Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

FPL

January 23, 2003

L-2003-002
10 CFR 50.90
10 CFR 2.790

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE: St. Lucie Unit 2
Docket No. 50-389
Proposed License Amendment
Contingency Change to the Definition of Steam Generator Tube Inspection

Pursuant to 10 CFR 50.90, Florida Power & Light Company (FPL) requests to amend Facility Operating License NPF-16 for St. Lucie Unit 2. As a contingency for the spring 2003 Unit 2 refueling outage, FPL has developed a proposed license amendment (PLA) for St. Lucie Unit 2 Cycle-14 operation to modify the definition of steam generator tube inspection as contained in Technical Specification (TS) 4.4.5.4.a.8 for Cycle 14 only.

The St. Lucie Unit 2 steam generator (SG) inspection program requires a degradation assessment to determine susceptible areas of the tubing to be inspected and the appropriate eddy current techniques to detect and quantify the degradation for each area. Input data needed for the subsequent condition monitoring and operational assessment are considered as part of the tube integrity assessment required by the St. Lucie Unit 2 steam generator inspection program and satisfy the intent of Nuclear Energy Institute (NEI) guideline, NEI 97-06[1].

The St. Lucie Unit 2 SG inspection program fulfills TS 4.4.5.4.a.8 requirements for inspecting SG tubing through a prescriptive program that meets NEI 97-06. St. Lucie Unit 2 performs an extensive inspection program at the tube expansion transition and within the tubesheet. Recent inspections included bobbin probe examination of all active tubes, and sample inspections with rotating probes for low row U-bends and dings (i.e., local geometry variations due to manufacturing, installation, and maintenance). In addition, all active hot leg tube expansion transitions were examined with rotating probes to a depth of 5 inches inside the tubesheet. To date, rotating probe inspections for the tubesheet region have not detected circumferential indications near the inspection boundary (i.e., 5 inches below the top of the tubesheet). However, the Alloy 600 mill annealed tubes at St. Lucie Unit 2 are susceptible and may develop such degradation.

[1] NEI 97-06, "Steam Generator Program Guidelines," Revision 1, January 2001.

Attachment 6 Contains 10 CFR 2.790 Information
Exempt from Disclosure

A P 0 1

Attachment 1 is a description of the proposed change and the supporting justification. Attachment 2 is the Determination of No Significant Hazards and Environmental Considerations. Attachment 3 is a marked up copy of the proposed Technical Specification change. Attachment 4 is a copy of the retyped TS page. Attachment 5 is a non-proprietary version of WCAP-15975-NP, Revision 0, "NDE Inspection Strategy for the Tubesheet Region in St. Lucie Unit 2." Attachment 6 is a proprietary version of WCAP-15975-P, Revision 0, "NDE Inspection Strategy for the Tubesheet Region in St. Lucie Unit 2." Attachment 6 also includes the Westinghouse application for withholding proprietary information from public disclosure for WCAP-15975-P.

The St. Lucie Facility Review Group and the Florida Power & Light Company Nuclear Review Board have reviewed the proposed amendment. In accordance with 10 CFR 50.91(b)(1), a copy of the proposed amendment is being forwarded to the State Designee for the State of Florida.

Approval of this proposed license amendment is requested by May 1, 2003 as a contingency to support startup from the spring 2003 refueling outage (SL2-14). Please issue the amendment to be effective on the date of issuance and to be implemented within 60 days of receipt by FPL. Please contact George Madden at 772-467-7155 if there are any questions about this submittal.

Westinghouse Electric Company, LLC, has determined that the information contained in WCAP-15975-P is proprietary in nature. Therefore, it is requested that Attachment 6 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.790(a)(4). The Westinghouse reasons for the classification of this information as proprietary and the signed affidavit are included in Attachment 6.

Very truly yours,

Donald E. Jernigan
Vice President
St. Lucie Plant

DEJ/GRM

Attachments

cc: Mr. William A. Passetti, Florida Department of Health

STATE OF FLORIDA)
) ss.
COUNTY OF ST. LUCIE)

Donald E. Jernigan being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant, for the Nuclear Division of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said Licensee.

