TAC No. MC5084

Responses to NRC Requests for Additional Information on WCAP-16208-P, Rev. 0, "NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions"

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DEFINITIONS

ARC – Alternate repair criteria are approvals by NRC to utilize specific criteria for repair decisions based on detection of flaws.

AVT – All Volatile Treatment.

BET – Bottom of the explansion transition.

BTA – Bore Trepanning Association process for machine boring. A process improvement employed for tubesheet drilling applicable to Plant CE2 (only one steam generator), Plant CE3 and the Plant CG replacement steam generators

Collar - Tubesheet mockups were fabricated from tubesheet bar stock material SA-508, Class 3. The machined bar stock in which a tube was explosively expanded was referred to in this project as a collar.

C* - The CE design explansion joint inspection distance.

EDM - Electrical discharge machining.

EOC – End of the operating cycle.

Explansion – Explosive expansion of tubing into a Combustion Engineering steam generator tubesheet.

F* - The Westinghouse design rolled joint inspection distance.

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FPL - Florida Power & Light.

Joint – The tube and tubesheet contact surface area created by the explansion process.

H* - The Westinghouse design hydraulic expansion joint inspection distance.

Leakage criteria – The generic Combustion Engineering design technical specifications LCO for accident induced leakage value is 0.5 gpm per steam generator. The leak limit is reduced by one-fifth (i.e. 0.1 gpm) to provide margin for leaks from other potential degradation types. The criterion conservatively assumes that the leakage is from 100% of the tubes in the steam generator that have throughwall circumferentially oriented flaws present at the threshold length below the hot leg BET.

LCO – Technical specifications limiting condition for operation.

Maximum load – The largest force encountered while pulling the tube out of the tubesheet.

MDM - Metal Disintegration Machining.

NODP – Normal operating differential pressure = RCS pressure minus SG pressure at normal full power operating conditions.

Pullout force - The force required to move the tube relative to the tubesheet.

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POD – Probability of detection based on the ability of an NDE technique to indicate the presence of a flaw.

RAI - Request for additional information.

Rough bore – The machined surface on the inside diameter of each laboratory specimen rough bore collar was drilled on a lathe to a surface roughness not greater than 250 micro-inches (AA) to mockup the gun-drilled tubesheet hole surface. Applicable to St. Lucie Unit 2.

SLB or MSLB – The design basis event known as main steam line break.

STD – The Science and Technology Division of Westinghouse.

Smooth Bore - The machined surface on the inside diameter of each laboratory specimen smooth bore collar was drilled on a lathe to a surface roughness not greater than 250 micro-inches (AA) and then reamed to increase smoothness to mockup the BTA process tubesheet hole surface. Not applicable to St. Lucie Unit 2.

Taper – The theoretically incomplete contact near the top of the joint just below the explansion transition. The W* topical report increased the threshold length to account for an approximately 0.7" taper.

Threshold length – The tube to tubesheet joint length below the BET that provides a sufficient contact force to preclude pullout at 3NODP and leakage at SLB pressures.

TTS – Top of the tubesheet.

W* - The Westinghouse design explosive expansion joint inspection distance.

1.0 INTRODUCTION

1.1 BACKGROUND

The Westinghouse Owner's Group program to provide recommended tubesheet region inspection lengths, for plants with Combustion Engineering supplied steam generators with explosive expansions, was documented in report WCAP-16208-P, Reference 1. This inspection length is commonly referred to as C* ("C-Star"). Reference 1 was submitted by Florida Power & Light (FPL) to the NRC as part of their request for a license amendment.

The NRC has reviewed the Reference 1 document. In December 2004, the NRC compiled a list of requests for additional information (RAIs). Reference 2 provided responses to this first set of RAIs. In December 2005, the NRC issued a second set of RAIs (Reference 3).

This document provides the responses to this second set of RAIs. Responses to RAIs 1, 3, 5 and 6 were provided by Westinghouse. Responses to RAIs 2 and 4 were provided by Florida Power and Light through Reference 4 and are included in this document for completeness.

A fundamental objective of WCAP-16208-P was to establish a leakage based inspection depth to ensure that the total predicted leakage from the tubesheet at St. Lucie Unit 2 was no more than 0.1 gpm/SG assuming 8500 tubes in service. On a per tube basis, this translates to a leak rate of $1.18x10^{-5}$ gpm/tube. Thus, WCAP-16208-P established a leak rate criterion per steam generator as well as a leak rate criterion per tube. The primary to secondary leakage rate assumed in the current accident analyses for St. Lucie Unit 2 is 0.15 gpm/SG (Reference 4). This document (LTR-CDME-05-257) recalculates the minimum required inspection depth to establish a per tube leakage rate that is equivalent to the minimum detectable leak rate per tube that was determined by the mockup testing.

