

# CATEGORY 1

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SUBJECT: Submits 90-day response to GL 97-05, "Steam Generator Tube Insp Techniques."

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March 11, 1998

L-98-73  
10 CFR 50.4  
10 CFR 50.54 (f)

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

RE: St. Lucie Units 1 and 2  
Docket Nos. 50-335 and 50-389  
Generic Letter 97-05 - Response

The Florida Power and Light Company (FPL) responses to Generic Letter (GL) 97-05, *Steam Generator Tube Inspection Techniques*, for St. Lucie Units 1 and 2 is attached. The generic letter requested, within 90 days, that licensees provide current information regarding the use of sizing techniques at their facilities.

On December 17, 1997, the NRC issued GL 97-05 requesting licensees to verify compliance with Appendix B to 10 CFR 50 and the technical specifications, and to maintain a reasonable level of assurance that structural and leakage integrity margins for steam generator tubes are satisfied. The NRC concluded that it is appropriate for the licensees to review the types of steam generator tube indications that are being left in service based on sizing, the inspection method being used to perform the sizing for each type of indication, and the technical basis for the acceptability of each inspection method.

The attached information is provided pursuant to the requirements of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). This letter contains no new regulatory commitments. Please contact us if there are any questions about this submittal.

Very truly yours,

Rajiv S. Kundalkar  
Vice President  
Nuclear Engineering

RSK/GRM

Attachment

cc: Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, St. Lucie Plant

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

Rajiv S. Kundalkar being first duly sworn, deposes and says:

That he is Vice President, Engineering, 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.

  
\_\_\_\_\_  
Rajiv S. Kundalkar

STATE OF FLORIDA  
COUNTY OF St. Lucie\_\_\_\_\_

Sworn to and subscribed before me

this 11 day of March, 1998  
by R. S. Kundalkar, who is personally known to me.

  
\_\_\_\_\_  
Name of Notary Public - State of Florida



Leslie J. Whitwell  
MY COMMISSION # CC646183 EXPIRES  
May 12, 2001  
BONDED THRU TROY FAIR INSURANCE, INC.

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

RESEARCH REPORT  
ON THE  
EFFECTS OF  
THE  
NEW  
COURT  
SYSTEM  
ON  
THE  
JURY  
SYSTEM  
IN  
THE  
UNITED  
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AMERICA

**NRC Request:**

Within 90 days of the date of this generic letter, addressees are to submit a written response that includes the following information:

- (1) whether it is their practice to leave steam generator tubes with indications in service based on sizing,
- (2) if the response to item (1) is affirmative, those licensees should submit a written report that includes, for each type of indication, a description of the associated nondestructive examination method being used and the technical basis for the acceptability of the technique used.

**NRC Request Part 1:**

*Whether it is their practice to leave steam generator tubes with indications in service based on sizing*

**FPL Response Part 1:**

The Unit 1 steam generators are BWI replacement units, and the Unit 2 steam generators are Combustion Engineering Series 3410. It is currently the practice for St. Lucie Units 1 and 2 to leave steam generator tubes with mechanical wear indications at support structures in service based on sizing. No other type of service induced degradation is in service based on sizing for the current cycle of operation for St. Lucie Units 1 and 2.

Specifically, steam generator tubes with mechanical wear indications which can be sized as less than the Technical Specification value of 40% of the nominal tube wall thickness are left in service.

Steam generator tube inspections for previous operating cycles included sizing of IGA/SCC indications in addition to mechanical wear indications, as discussed above. Sizing of IGA/SCC indications was last conducted during the Spring 1996 inspection at St. Lucie Unit 1. In the 1996 inspection, IGA/SCC indications which were located in the sludge pile region, or at eggcrate type tube support structures, remained inservice if sized as less than the Technical Specification limit of 40% of the nominal tube-wall thickness. IGA/SCC indications at other locations in the steam

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generators (i.e., tube expansion transitions, free spans, and drilled hole tube supports) were plugged on detection without regard to sizing.

The St. Lucie Unit 1 steam generators were replaced in December 1997. Therefore, there is no service induced degradation known to exist in the current cycle of operation. The first inservice inspection of the replacement steam generators is scheduled for the Fall 1999 refueling outage (SL1-16), and a plug on detection approach is planned for IGA/SCC type indications.

At St. Lucie Unit 2, sizing of IGA/SCC indications was last conducted during the Fall 1995 inspection. In the 1995 inspection, a small number of possible IGA/SCC indications (i.e., approximately 43) were sized as less than the Technical Specification limit of 40% of the nominal tube wall thickness and remained in service. Sizing of IGA/SCC indications was not done during the Spring 1997 inspection, and a plug on detection approach was used. Therefore, no IGA/SCC indications were left in service based on sizing for the current cycle of operation at St. Lucie Unit 2.