Donald E. Jernigan

STATE OF FLORIDA

COUNTY OF ST LUCIE

Sworn to and subscribed before me

this 23 day of JANUARY, 2003
by Donald E. Jernigan, who is personally known to me.

Name of Notary Public - State of Florida

GEORGE R MADDEN
Notary Public - State of Florida
My Commission Expires Jun 17, 2004
Commission # CC931387

(Print, type or stamp Commissioned Name of Notary Public)

ATTACHMENT 1

DESCRIPTION OF THE PROPOSED CHANGE AND JUSTIFICATION

Introduction

Florida Power and Light Company (FPL) has developed a proposed license amendment (PLA) for St. Lucie Unit 2 Cycle 14 operation to modify the definition of steam generator (SG) tube inspection as contained in Technical Specification (TS) 4.4.5.4.a.8 for Cycle 14 only.

The proposed change does not adversely impact plant safety or operation of the plant. The proposed change does not impact the current cycle or future cycles of operation for St. Lucie Unit 2. The proposed change does not involve a significant hazards consideration. This change affects surveillance inspection requirements for steam generator tubes, which form a portion of the reactor coolant system (RCS) pressure boundary.

Discussion

NRC recently required Sequoyah Nuclear Station[1] and San Onofre Nuclear Generating Station[2] (SONGS) to submit emergency and exigent amendments respectively when their steam generator eddy current inspection results showed circumferential cracking was probably present in portions of the tube within the tubesheet that were not being inspected with supplemental rotating probe techniques. To date, rotating probe inspections for the tubesheet region at St. Lucie Unit 2 have not detected circumferential indications near the inspection boundary (i.e., 5 inches below the top of the tubesheet). However, this license amendment may be required for SL2-14 restart if inspection results indicate similar conditions exist.

Description of the Change

FPL proposes a revision to Technical Specification Reactor Coolant System, 3/4.4.5 Steam Generators, Surveillance Requirements, for St. Lucie Unit 2. The specific Technical Specification to be changed is 4.4.5.4.a.8, which currently states:

> "Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg."

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[1] Sequoyah Nuclear Plant, Unit 2 - Issuance of Technical Specification Amendment Regarding Steam Generator Tube Inspection Scope, dated May I0, 2002.

[2] San Onofre Nuclear Generating Station, Units 2 and 3 - Issuance of Amendments on Steam Generator Tube Inspections, dated June 17,2002.

This PLA would add clarifying words for this inspection to address the portion of the tube within the tubesheet below the tube engagement area as follows (added text in bold italics):

"Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg ***excluding the portion of the tube within the tubesheet below 5 inches from the secondary face of the tubesheet*.***"

Add the following footnote to the bottom of the page.

" *This exclusion is approved for Cycle 14 operation only."

Basis/Justification for Proposed Changes

Design

The St. Lucie Unit 2 Model 3410 steam generators are designed and fabricated by Combustion Engineering (CE). They are vertical tube and shell recirculating heat exchangers. The tubes were explosively expanded (explansion) into the tubesheet for the entire tubesheet thickness of 21.75 inches (includes primary surface cladding). The explansion process forms an interference fit between the tube and tubesheet. The interference fit forms an interface which provides a structural and leak resistant boundary within the tubesheet between the primary and secondary system. The transition from the expanded portion of the tube to the unexpanded portion is referred to as the expansion transition, which is located at the secondary face or top edge of the tubesheet.

Current Situation

The St. Lucie Unit 2 steam generator inspection program requires a degradation assessment to determine susceptible areas of the tubing to be inspected and the appropriate eddy current techniques to detect and quantify the degradation for each area. Input data needed for the subsequent condition monitoring and operational assessment are considered as part of the tube integrity assessment required by the St. Lucie Unit 2 steam generator inspection program and satisfy the intent of Nuclear Energy Institute (NEI) guideline, NEI 97-06[3].