The leak rate results provided in WCAP-16208-P are a range of leak rates as a function of joint length as determined by tube to tubesheet mockup testing. The test setup was established to provide a conservative minimum detectable leak rate of [

]a,c,e

The leak rate criterion/tube will be used to predict the total leakage from the tubesheet for a given SG based on the number of tubes in service. For Cycle 15 operation (Reference 4), SG 2A has 6942 tubes in service and SG 2B has 6702 tubes in service. Therefore, SG 2A has a predicted leakage of 0.032 gpm and SG 2B has a predicted leakage of 0.030 gpm for Cycle 15.

1.2 SUMMARY

The responses presented in this document:

- Clarify how the data supports the analytical adjustment to account for the axial load resistance provided by the differential thermal expansion effects.

- Provide corrections and clarification to apparent conflicts/discrepancies in proposed sleeve Technical Specification amendments.
- Clarify the use of leak rate data.
- Provide reasonable assurance that postulated accident induced leakage will remain within the limits of the accident analyses.
- Determine a new inspection depth to support the minimum detectable leak rate of 4.54×10^{-6} gpm/tube. This revised inspection depth includes the actual rather than the nominal hot leg temperature and uses the "first slip" rather than the "maximum load" pullout data.

The responses to these RAIs result in a change in the recommended inspection depth from 10.1 inches to 10.3 inches below the bottom of the expansion transition for the St. Lucie Unit 2 original steam generators. The actual minimum inspection distance for Cycle 15 was 13 inches below the top of tubesheet (Reference 5). The largest variation between the expansion transition and the top of tubesheet was 0.73" (Reference 6), thus ensuring a minimum inspected engagement length of 12.27 inches. This exceeds the minimum required inspection depth of 10.3 inches.

Table 2-1, Table 6-15 and the Executive Summary table of Reference 1 are thus amended as follows:

Table 2-1 from WCAP-16208-P: Leakage Based Inspection Length Including Tubesheet Deflection and NDE Corrections (Amended for St. Lucie 2 Only)

Plant	Leak Rate Based Inspection Length Adjusted for TS Dilation (inches)	Leak Rate Based Inspection Length Adjusted for TS Dilation and NDE (inches)
Plant CI	11.1	11.4
St. Lucie 2	9.8 ⇒ 10.0	10.1 ⇒ 10.3
Plants CF & CD	10.1	10.4
Plant CG	11.3	11.6
Plant CE1	10.1	10.4
Plant CE3	11.3	11.6

Table 6-15 from WCAP-16208-P: Inspection Length Based on Leakage
(Amended for St. Lucie 2 Only)

Plant	Burst Based Inspection Length Corrected for Dilation and NDE (in.)	Uncorrected Joint Length that Meets Leakage Criteria (inches)	Interpolated Leak Rate Based Inspection Length Corrected for Dilation (in.)	Leak Rate Based Inspection Length Corrected for Dilation and NDE (in.)
Plant CI	3.1	6.55	11.1	11.4
St. Lucie 2	2.6	6.56	9.8 ⇒ 10.0	10.1 ⇒ 10.3
Plant CF/Plant CD	2.6	6.57	10.1	10.4
Plant CG	4.6	6.56	11.3	11.6
Plant CE1	2.8	6.57	10.1	10.4
Plant CE3	4.3	6.57	11.3	11.6

Executive Summary Table from WCAP-16208-P
(Amended for St. Lucie 2 Only)

Plant	Leak Rate Based Inspection Length Corrected for Dilation and NDE (in.)
Plant CI	11.4
St. Lucie 2	10.1 ⇒ 10.3
Plants CF & CD	10.4
Plant CG	11.6
Plant CE1	10.4
Plant CE3	11.6

1.3 QUALITY ASSURANCE

The responses to RAIs 2 and 4 were provided by Florida Power and Light through Reference 4. The response to these two RAIs were completed and reviewed under the requirements of the Florida Power and Light quality assurance program.

The remainder of the work that is presented in this document was completed and reviewed under the requirements of the Westinghouse Quality Assurance Program (Reference 7).

2.0 RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION

2.1 RAI #1

In the March 31, 2005 response to request for additional information (RAI) number 12, all available data were used to support the analytical adjustment to account for the axial load resistance provided by the differential thermal expansion effects. However, it is not clear whether all of the available data was used to support the analytical adjustment to account for the axial load resistance provided by internal pressure. For example, specimens 8 and 12 from the Task 1154 program were run at room temperature with internal pressure; however, an analysis of this data (similar to what was done for the elevated temperature data point) was not provided. Please evaluate all data in which internal pressure (above ambient pressure) was applied to support the basis for the analytical adjustments to account for the internal pressure. With respect to the analysis of the pressure effects provided in your response, please provide additional details on how the axial force resistance due to the internal pressure of 1435 psi was calculated and discuss how the effect of the residual contact pressure was taken into account in your analysis. (The actual pullout force was nearly the same as the pullout resistance expected analytically from the internal pressure effects. As a result, if the residual contact pressure was not included in this assessment, it would appear that the analytical adjustments for internal pressure are too high).

