April 8, 2003

Mr. J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

SUBJECT: ST. LUCIE UNIT 2 — REVIEW OF STEAM GENERATOR TUBE INSERVICE INSPECTION REPORT FROM THE FALL 2001 OUTAGE (TAC NO. MB6445)

Dear Mr. Stall:

By letter dated December 28, 2001, Florida Power & Light Company (FPL) submitted a steam generator (SG) tube plugging report pursuant to section 4.4.5.5.a of the St. Lucie, Unit 2 Technical Specifications (TS). By letter dated April 19, 2002, FPL submitted an SG report in accordance with Nuclear Energy Institute (NEI) 97-06. By letter dated October 3, 2002, FPL submitted an SG tube inservice inspection special report pursuant to Sections 4.4.5.5.b and 6.9.2 of the St. Lucie, Unit 2 TS. These reports were submitted as a result of the SG inspection performed at the end of operating Cycle 12, which ended in November 2001.

The staff's review of the reports is enclosed. The staff concluded that FPL provided the information required by the St. Lucie, Unit 2 TS and that no additional follow-up is required at this time.

Sincerely,

/RA/

Brendan T. Moroney, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-389

Enclosure: As stated

cc w/enclosure: See next page

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Mr. J. A. Stall
Florida Power and Light Company

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U.S. NUCLEAR REGULATORY COMMISSION

ASSESSMENT OF FALL 2001 (END OF CYCLE 12)

STEAM GENERATOR INSPECTION REPORT

ST. LUCIE NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-389

By letter dated December 28, 2001, Florida Power & Light Company (the licensee) submitted a steam generator tube plugging report (15-day report) pursuant to Section 4.4.5.5.a of the St. Lucie, Unit 2 Technical Specifications (TSs). By letter dated April 19, 2002, the licensee submitted a steam generator (SG) report regarding its condition monitoring and preliminary operational assessments in accordance with Nuclear Energy Institute (NEI) 97-06. By letter dated October 3, 2002, the licensee submitted a steam generator tube inservice inspection special report (12-month report) pursuant to Sections 4.4.5.5.b and 6.9.2 of the St. Lucie, Unit 2 TSs. The licensee submitted these reports as a result of its SG inspection performed during refueling outage SL2-13 at the end of operating Cycle 12, which ended in November 2001.

St. Lucie, Unit 2 has two Combustion Engineering Model 3410 SGs. These SGs have tubes and tube support plates fabricated with mill-annealed Alloy 600 and carbon steel, respectively. The tube support plates use a combination of drilled hole and egg-crate configurations. The tube expansion joints in the tubesheet are full length and explosively installed.

In the December 28, 2001, letter, the licensee summarized the number of degraded tubes that were plugged as a result of the SG tube inspection. The licensee plugged 129 and 232 tubes in SGs 2A and 2B, respectively. At the beginning of operating Cycle 13, the cumulative plugged tubes were 474 and 539 in SGs 2A and 2B, respectively.

In the April 19, 2002, letter, the licensee summarized its condition monitoring and operational assessment results in accordance with NEI 97-06, Section 3.1.7. NEI 97-06 specifies that pressurized-water reactor licensees submit, to the U.S. Nuclear Regulatory Commission (NRC), a condition monitoring assessment, including results of destructive testing of removed tube(s) and in situ pressure testing, within 120 days after the reactor coolant system re-enters hot shutdown conditions. The licensee did not remove any tubes from the Unit 2 SGs for destructive testing during refueling outage SL2-13; however, the licensee completed the in situ pressure tests on 27 candidate tubes. The candidate tubes in the in situ pressure tests included those indications that exceeded, as well as within, the Electric Power Research Institute screening criteria to ensure a reasonable robustness of the tests. All candidate tubes passed the tests without leakage or burst. The licensee stated that its condition monitoring assessment results demonstrated that all tubes satisfied the structural integrity and accident-induced leakage performance criteria of NEI 97-06 for Cycle 12. The licensee stated that its preliminary operational assessment results demonstrate that the structural and leakage integrity of the SG tubes in Unit 2 will satisfy the performance criteria during operating Cycle 13.