The St. Lucie Unit 2 SG inspection program fulfills TS 4.4.5.4.a.8 requirements for inspecting SG tubing through a prescriptive program that meets NEI 97-06. St. Lucie Unit 2 performs an extensive inspection program at the tube expansion transition and within the tubesheet. Recent inspections included bobbin probe examination of all

[3] NEI 97-06, "Steam Generator Program Guidelines," Revision 1, January 2001.

active tubes and sample inspections with rotating probes for low row U-bends and dings (i.e., local geometry variations due to manufacturing, installation, and maintenance). In addition, all active hot leg tube expansion transitions were examined with rotating probes to a depth of 5 inches inside the tubesheet. To date, rotating probe inspections for the tubesheet region have not detected circumferential indications near the inspection boundary (i.e., 5 inches below the top of the tubesheet). However, the Alloy 600 mill annealed tubes at St. Lucie Unit 2 are susceptible and may develop such degradation.

Analysis

An alternate tube repair criteria (referred to as W*) was developed by Westinghouse Electric Company[4] for Westinghouse plants to permit tubes with predominantly axially oriented primary water stress corrosion cracking (PWSCC) in the WEXTEX tubesheet expansions to remain in service. The W* analysis defines an inspection extent within the tubesheet for which flaws would be allowed to remain in service, and assures adequate strength is available to resist the axial pullout loads experienced within the tubesheet.

WCAP-15975[5], Revision 0, "NDE Inspection Strategy for the Tubesheet Region in St. Lucie Unit 2," provides a test program and technical basis for application of supplemental inspections in the tubesheet region of the steam generators at St. Lucie Unit 2. The test program defines an inspection extent for supplemental inspections that ensures tube structural and leakage integrity in accordance with the requirements of NEI 97-06 (Steam Generator Program Guidelines) and the licensing basis for St. Lucie Unit 2. The program does not provide a basis for leaving detected flaws in service inside or outside the tube engagement area (TEA). As such, the proposed license change defines the inspection extent, but does not request review for any alternate repair criteria.

WCAP-15975, Revision 0, "NDE Inspection Strategy for the Tubesheet Region in St. Lucie Unit 2," is applicable to the St. Lucie Unit 2 steam generators and defines the inspection extent as 5 inches in Section 8.

WCAP-15975 determines that the surrounding tubesheet prevents tube rupture and provides resistance against axial pullout loads during normal and accident conditions. In addition, any primary-to-secondary leakage from tube degradation below the TEA length is an inconsequential contribution to the total leakage assumed for a steam line break (SLB) accident and is considered negligible. Consequently, any tube degradation

[4] Westinghouse Report, WCAP 14797 (Proprietary) and WCAP 14798 (Non-Proprietary), Revision 1, "Generic W* Tube Plugging Criteria for 51 Series Steam Generator Tubesheet Region WEXTEX Expansions," February 1997.

[5] Westinghouse Report, WCAP-15975, Revision 0, "NDE Inspection Strategy for the Tubesheet Region in St. Lucie Unit 2," November 2002.

that may go undetected below the TEA would not affect structural or leakage margins.

Definitions

- Tube Engagement Area (TEA) - The length of tubing below the top-of-tubesheet of the explanded portion of the tube which must be demonstrated to have no detectable degradation and is characterized in WCAP-15975, Section 8 as 3.75 inches.

- Inspection Extent Uncertainty - The uncertainty associated with the actual probe location relative to the indicated location during data analysis of the recorded eddy current data.

- Inspection Extent - The minimum length of tubing below the hot leg top-of-tubesheet to be inspected to determine if degradation is detected within the TEA length plus margin. This length includes inspection extent uncertainty to ensure that the TEA length is completely inspected. WCAP-15975 defines the inspection extent as 5 inches below the hot leg top-of-tubesheet.

The TEA length (3.75 inches) as characterized in WCAP-15975, Revision 0 (with uncertainty of 1.25 inches) is included in the current St. Lucie Unit 2 inspection program for the tube-to-tubesheet expansion area. Thus, the current SG inspection program in the transition area inspects the tubes 5 inches below the hot leg top-of-tubesheet. The TEA length is defined for St. Lucie Unit 2 in WCAP-15975, Revision 0 considering the most stringent loads associated with plant operation, including transient and accident conditions, and with an additional margin provided by satisfying NEI 97-06 performance criteria.

The St. Lucie Unit 2 WCAP-15975 report does not constitute an alternate repair criterion. The WCAP report supports St. Lucie Unit 2 inspection extent within the hot leg tubesheet using qualified inspection technology.