2.1.1 Response A to RAI #1

Specimens 8 and 12 are not used in any analyses reported in WCAP-16208-P or responses to NRC questions because the load during the pullout test exceeded the tube yield. When the pull force exceeds the yield strength of the tube the data reflects the tube strength and not the joint strength. The data is then independent of the joint length and does not add meaningful or useful information. Specimens 8 and 12 from the Task 1154 program (Reference 8) were both tested at room temperature and an internal pressure of 2575 psi. The load test results for specimens 8 and 12 were both in excess of the tube yield strength.

2.1.2 Background for Responses B and C to RAI #1

The net contact pressure, P_C, between the tube and the tubesheet during operation or accident conditions is given by,

$$P_C = P_0 + P_P + P_T - P_B \tag{1}$$

where P_B is the loss of contact pressure due to dilation of the tubesheet holes, P_0 is the installation preload, P_P is the pressure induced load, and P_T is the thermal induced contact load.

In the case of the laboratory samples tested at room temperature, both P_T and P_B are zero.

The pullout force that is attributable to any of these components, F_x of contact pressure is calculated by multiplying the applicable contact pressure, P_x, by the contact area, A, and the coefficient of friction, μ:

$$F_x = P_x A \mu \tag{2}$$

When the inside of the tube is pressurized, P, some of the pressure is absorbed by the deformation of the tube within the tubesheet and some of the pressure is transmitted to the OD of the tube, P_P, as a contact pressure with the ID of the tubesheet:

$$P_P = P\xi \tag{3}$$

In this equation, ξ is the transmittance factor. The magnitude of the transmittance factor is found by considering the relative flexibilities of the tube and the tubesheet. The following discussion of flexibilities was obtained from Reference 9.

Flexibility, f, is defined as the ratio of deflection relative to applied force. It is the inverse of stiffness that is commonly used to relate force to deformation. There are three flexibility terms associated with the radial deformation of a cylindrical member depending on the surface to which the loading is applied and the surface for which the deformation is being calculated (e.g., for transmitted internal pressure one is interested in the radial deformation of the OD of the tube and the ID of the tubesheet). The deformation of the OD of the tube in response to the external pressure provided by the contact pressure is also of interest. These flexibility terms are derived from equations for radial displacement in thick-walled cylinders (Reference 10).

The flexibility of the tubesheet, designated herein by the subscript c, in response to an internal pressure, P_{ci}, is found as,

[ ] a,c,e Tubesheet (4)

where,

r_{ci} = inside radius of the tubesheet and outside radius of the tube,
r_{co} = outside radius of the tubesheet hole unit cell,
E_c = the elastic modulus of the carbon steel tubesheet material, and
ν = Poisson's ratio for the tubesheet material.

Here, the subscripts on the flexibility stand for the component, c for tubesheet (and later t of tube), the surface being considered, i for inside or o for outside, and the surface being loaded, again, i for inside and o for outside.

The flexibility of the tube in response to the application of an external pressure, P_{to}, e.g., the contact pressure within the tubesheet, is,

[ ] a,c,e Tube (5)

where E_t is the elastic modulus of the tube material. Poisson's ratio is the same for the tube and the tubesheet.

Finally, the flexibility of the outside radius of the tube in response to an internal pressure, P_{ti}, is,

[ ]a,c,e Tube (6)

where r_{ti} is the internal radius of the tube.

The transmittance factor in equation (3) is found by:

[ ]a,c,e (7)

The denominator of the fraction is also referred to as the interaction coefficient between the tube and the tubesheet. The contact pressure does not increase by as much as the amount of internal pressure that is transmitted through the tube alone, because the tubesheet acts as a spring and the interface moves radially outward in response to the increase in pressure.

2.1.3 Response B to RAI #1

There are three cases reported in WCAP-16208-P of tube movement during testing with pressure applied inside the tube. All pullout screening tests were conducted with internal pressure. Only Sample 3, with a 2 inch joint length, and Sample 4, with a three inch joint length, experienced tube displacement during a pullout screening test. The tube blowout (another form of tube displacement) of Sample 1, with a joint length of 1 inch, occurred during room temperature leak testing. Samples 1, 3 and 4, like all of the samples documented in WCAP-16208-P, were explosively expanded into the tubesheet mock-up.

The response to RAI #12 in Reference 2 provided an analytical adjustment for internal pressure for a specific test. In the RAI #12 example, the resistance to movement provided by internal pressure was [ ]a,c,e However, this value was calculated for a sample that was tested at SLB pressure and is not applicable to the lower pressures of Samples 1, 3 and 4.

The blowout of Sample 1 was an unintended (but was considered possible and was thus monitored) consequence of a room temperature leak test. Figure 1 presents a plot of the internal pressure versus a relative time scale. Prior to the blowout, Sample 1 held an average pressure of [

]a,c,e

Sample 1 used 48 mil wall tubing. Using the nominal dimensions of the tubesheet collar, the calculated values for the flexibility terms in equations (4), (5) and (6) are:

[

]a,c,e

2.1.4 Response C to RAI #1

The purpose of the pullout screening tests was to demonstrate that a given joint could withstand a 3NODP load without movement (see Section 5.0 of Reference 1). This differed from the purpose of the pullout testing conducted in Task 1154 (Reference 8), which was performed to assess the maximum strength of the joint.

