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AUTH.NAME AUTHOR AFFILIATION
STALL,J.A. Florida Power & Light Co.
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SUBJECT: Forwards Rev 1 to SAIC-97/1008, "Analysis of Radiological Consequences of Main Steam Line Break Outside Containment for St Lucie Unit 1 Nuclear Power Plant Using NUREG-0800 Std Review Plan Section 15.1.5,App A."

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CATEGORY 1 DOCUMENT

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

June 3, 1997

L-97-141
10 CFR 50.4

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

RE: St. Lucie Unit 1
Docket No. 50-335
Dose Assessment Correction
Cycle 14 Steam Generator Run Time Analysis

The purpose of this letter is to provide a revision to the dose assessment submitted by Florida Power & Light Company (FPL) on April 4, 1997, and to provide additional information on the Fall 1996 steam generator inspection results. Attachment 1 provides the requested clarifications and additional information on the FPL steam generator inspection results for St. Lucie Unit 1. Attachment 2 provides the revised St. Lucie Unit 1 dose assessment using Standard Review Plan Section 15.1.5 methodology.

The revised dose assessment, prepared by Scientific Applications International Corporation (SAIC) for FPL, is SAIC Report, SAIC-97/1008 Revision 1, *Analysis of the Radiological Consequences of a Main Steam Line Break Outside Containment for the St. Lucie Unit 1 Nuclear Power Plant Using NUREG-0800 Standard Review Plan 15.1.5 Appendix A*, dated April 29, 1997. Revision 1 of the SAIC report incorporates a radionuclide release scenario which provides more realistic postulated doses when compared to doses estimated in Revision 0, which was provided as Attachment 2 to our April 4, 1997 submittal (L-97-90). The revised report provides a SRP dose calculation for an assumed pre-accident one gpm primary-to-secondary leak and a variable, but constant, post-accident primary-to-secondary leak rate for a postulated main steam line break (MSLB) outside containment. The three cases which were analyzed are: (1) a preexisting iodine spike in the primary coolant system, (2) an accident induced iodine spike, and (3) an accident induced 1.61 percent (%) fuel failure. The bounding results of this analysis are tabulated below and show the maximum allowable post-accident primary-to-secondary leak rate required to reach the regulatory dose limits set forth in 10 CFR 100 and 10 CFR 50, Appendix A, General Design Criteria 19, as indicated in SRP Section 15.1.5, Appendix A. Since the thyroid dose is more limiting than the whole body dose, only the limiting results are presented.

These results show that, for the bounding case of a postulated MSLB with induced steam generator tube leakage following 15 months of operation, the calculated upper bound leakage of less than 4 gpm from all forms of degradation, is substantially below the 6.8 gpm leak rate which is considered acceptable under the pending steam generator rule making criteria, in that the results do not exceed the 10 CFR 100 and 10 CFR 50 Appendix A general design criteria (GDC) 19 accident dose limits.

A001

Regulatory Thyroid Dose Limiting Post-Accident Primary-to-Secondary Leak Rate				
Dose Location	Regulatory Thyroid Dose Limit (REM)	Preexisting Iodine Spike Case (gpm)	Concurrent Iodine Spike Case (gpm)	1.61. % Failed Fuel Case (gpm)
Control Room	30	67	196	6.8
Exclusion Area Boundary (Site Boundary)	30 or 300[a]	430	157	33
Low Population Zone (LPZ)	30 or 300[a]	3,000	988	200

[a] For the concurrent iodine spike case, the regulatory limit is 30 REM; for the other cases the regulatory dose limit is 300 REM

During a July 3, 1996, meeting with the NRC, Florida Power and Light Company (FPL) committed to provide the results of the St. Lucie Unit 1 steam generator run time analysis to the NRC within 90 days of the startup from the 1996 refueling outage (SL1-14). FPL letter L-96-273 dated October 24, 1996, provided FPL's plans to operate the Unit 1 steam generators for fifteen (15) months (i.e., through October 23, 1997). FPL letters L-97-47 dated February 21, 1997, and L-97-90 dated April 4, 1997, supplemented this information in response to an NRC RAI dated January 23, 1997. The run time analysis was a physically based analysis that used the guidance contained in Draft Regulatory Guide (RG) 1.121, Generic Letter 95-05, and the Draft Regulatory Guide, *Steam Generator Tube Integrity*.

This letter does not contain any new regulatory commitments. FPL is prepared to meet with the NRC to discuss the results of this and any other previously submitted analyses. Please contact us if you have any additional questions.

Very truly yours,

J. Scarola for JAS

J. A. Stall
Vice President
St. Lucie Plant

JAS/GRM

Attachments

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

Cycle 14 Steam Generator Runtime Analysis Request for Additional Information Response

NRC Question 1:

Clarify the following statement on page 60 of Enclosure 2 of your October 24, 1996 submittal, "St. Lucie Unit 1; Docket No. 50-335; Steam Generator Run Time Analysis for Cycle 14"

"The number of simulated leaking defects in the entire steam generator is obtained by first sampling from a binomial distribution using the average level frequency of leak computations and the number of equivalent levels in the steam generator?"

FPL Response to Question 1:

The number of simulated leaking defects for the entire steam generator is obtained in a two-step process. The first step is the computation of the number of leaking defects at an average level. As in the structural integrity portion of the analysis (Section 5.1), the 'average' level corresponds physically to roughly one tube support level. The number of leaking defects for this average support is obtained by sampling from a Binomial distribution using the probability of any leaking defect in the average support. The result of this process is a trial outcome of N leaking defects (N= 0,1,2,3,.....,k) for the average support.