Tube burst is precluded for cracks within the tubesheet by the constraint provided by the tubesheet. Tube severance, however, may occur due to a 360-degree circumferential crack or many axially oriented cracks and tube pullout from the tubesheet under the axial forces on the tube from primary to secondary pressure differentials could occur. Section 4 of WCAP-15975 describes the testing that was performed to define the length of non-degraded tubing that is sufficient to compensate for the axial forces on the tube and thus prevent pullout. This length is bounded by the proposed inspection extent. The operating conditions utilized in WCAP-15975 were specific to St. Lucie Unit 2 and are summarized in Section 3 of the WCAP.

Operating experience has demonstrated negligible normal operating leakage from primary water stress corrosion cracking (PWSCC) in expansion transitions at the top of the tubesheet. PWSCC in the explanded region within the tubesheet would be even

further leakage limited by the tight tube-to-tubesheet crevice and the limited crack opening permitted by the tubesheet constraint. The SLB conditions provide the most severe radiological hazards for postulated accidents involving loss of pressure or fluid in the secondary system. WCAP-15975, Revision 0, Section 3.1.2 provides the justification to neglect the total SLB leak rate contributed by cracks below the TEA length. Therefore, eddy current inspection in the area below the TEA length is not necessary to preclude leakage under normal operating or postulated accident conditions.

Conclusion

Florida Power & Light is proposing to modify the St. Lucie Unit 2 Technical Specification Steam Generator Surveillance Requirement 4.4.5.4.a.8, Tube Inspection. The proposed change is to clarify that the tube inspection extent for St. Lucie Unit 2 excludes the portion of the tube within the tubesheet below the defined inspection extent of 5 inches. The WCAP-15975 analysis accounts for the reinforcing effect that the tubesheet has on the external surface of the SG tube within the tubesheet region. The analysis shows that tube integrity and leakage remain within the existing design limits.

This evaluation demonstrates that there is no safety concern associated with the proposed license amendment. The proposed change does not involve a significant hazards consideration. This license amendment is, therefore, acceptable with respect to the operation of St. Lucie Unit 2 for Cycle 14.

ATTACHMENT 2

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Introduction

As a contingency, FPL has developed a proposed license amendment for St. Lucie Unit 2 Cycle 14 operation to modify the definition of steam generator tube inspection as contained in Technical Specification (TS) 4.4.5.4.a.8 for Cycle 14 only.

The St. Lucie Unit 2 steam generator inspection program requires a degradation assessment to determine susceptible areas of the tubing to be inspected and the appropriate eddy current techniques to detect and quantify the degradation for each area. Input data needed for the subsequent condition monitoring and operational assessment are considered as part of the tube integrity assessment required by the St. Lucie Unit 2 steam generator inspection program and satisfy the intent of Nuclear Energy Institute (NEI) guideline, NEI 97-06, "Steam Generator Program Guidelines," Revision 1, January 2001.

The St. Lucie Unit 2 SG inspection program fulfills TS 4.4.5.4.a.8 requirements for inspecting SG tubing through a prescriptive program that meets NEI 97-06. St. Lucie Unit 2 performs an extensive inspection program at the tube expansion transition and within the tubesheet. Recent inspections included bobbin probe examination of all active tubes, and sample inspections with rotating probes for low row U-bends and dings (i.e., local geometry variations due to manufacturing, installation, and maintenance). In addition, all active hot leg tube expansion transitions were examined with rotating probes to a depth of 5 inches inside the tubesheet. To date, rotating probe inspections for the tubesheet region have not detected circumferential indications near the inspection boundary (i.e., 5 inches below the top of the tubesheet). However, the Alloy 600 mill annealed tubes at St. Lucie Unit 2 are susceptible and may develop such degradation.

Determination of No Significant Hazards Consideration

The standards used to arrive at a determination that a request for amendment involves a no significant hazards consideration are included in the Commission's regulation, 10 CFR 50.92, which states that no significant hazards considerations are involved if the operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Each standard is discussed as follows:

(1) Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

Florida Power & Light proposes to modify St. Lucie Unit 2 Technical Specifications for Unit 2 to define the steam generator (SG) tube inspection scope. The St. Lucie Unit 2 specific analysis takes into account the reinforcing effect the tubesheet has on the external surface of an expanded SG tube. Tube-bundle integrity will not be adversely affected by the implementation of the revised tube inspection scope. SG tube burst or collapse cannot occur within the confines of the tubesheet; therefore, the tube burst and collapse criteria of NRC Regulatory Guide (RG) 1.121 (Bases for Plugging Degraded PWR Steam Generator Tubes) are inherently met. Any degradation below the tube engagement area (TEA) length is shown by analyses and test results to be acceptable, thereby precluding an event with consequences similar to a postulated tube rupture event.