[

]a,c,e The pullout

screening and blowout test results were only provided in Figures 5-1 through 5-3 of WCAP-16208-P for a ballpark comparison with the Task 1154 data and were not used in the regression analysis. Nevertheless, RAI #1 seeks to assess relevant information from these tests rather than a simple pass/fail value. To provide a thorough explanation, a review of the pullout screening test data is presented here.

Figure 2 and Figure 3 present the screening pullout test data for Samples 3 and 4, respectively. The plots provide load and internal pressure data as a function of displacement. Load is plotted against the left side abscissa and internal pressure is plotted against the right side abscissa. The figures also demonstrate where various definitions of load may be read.

In Table 5-1 and Figure 5-3 of WCAP-16208-P, both the Sample 3 and Sample 4 data that is reported use a very conservative definition of "First Move" that is different from the rest of the data provided in Figure 5-3 of WCAP-16208-P and from the criteria used in response to RAI #6.
[

]a,c,e

The "First Slip" criterion, provided in the response to RAI #6, is appropriate for the determination of contact pressure. [

]a,c,e

Table 5-1 of WCAP-16208-P provides the "Axial Force From Internal Pressure". For Sample 1, this is based on the blowout pressure of [ ]a,c,e For Samples 3 and 4, the values provided in Table 5-1 of WCAP-16208-P are based on the nominal internal NODP pressure of [ ]a,c,e Figure 2 and Figure 3 show that the actual internal pressures were slightly less than nominal. Load and actual internal pressures, as well as the calculated values for Axial Force from Internal Pressure (using the [ ]a,c,e value from equation 8) and the Pullout Force (the sum of the External Applied Load and the Axial Force from Internal Pressure) are provided in Table 1.

Using the actual internal pressure and "First Slip" load, rather than the nominal internal pressure of [ ]a,c,e and "First Move" load, is appropriate for the evaluation of analytical adjustments to account for the internal pressure.

The Sample 3 Pullout Screening test had an internal pressure of [
]a,c,e The external load was applied after the internal pressure was applied, without movement.

Sample 3 used 42 mil wall tubing. Using the nominal dimensions of the tubesheet collar, the calculated values for the flexibility terms in equations (4), (5) and (6) are:

[

]a,c,e

Adjusting the data in Figure 5-1 through 5-3 for the "First Slip" criterion rather than the "Maximum Load" criterion that was used, would only lower the regression and lower bound curves, thus the evaluations provided above would remain valid.

2.2 RAI #2

The NRC is currently reviewing an amendment to permit the installation of sleeves at St. Lucie 2. In some cases, the sleeve joint may be established greater than 10.1 inches below the top of the *tubesheet or the bottom of the expansion transition, whichever is lower. As such, Technical Specification 4.4.5.4.a.8 would no longer require the sleeve or tube to be inspected in this region. However, this is in potential conflict with a proposed requirement to inspect both the tube and sleeve over their full length. That is, it could lead to the incorrect interpretation that only the portion of the sleeve above 10.1 inches from the top of the tubesheet was required to be inspected. Similarly, there is a potential conflict of the tube plugging (or repair) limit in Technical Specification 4.4.5.4.a.6 since the plugging limit is not applicable below 10.1 inches from the top of the tubesheet despite the fact that the expectation is that any degradation in the pressure boundary portion of the sleeve/tube assembly below 10.1 inches from the top of the tubesheet is plugged on detection. Please correct these apparent conflicts/discrepancies in your proposed Technical Specifications.*

2.2.1 Response to RAI #2

The response to this RAI was provided entirely by FPL (Reference 4), in accordance with the FPL quality assurance program. The response is included here for completeness.

Please note that the proposed inspection depth within the tubesheet at St. Lucie Unit 2 is increased from 10.1 inches to 10.3 inches. The basis for this change is provided in the reply to questions 4, 5 and 6. This requires a conforming change to FPL proposed license amendment for Alloy 800 Leak Limiting Sleeves (FPL Letter L-2004-233, January 6, 2005).

FPL agrees to clarify the wording in proposed Technical Specification 4.4.5.4.a.8 and 4.4.5.4.a.6 consistent with the Staff's concerns.

2.3 RAI #3

In the March 31, 2005 responses to RAI 16 and 22, you discussed various data that was not included in Appendix B; however, some data in Appendix B was not included in Table 4-1 (which is used in determining the leak rate as a function of joint length). Please discuss the basis for not including all of the Appendix B data in Table 4-1. For example, was data not included in Appendix B when it was well outside the targeted temperatures or pressures? Furthermore, was data from Appendix B not included in Table 4-1 when steady state was never reached although the temperatures and pressures were within the desired range?