**NRC Request Part 2:**

*If the response to item (1) is affirmative, those licensees should submit a written report that includes, for each type of indication, a description of the associated nondestructive examination method being used and the technical basis for the acceptability of the technique used.*

**FPL Response Part 2:**

**Background** - The nuclear power industry recently adopted an initiative requiring each utility to implement the guidance of NEI 97-06, *Steam Generator Program Guidelines*, no later than the first refueling outage starting after January 1, 1999. As specified in NEI 97-06, each utility is to follow the inspection guidelines contained in the latest revision of the EPRI *PWR Steam Generator Examination Guidelines*.

Appendix H, "Performance Demonstration for Eddy Current Examination," of EPRI *PWR Steam Generator Examination Guidelines*, Revisions 3 through 5, provide guidance on the qualification of steam generator tubing examination techniques and equipment used to detect and size flaws. Revision 4 of the EPRI guidelines is applicable to the most recent inservice inspections at St. Lucie Plant. Per EPRI guidelines, damage mechanisms are divided into the following categories for qualification: thinning, pitting, wear, outside diameter intergranular attack/stress-corrosion cracking (IGA/SCC), primary-side SCC, and impingement damage.



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For qualification purposes, test samples are used to evaluate detection and sizing capabilities. While pulled tube samples are preferred, fabricated samples may be used. If fabricated test samples are used, the samples are verified to produce signals similar to those observed in the field in terms of signal characteristics, signal amplitude, and signal-to-noise ratio. Samples are examined to determine the actual through wall defect measurements as part of the Appendix H qualification process.

Procedures developed in accordance with Appendix H specify the essential variables for each technique. Essential variables are associated with an individual instrument, probe, cable, or on-site equipment configuration. Additionally, certain techniques have undergone testing and review to quantify sizing performance. The sizing data set includes the detection data set for the technique used with additional requirements for number and composition of the grading units.

**Sizing Techniques** - For the current cycle of operation for St. Lucie Unit 2, sizing techniques were used during steam generator inspections to leave tubes with mechanical wear indications in service based on sizing. For previous cycles of operation, as discussed in the response to item (1) above, sizing techniques were also used to leave IGA/SCC indications in service based on sizing. The St. Lucie Unit 1 steam generators were replaced in December 1997, and for the current cycle of operation at St. Lucie Unit 2, a plug on detection approach for IGA/SCC indications was used. Therefore, mechanical wear is the only type of service induced degradation which remains in service based on sizing for the current cycle of operation.

The basis for application of the sizing techniques is the conduct of the examinations under the St. Lucie Plant Quality Assurance Program following the requirements of Sections XI and V of the ASME Code, 1989 Edition and Regulatory Guide 1.83. Additional support for sizing degradation-specific mechanisms is provided by the qualification data sets in Appendix H to the EPRI *PWR Steam Generator Examination Guidelines*.

**Mechanical Wear** - For mechanical wear at vertical and diagonal straps and other support structures, sizing is accomplished using the 400/100 Khz differential mix or the 400/100 Khz absolute mix of the bobbin probe. A calibration curve for vertical maximum amplitude is determined based on applicable standards which replicate the damage mechanism type and quantity. The calibration curve represents the full range of expected depths.

The sizing qualification is based on 64 sample data points which were used for the Appendix H technique qualification provided in the EPRI guidelines. The samples ranged in depth from 4% to 78% through wall depth. This technique has a greater than 80% probability of detection at a 90% confidence level, and a root mean square sizing error of less than 5% through-wall.

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**IGA/SCC at Sludge Pile Regions and Eggcrate Type Supports** - For St. Lucie Unit 1, a detailed technical basis for the acceptability of the technique for sizing IGA/SCC type indications was provided to the NRC in FPL letters L-96-166, *Steam Generator Tube Inspection, Request for Additional Information (RAI) Response*, L-96-273, *Steam Generator Run Time Analysis for Cycle 14* and L-97-141, *Dose Assessment Correction, Cycle 14 Steam Generator Run Time Analysis*. This correspondence provides a run time analysis for St. Lucie Unit 1 in accordance with guidance provided in the Draft Regulatory Guide, *Steam Generator Tube Integrity*, Draft Regulatory Guide 1.121, *Bases for Plugging Degraded PWR Steam Generator Tubes* and Generic Letter 95-05, *Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking*.

For steam generator tube inspections through the Fall 1995 at St. Lucie Unit 2, a technical basis for the acceptability of the technique for sizing IGA/SCC type indications is provided in EPRI NP-5397-LD, *Laboratory Evaluation of Steam Generator Tubes 120/12, 79/9, and 59/95 From St. Lucie Unit 1*, August, 1987. The EPRI report concludes that the field eddy-current results showed good correlation with the defect depths and is conservative in sizing the defects. Inspection and sizing techniques used at St. Lucie Unit 2 were the same as those used at St. Lucie Unit 1 for detection and sizing of IGA/SCC indications.

As discussed in the response to item (1) above, sizing of IGA/SCC indications was abandoned after the Fall 1995 inspection at St. Lucie Unit 2, and after the Spring 1996 inspection at St. Lucie Unit 1. The St. Lucie Unit 1 steam generators were replaced in December 1997. Therefore, mechanical wear is the only type of service induced degradation which remains in service based on sizing for the current cycle of operation at the St. Lucie Plant.



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