Tube burst is precluded for cracks within the tubesheet by the constraint provided by the tubesheet. Thus, structural integrity is maintained by the tubesheet constraint. A 360-degree circumferential crack or many axially oriented cracks could permit severing of the tube and tube pullout from the tubesheet under the axial forces on the tube from primary to secondary pressure differentials. Testing was performed to define the length of non-degraded tubing that is sufficient to compensate for the axial forces on the tube and thus prevent pullout. This proposed amendment would encompass that length of non-degraded tubing for inspection.

In conclusion, incorporation of the revised inspection scope into St. Lucie Unit 2 Technical Specifications maintains existing design limits and therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

(2) Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any previously evaluated.

Tube-bundle integrity is expected to be maintained during all plant conditions upon implementation of the proposed tube inspection scope. Use of this scope does not introduce a new mechanism that would result in a different kind of accident from those previously analyzed. Even with the limiting circumstances of a complete circumferential separation of a tube occurring below the TEA length, SG tube pullout is precluded and leakage is predicted to be maintained within the Updated Final Safety Analysis Report limits during all plant conditions.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

Upon implementation of the revised inspection scope, operation with potential cracking below the inspection extent length in the explansion region of the SG tubing meets the margin of safety as defined by RG 1.121 and RG 1.83 (Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes) and the requirements of General Design Criteria 14, 15, 31, and 32 of 10 CFR 50. Accordingly, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, we have determined that the proposed amendment does not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any previously evaluated, or (3) involve a significant reduction in a margin of safety; and therefore does not involve a significant hazards consideration.

Environmental Impact Consideration Determination

The proposed license amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The proposed amendment involves no significant increase in the amounts and no significant change in the types of any effluents that may be released off-site, and no significant increase in individual or cumulative occupational radiation exposure. FPL has concluded that the proposed amendment involves no significant hazards consideration, and therefore, meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment need not be prepared in connection with issuance of the amendment.

ATTACHMENT 3

ST. LUCIE UNIT 2 MARKED-UP TECHNICAL SPECIFICATION PAGE

Page
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REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

4.4.5.4 Acceptance Criteria

a. As used in this Specification

1. Imperfection means an exception to the dimensions, finish or contour of a tube from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube wall thickness, if detectable, may be considered as imperfections.

2. Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube.

3. Degraded Tube means a tube containing imperfections greater than or equal to 20% of the nominal wall thickness caused by degradation.

4. % Degradation means the percentage of the tube wall thickness affected or removed by degradation.

5. Defect means an imperfection of such severity that it exceeds the plugging limit. A tube containing a defect is defective.

6. Plugging Limit means the imperfection depth at or beyond which the tube shall be removed from service and is equal to 40% of the nominal tube wall thickness.

7. Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 4.4.5.3c., above.

8. Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg

9. Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline

excluding the portion of the tube within the tubesheet, below 5 inches from the secondary face of the tubesheet *.

ADD Footnote

* This exclusion is approved for Cycle 14 operation only.

ATTACHMENT 4

ST. LUCIE UNIT 2 RETYPED TECHNICAL SPECIFICATION PAGE

The attached retype reflects the currently issued version of the Technical Specifications. Pending Technical Specification changes or Technical Specification changes issued subsequent to this submittal are not reflected in the enclosed retype. The enclosed retype should be checked for continuity with Technical Specifications prior to issuance.

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

4.4.5.4 Acceptance Criteria

a. As used in this Specification

1. Imperfection means an exception to the dimensions, finish or contour of a tube from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube wall thickness, if detectable, may be considered as imperfections.

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8. Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg excluding the portion of the tube within the tubesheet below 5 inches from the secondary face of the tubesheet*.

9. Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline

* This exclusion is approved for Cycle 14 operation only.