2.3.1 Response to RAI #3

Section 4.4 of WCAP-16208-P introduces Table 4-1. Section 4.4 states the following:

"There was an effect of time in the leak rate data. Most of the samples started with a relatively high leak rate and did not achieve a steady leak rate for a period of several minutes. The higher leak rate observed during the start of testing is uncharacteristic of leakage that would be observed in an operating steam generator. The data in Appendix B were reviewed to identify those data that had reached steady, or established, values under SLB conditions. Table 4-1 provides a summary of all the established elevated temperature leak rate values. The data in this table consists of valid leak rates (all parameters within specification and close to the targeted parameters), that have demonstrated some degree of an established or steady value. It also provides the basis for the selection of each point."

In addition, there are a set of notes on the page following Table 4-1 (see page 4-10 of WCAP-16208-P – Reference 1) that describes the basis for selecting the data in Table 4-1. The basis for using "established" data was elaborated upon in the response to RAI 21 (Reference 2).

[

]^{a,c,e} However, the established leak rates in Table 4-1 are only for those tests conducted at SLB pressure and 600°F.

- Leak rate data that was obtained well outside the targeted temperatures or pressures was not included in Appendix B of Reference 1 (see response to RAI 16 in Reference 2), therefore it was not included in Table 4-1 of Reference 1.
- Leak rate data obtained from tests conducted at conditions other than the target pressure differential of 2560 psi and the target temperature of 600°F, was not included in Table 4-1 of Reference 1.
- The remaining leak rate data (all taken at 2560 psi, 600°F) was considered on a test set by test set basis to determine if an established or steady value was reached. Justification for each data point in Table 4-1 is provided on page 4-10 of WCAP-16208-P (Reference 1). Thus, the remaining leak rate data in Appendix B of Reference 1 was considered in determining the established leak rate, for each unique set of tests.

2.4 RAI #4

In Attachment 1 to your November 8, 2004 submittal, it was indicated that (as part of another amendment request) the Limiting Condition for Operation (LCO) leakage rate was being reduced from 0.5 to 0.15 gallons per minute (gpm) per steam generator. You further state that this modification will reduce the margin between the assumed primary to secondary leakage rate of WCAP-16208-P (0.1 gpm) and the reduced LCO leakage rate utilized in the UFSAR accident analyses (0.15 gpm). The LCO leakage rate in your technical specifications limits the amount of primary-to-secondary leakage during normal operation (i.e., normal operating leak rate limit). Based on your statements, the staff is inferring that your UFSAR accident analyses (e.g., steam line break) assumes that the amount of primary-to-secondary leakage during the accident is identical to your LCO leakage limit (i.e., 0.15 gpm). If this is correct, please address the following:

c. During a steam line break the differential pressure across the tubes is greater than the differential pressure during normal operation. As a result, the primary-to-secondary leakage may be greater during a steam line break than during normal operation. Since you could be operating with leakage as high as your normal operating leakage limit (0.15 gpm), the amount of leakage during a steam line break (or other postulated accidents) could be greater than that assumed in your accident analyses. If so, please discuss what controls are in place to ensure that you do not exceed your accident induced leakage limit simply as a result of normal operating *leakage. In addition, discuss your plans for modifying your technical specification normal operating leakage limit to be consistent with your accident induced leakage limit assumed in your UFSAR accident analyses. Alternatively, discuss your plans for modifying your accident analyses to account for this phenomenon.*

d. As part of the C amendment, you will be assuming that there is 0.1 gpm accident induced primary-to-secondary leakage as a result of flaws within the tubesheet region. In addition, you may have accident induced leakage from other sources such as sleeves or other tube degradation. This latter amount of leakage will need to be limited to 0.05 gpm to ensure you do not exceed your accident induced leakage limits in your UFSAR. Since the source of any normal operating leakage is not known (i.e., it could be from sources other than the tubesheet or sleeves or other defects assumed to leak in your operational assessment) and it could be as high as 0.15 gpm (or even higher during some postulated accidents for the reason discussed above), it is not clear that you will be able to stay within your accident induced leakage limits unless you change your technical specification normal operating leakage limit or your UFSAR accident analysis leakage limit. Please discuss whether you will be able to stay within your accident induced leakage limit given your normal operating leakage limit and your proposed C* inspection requirements.*

2.4.1 Response to RAI #4

The response to this RAI was provided entirely by FPL (Reference 4), in accordance with the FPL quality assurance program. The response is included here for completeness.

The FPL implementation plan for this LAR requires establishment of procedural controls to limit normal operating leakage through any one steam generator to the value assumed in the accident analysis (0.15 gpm) less those amounts postulated in the Operational Assessment completed at each inspection. Postulated leakage includes leakage predicted from the tubesheet (i.e., WCAP-16208-P), from installed sleeves, and other sources as identified in the Operational Assessment. The leakage prediction methodology is discussed below. St. Lucie Plant Off-Normal Operating Procedure, Steam Generator Tube Leak 2-0830030, incorporates the guidance of EPRI PWR Primary-to-Secondary Leak Guidelines, and requires plant shutdown at 0.05 gpm primary to secondary leakage. If the current margin (e.g., the amount taking the value assumed in the accident analysis less postulated leakage) is less than 0.05 gpm through any one steam generator, FPL will revise this procedure to limit normal operating leakage to the lower value for the subsequent operating period.