The second step in the computation is the summation of leaking defects over all levels in the steam generator. As in Section 5.1 of the report, the number of such levels is 15 for the most affected steam generator. The summation process is ordinary addition unlike that for probability of burst which is a Boolean summation.

NRC Question 2:

In Table 4-1 of Enclosure 4 to your October 24, 1996 submittal, the maximum bobbin depth for tube R15L55 at 1H is recorded as "94/64." Please clarify what is meant by this entry.

FPL Response to Question 2:

Table 4-1 of Enclosure 4 to our October 24, 1996 submittal provides results of In-situ Pressure Tests conducted for defect indications in St. Lucie Unit 1 steam generator tubing. These results were discussed with the Staff at the completion of the testing. Prior to in-situ pressure testing, all test candidate indications were reviewed by lead analysis personnel. The maximum bobbin

depth for R15L55 at 1H was subsequently listed as "94/64" due to the complex nature of the indication. The overall indication is measured as 64% through wall. A smaller component of the indication, however, when measured separately, measures 94% through wall. In-situ testing for this indication demonstrated that, while leakage did occur, adequate structural margins existed. The specific entry (94/64) reflects this result.

NRC Question 3:

In Figures 13 and 14 of Appendix A to Enclosure 1, the number of indications with depths between 0-19%, 20-39%, and >40% were provided. Please provide a breakdown of the number of indications between 40-50%, 50-60%, ... and 90-100% for the indications greater than 40% in 1996. Also, please state whether the depths are max depth or average depth. If not max depth please provide max depth readings.

FPL Response to Question 3:

A breakdown of the number of indications between 40-50%, 50-60%, ... and 90-100% for indications greater than 40% in 1996 is provided in Table 1 for steam generator A and Table 2 for steam generator B.

Data analysis personnel were instructed to provide maximum eddy current depth estimates for all indications. At St. Lucie Unit 1, bobbin coil indications at eggcrates, that are 2.5 volts or greater in amplitude, may exhibit a complex signal indicative of an indication with variable depth. As discussed in our response to Question 2, such an indication at R15L55 at 1H in steam generator B was noted during reviews prior to in-situ pressure testing. This indication is included in Table 2 as 64%, although a smaller component of the indication was later measured as 94% through wall. A sample review of bobbin data verified that eggcrage indications less than 2.5 volts in amplitude do not exhibit such complex signals. In addition, all remaining eggcrate indications measuring 2.0 volts or greater were reviewed and no additional exceptions were noted.

Table 1

St. Lucie Unit 1 - SGA 1996, >40% Depth Breakdown

Elevation	NQI	40-49%	50-59%	60-69%	70-79%	80-89%	90%+	TOTALS
01 H	84	41	27	15	3	2		172
02 H	46	47	15	2	2	1		113
03 H	36	20	8	3				67
04 H	20	13	2	2	1			38
05 H	21	6	4	1				32
06 H	8	2	2					12
07 H	7							7
08 H		1						1
09 H								0
10 H								0
01 C	8		1					9
02 C	8							8
03 C	4	3			1			8
04 C	6	1	2					9
05 C	3	1	1					5
06 C	2							2
07 C	4		3					7
08 C	1							1
09 C		1						1
10 C								0
VS 1	2							2
VS 2	5		1					6
VS 3								0
TS H	37	28	7	1				73
TE H								0
TS C								0
TE C								0
DC B								0
DH B								0
DH T								0
DC T								0
TOTALS	302	164	73	24	7	3	0	573

NQI - Non Quantifiable Indication
01H, 02H . . . . - 1st support hot side
01C, 02C . . . . - 1st, 2nd support cold side
VS1, VS2 . . . . - 1st, 2nd Vertical Strap from hot side
DHB, DCB - Diagonal Strap, Hot or Cold Side, Bottom Edge
DHT, DCT - Diagonal Strap, Hot or Cold Side, Top Edge
TSH, TSC - Tubesheet Hot or Cold, Secondary face
TEH, TEC - Tube End Hot or Cold Side

Table 2

St. Lucie Unit 1 - SGB 1996, >40% Depth Breakdown

Elevation	NQI	40-49%	50-59%	60-69%	70-79%	80-89%	90%+	TOTALS
01 H	173	37	31	16	17	5		279
02 H	80	16	7	5				108
03 H	40	10	7	2	3			62
04 H	22	5	4					31
05 H	20					1		21
06 H	6	2	2					10
07 H	4	1	2					7
08 H	6	1	1					8
09 H								0
10 H								0
01 C	10	1						11
02 C	2	3	1	1				7
03 C	5	1						6
04 C	5	1	2					8
05 C	3	3						6
06 C	6	2						8
07 C	5	1		1				7
08 C	4	1						5
09 C								0
10 C		1						1
VS 1	9							9
VS 2	17				1			18
VS 3	1							1
TS H	26	10	3	2		1		42
TE H								0
TS C	3	1						4
TE C								0
DC B								0
DH B								0
DH T								0
DC T								0
TOTALS	447	97	60	27	21	7	0	659

NQI - Non Quantifiable Indication
01H, 02H . . . . - 1st support hot side
01C, 02C . . . . - 1st, 2nd support cold side
VS1, VS2 . . . . - 1st, 2nd Vertical Strap from hot side
DHB, DCB - Diagonal Strap, Hot or Cold Side, Bottom Edge
DHT, DCT - Diagonal Strap, Hot or Cold Side, Top Edge
TSH, TSC - Tubesheet Hot or Cold, Secondary face
TEH, TEC - Tube End Hot or Cold Side