the tubesheet thickness (with and without the clad), the flow distribution baffle thickness, the tube support plate thickness, the anti-vibration bar cross section (e.g., rectangular) and the depth of penetration of the anti-vibration bars.

<u>Response:</u>

Heat transfer surface area = 94,500 square feet

Tubesheet thickness - with clad = 25.435"
- without clad = 25.185"

Flow distribution baffle plate thickness = 0.750" (0.740 min)

Tube support plate thickness = 1.125" (1.115 min)

AVB design:

Cross section = rectangular

Depth of penetration:

The first set of anti-vibration bars penetrates to row 1
The second set of anti-vibration bars penetrates to row 16
The third set of anti-vibration bars penetrates to row 35
The fourth set of anti-vibration bars penetrates to row 63