This RAI response increases the required inspection depth within the tubesheet from 10.1 inches to 10.3 inches and reduces leakage predicted from the tubesheet as discussed in the Introduction section. The new predicted leakage values are well below 0.1 gpm.

The operational restrictions proposed by FPL, at a minimum, maintain the current margin and account for leakage predictions from the tubesheet, sleeves or other sources. The conservative nature of the proposed license amendments for C* and sleeves is expected to bound potential increases in normal operating leakage in the unlikely event that a SLB occurs at the same time that a tube leak is being experienced. That is, leakage predictions for the tubesheet assumes that all inservice tubes are completely severed at the required inspection depth (10.3"), but no such tube severs have occurred to date at St. Lucie Unit 2. Further, all installed tube/sleeve assemblies are assumed to leak, but few, if any sleeves are expected to experience leakage based on industry operating experience. Accordingly, actual leakage due to limited tubesheet inspections and the installation of sleeves is expected to be a small fraction of that calculated by the operational assessments.

The proposed license amendments for C* and sleeves are also conservative with respect to assumed limiting accident pressures. Both amendments assume a peak accident pressure of 2560 psid. A review of data for Post-Trip Main Steam Line Break pressurizer pressure and steam generator steam pressure (St. Lucie Unit 2 UFSAR Figures 15.1.6-4 and 15.1.6.6 respectively) shows that the accident induced pressure differential is significantly less, with a peak value of less than 1800 psid. It is therefore also expected that any normal operational leakage would not increase significantly in the unlikely event that a main steam like break is experienced and that any increase would be bounded by these conservatisms.

Based in the information presented above, the reduction in predicted tubesheet leakage, in conjunction with the controls being placed on normal operating leakage, provide reasonable assurance that the postulated accident induced leakage will remain within the limits of the accident analysis assumptions. Further, FPL will continue to follow industry's review of this issue, and dependent on the outcome of this effort, follow Industry guidance to account for the difference in differential pressure between normal operation and postulated accidents to ensure that the accident induced leakage limit is not exceeded.

2.4.2 Leakage Prediction Methodology

The methodology provided in the following table is established to define the total predicted leakage from all sources for the St. Lucie Unit 2 steam generators and ensure appropriate margin to the primary to secondary leakage rate assumed in the accident analyses. The actual minimum inspection distance for Cycle 15 was 13" below the top of tubesheet. This ensures a minimum inspected engagement length of 12.27", which exceeds the minimum required inspection depth.

St. Lucie Unit 2 Steam Generators Method for Leakage Prediction and Margin Assessment for Cycle 15			
		SG 2A	SG 2B
Define Total Predicted Leakage	*HL Tubesheet Leakage Prediction* [3]		
	4.54×10^{-6} gpm x 6942 Inservice Tubes (SG 2A)	0.032 gpm	
	4.54×10^{-6} gpm x 6702 Inservice Tubes (SG 2B)		0.030 gpm
	Sleeve Leakage Prediction [4]		
	8.63×10^{-4} gph x 0 TZ Sleeves/60 (SG 2A)	0.000 gpm	
	8.63×10^{-4} gph x 0 TZ Sleeves/60 (SG 2B)		0.000 gpm
	1.96×10^{-3} gph x 0 TS Sleeves/60 (SG 2A)	0.000 gpm	
	1.96×10^{-3} gph x 0 TS Sleeves/60 (SG 2B)		0.000 gpm
	Other Leakage Sources for Cycle 15 [5]	0.000 gpm	0.000 gpm
	Total Predicted Leakage	**0.032 gpm**	**0.030 gpm**
Margin Assessment	Leakage Assumed in Accident Analyses [1]	0.15 gpm	0.15 gpm
	Total Predicted Leakage	0.032 gpm	0.030 gpm
	Current Margin	0.118 gpm*	0.120 gpm*
	Plant Procedure Shutdown Criterion [2]	0.050 gpm	0.050 gpm
* If **Current Margin** is LESS THAN the **Plant Procedure Shutdown Criterion**, reduce the **Plant Procedure Shutdown Criterion** to the **Current Margin** Value for the next Cycle.			

1. St. Lucie Unit 2 UFSAR
2. St. Lucie Plant Off Normal Operating Procedure, Steam Generator Tube Leak 2-0830030
3. Westinghouse Report, WCAP-16208-P, Revision 0, "NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions," October 2004.
4. WCAP-15918-P, Rev. 2 "Steam Generator Tube Repair For Combustion Engineering and Westinghouse Designed Plants With ¾" Inconel 600 Tubes Using Leak Limiting Alloy 800 Sleeves", July 2004.
5. PSL-ENG- SESJ-05-041, Rev. 0, Condition Monitoring and Operational Assessment for the St. Lucie Unit 2 Steam Generators Based on Eddy Current Examination End of Cycle 14, January 2005.