ENCLOSURE

In the October 3, 2002, letter, the licensee summarized the results of the SG tube inservice inspection performed during refueling outage SL2-13. The licensee inspected a total of 8066 and 8104 tubes, full length, in SGs 2A and 2B, respectively, with a bobbin coil probe. In addition, the licensee used a rotating pancake coil probe equipped with a Plus Point coil for an expanded inspection of specific regions of the tubes (e.g., the U-bend and top of the tubesheet regions). The extent of the special inspection using the rotating pancake coil probe was not clearly discussed in the report. However, the licensee did provide the information on the special inspection in the conference calls with the NRC staff during the fall 2001 outage. By letter dated May 23, 2002, the NRC forwarded a phone call summary to the licensee (ADAMS Accession Number ML021430562). In the phone call summary, the staff stated that the licensee planned to use a rotating pancake coil equipped with a Plus Point coil to inspect: the U-bend region of 30 percent of the tubes in rows 1 and 2; 30 percent of the dents (randomly located, manufacturing related) on the hot-leg side of the SGs; the hot-leg expansion transition region of 100 percent of the tubes; and all new or changed free span indications. The May 23, 2002, phone-call summary provided additional information regarding the inspection scope.

The inspection results show that in SG 2A, the licensee detected 203 tubes (equal to 290 indications) having mechanical wear indications that were between 20 percent and 39 percent through wall (i.e., tube wall thickness). The licensee detected 102 tubes (116 indications) having indications that were equal to or greater than 40 percent through wall. This group included 11 axial indications (5 located within dings), 4 circumferential indications at the hot leg tubesheet and 87 axial outside diameter stress corrosion cracking indications at the egg-crate tube supports. The 102 tubes having indications greater than 40 percent through wall were all plugged. In addition, the licensee preventively plugged a total of 27 tubes. The preventively plugged tubes included 14 tubes with dents or dings that exceeded 10 volts between the hot leg tubesheet expansion and number 1 egg-crate tube supports, 8 tubes that had mechanical wear progression (i.e., less than 40 percent through wall) and 5 nonquantifiable geometric anomalies at the hot leg tubesheet expansion.

In SG 2B, the licensee detected 124 tubes (169 indications) having mechanical wear indications that were between 20 percent and 39 percent through wall. The licensee detected 200 tubes (236 indications) having indications that were equal to or greater than 40 percent through wall. This group included 15 axial indications at the hot leg tubesheet expansion (1 located within a ding), 8 circumferential indications at the hot leg tubesheet expansion, 172 axial indications at the various egg-crate supports, and 5 volumetric indications. The volumetric indications included 1 at the hot leg tubesheet expansion, 1 at an egg-crate support and 3 volumetric wear indications due to foreign object damage at the cold leg tubesheet expansion. The licensee did not find any foreign object during foreign object search and retrieval effort. The 200 tubes having indications greater than 40 percent through wall were all plugged. In addition, the licensee preventively plugged a total of 32 tubes. The preventively plugged tubes included 18 tubes that had dents or dings greater than 10 volts between the hot leg tubesheet expansion and number 1 egg-crate tube support, 7 geometric anomalies at the hot leg tubesheet expansion, 2 geometric anomalies in U-bends, 1 wear due to a foreign object in the cold leg side, three at the support locations (2 diagonal and 1 egg-crate) for wear progression, and 1 due to a restricted U-bend location that did not permit rotating probe inspection.

The licensee stated that only mechanical wear degradation was sized for through wall depth using qualified sizing techniques. The licensee did not detect any wear indications in excess of 40 percent through wall. The licensee stated that depth-sizing techniques for other degradation

mechanisms have not been validated for the St. Lucie plant. Therefore, the licensee used a plug-on-detection approach to disposition degradation other than mechanical wear. In the May 23, 2002, phone call summary, the staff discussed detailed information on the indications detected that was provided by the licensee.

Based on its review of the information provided by the licensee, the staff concludes that no additional follow-up is required at this time. However, the staff recommends the following improvements for the future special reports to facilitate the staff review:

1. The licensee should identify the scope of the inspections and the number (and/or percentage) of tubes inspected by each of the eddy current probes, including inspection expansion, to aid the staff in understanding the full extent of the inspections. This information was summarized in the NRC's letter dated May 23, 2002, as discussed above.

2. The licensee should provide a summary of the types of imperfections being detected and left in service in addition to the individual tube listing.