2.5 RAI #5

Please confirm that the hot-leg temperature at St. Lucie Unit 2 is greater than that assumed in the tubesheet deflection analysis (600-degrees Fahrenheit) and in determining the increase in contact pressure as a result of differential thermal expansion between the tube and the tubesheet.

2.5.1 Response to RAI #5

The calculated bulk hot leg temperature at St. Lucie Unit 2 is 596.5°F considering a recent T-cold reduction implemented during Cycle 15 (Reference 11). This temperature difference could result in a slight calculational decrease in the contact pressure utilized in WCAP-16208-P (Reference 1, Section 6 and Figure 4-2). The temperature difference is judged to be bounded by the conservatisms in WCAP-16208-P.

Nevertheless, the effect of the lower temperature can be demonstrated. The response to RAI #27 (Reference 2) provided a correction for temperature [ ]^{a,c,e}

[

]a,c,e

Table 2 and Figure 4 present revisions to Table 6-4 and Figure 4-2 of WCAP-16208-P, respectively, to account for the change in hot leg temperature from 600°F to 596.5°F. The change in Figure 4 is very minor. The result is that the 'Uncorrected Joint Length that Meets Leakage Criteria', that was provided in Tables 4-8 and 6-15 of WCAP-16208-P (for 8500 tubes/SG at the assumed leak criteria of 0.1 gpm/SG), changes from 6.56 inches to 6.57 inches. Using the conservative minimum detectable leak rate of [ ]a,c,e (see Section 1.1), this value becomes 6.58 inches.

When the temperature increases from ambient conditions to operating conditions the differential thermal expansion of the tube relative to the tubesheet increases the contact pressure between the tube and the tubesheet. The mismatch in expansion between the tube and the tubesheet, δ, is given by,

$$\delta = (\alpha_t - \alpha_c)\Delta T r_{to} \tag{9}$$

where: α_t, α_c = thermal expansion coefficient for the tube and tubesheet respectively,
ΔT = the change in temperature from ambient conditions

The change in contact pressure due to the increase in temperature relative to ambient conditions, P_T, is given by,

a,c,e

[ ] (10)

Using a hot leg temperature of 596.5°F instead of 600°F, reduces P_T by [ ]a,c,e which thus reduces the "RCS Pressure and Diff. Thermal Axial Force" term used in Table 6-4 and 6-10 of Reference 1 by [ ]a,c,e

Table 3 is a revision of Table 6-4 of WCAP-16208-P that accounts for the change in hot leg temperature from 600°F to 596.5°F. At a depth of [

]a,c,e Thus, the burst based inspection length for St. Lucie Unit 2, presented in Table 6-8 of WCAP-16208-P, remains unchanged.

Table 4 is a revision of Table 6-10 of WCAP-16208-P that accounts for the change in hot leg temperature from 600°F to 596.5°F. For the meaningful digits displayed in the rightmost column, the table remains unchanged. To illustrate the change, the 'Cum. No-Dilate Length' at [

]a,c,e

The 'Uncorrected Joint Length that Meets Leakage Criteria' values of 6.57 (for 8500 tubes/SG at the assumed leak criteria of 0.1 gpm/SG) and 6.58 (for the minimum detectable leak rate of [ ]a,c,e) both interpolate to dilation-corrected inspection length of 9.8 inches. After correcting this value for NDE error, the inspection depth remains at 10.1 inches after considering the lower hot leg temperature of 596.5°F only.

This response does not consider the issue raised in RAI #6, but it does demonstrate that this lower hot leg temperature has no meaningful effect on the inspection depth.

2.6 RAI #6

Please clarify whether the load at first slip was reported and plotted in Figures 5-1 through 5-3 or whether the maximum load was plotted. If the load at first slip was not used in all cases, please discuss the effect on the required inspection distance if the load at first slip was used. In addition, if the load at first slip was not used in your March 31, 2005 response to RAI 10, please confirm that the 10.1-inch proposed inspection distance is still bounded when the most limiting specimen (using load at first slip) is evaluated.

2.6.1 Response to RAI #6

The pullout load data that was used in WCAP-16208-P (Reference 1) was taken from Reference 8 (Task 1154 report). A review of the Task 1154 data determined that 'maximum load' data was used. The use of the 'maximum load' was consistent with the intent of the Task 1154 approach (which was a pullout strength-limited inspection depth rather than a leak rate-limited inspection depth). Thus, with the exception of the pressurized data (which was not used in the regression analysis), the data that is plotted in Figures 5-1 through 5-3 is based on the 'maximum load' encountered during each pullout test. The criteria used for the pressurized data was discussed in the response to RAI #1.

The leakage-limited inspection depth provided in WCAP-16208-P uses the pullout force to assess the contact pressure of the joint, which in turn is used to provide a tubesheet hole dilation adjustment to the depth at which the leak rate criteria is met. For this purpose, a 'first slip' criterion provides the relevant pullout force. Reference 12 uses a definition that [

]a,c,e

[ ]a,c,e This criteria eliminates the bias that was associated with the 'first move' criteria.

The rough bore pullout data provided in Table 5-2 of WCAP-16208-P was obtained directly from Tables 4-2 and 4-3 of the Task 1154 report. Re-examination of the Table 4-2 data showed that only those tests in which a leak test was performed were included in the table (compare with Table 3-3 of the Task 1154 report). Appendix D of the Task1154 report lists all the Boston Edison samples that were pullout tested. In the response to this RAI, all of the Boston Edison pullout tests are considered, not just those that were leak tested.

In addition, the Task 1154 report provides the nominal or target joint lengths for each sample. Reference 29 from the Task 1154 report provided the actual joint lengths for each sample. The actual joint lengths were used in this response.

The Boston Edison pullout tests, as well as the Task 1154 Sample 20 and 21 collar samples, were performed with the load cell test rig shown in Figure 3.11 of the Task 1154 report. This rig was attached to the tube by means of a gripper. The amount of gripper slippage was assumed to be equal to the difference between the actual joint length and the distance that the hydraulic cylinder traveled. [

]a,c,e

The pullout tests conducted in Windsor used fittings that were welded to the sample. These fittings had threaded ends that fit into threaded receptacles on the tensile tester. It was assumed that there was no gripper slippage in the tests conducted at the Windsor facilities.

Table 5 provides all of the room temperature, ambient pressure pullout data from Task 1154, using the 'first slip' criteria. The data in Table 5 has been scaled in the same manner as described in Section 5.3 of WCAP-16208-P. In all cases, 'first slip' forces were less than 'maximum load' forces. Four of the samples exceeded the yield strength of the tubing material at the 'first slip' point. Another three samples exceeded the yield strength of the tubing material before the 'first slip' point, but then the load dropped below the yield strength of the tubing when the 'first slip' point had been reached.

Figure 5 presents a plot of the Table 5 data. Data that had exceeded the yield strength of the tube is plotted separately and was not included in the regression analysis. The lower 95% prediction bound is also included.

Table 6 presents the revised WCAP-16208-P Table 6-10 to account for the Figure 5 lower bound, as well as the RAI#5 response.

The 'Uncorrected Joint Length that Meets Leakage Criteria' values of 6.57 (determined in response to RAI#5 for the WCAP-16208-P generic leak rate criteria – see Section 2.5.1) and 6.58 (for the conservative minimum detectable leak rate of [ ]a,c,e – also determined in Section 2.5.1) both interpolate to a dilation-corrected inspection length of 10.0 inches. After correcting this value for NDE error, the inspection depth becomes 10.3 inches after incorporating the lower hot leg temperature of 596.5°F and the use of 'first slip' pullout data.

Performing the same analysis used to answer RAI 10 of Reference 2, using the "first move" load of the most limiting specimen, confirms that the proposed inspection distance is still bounded (the "first move" load is more conservative than "first slip" load). The most limiting specimen had a "first move" load of [

][a,b,c] at a joint length of [ ][a,b,c] Repeating the analysis of Table 3 demonstrates that an engagement length of less than 3.25 inches would resist a 3NODP load of either [ ][a,b,c] (1461 psid basis).

The actual minimum inspection distance for Cycle 15 was 13 inches below the top of tubesheet (Reference 5). The largest variation between the expansion transition and the top of tubesheet was 0.73" (Reference 6), thus ensuring a minimum inspected engagement length of 12.27 inches. This exceeds the minimum required inspection depth of 10.3 inches.

Table 1: Loads and Forces at First Move, First Slip and Maximum Load

a,b,c

Criteria		Sample 1	Sample 3	Sample 4

Table 2: WCAP-16208-P, Table 4-6: Transformed Leak Rate Data: Revised for Change of Hot Leg Temperature from 600°F to 596.5°F

a,b,c

Index	Sample	Raw Data		Transformed	
		L Joint Length (inches)	**Q** Leak Rate (gpm)	**$L-L_{avg}$** Joint Length (inches)	**$Q-Q_{avg}$** Leak Rate (gpm)

Table 3: WCAP-16208-P, Table 6-4: Tubesheet Deflection Analysis Results, Reduction in Contact Load for St. Lucie 2 Steam Generator: Revised for Change of Hot Leg Temperature from 600°F to 596.5°F

a,b,c

Depth into Tubesheet (inches)	Fx Dilation Load (lbf.)	Fz Dilation Load (lbf.)	Fz Contact Load (lbf.)	RCS Pressure and Diff. Thermal Axial Force (lbf.)	Fz net (lbf)	Cumulative Fz net Loads (lbf)

Table 4: WCAP-16208-P, Table 6-10: Effect of Tubesheet Deflection for St. Lucie 2 Steam Generators: Revised for Change of Hot Leg Temperature from 600°F to 596.5°F

a,b,c

Depth in Tubesheet (in)	TS Joint Axial Force (lbf)	RCS Pressure and Diff. Thermal Axial Force (lbf)	Initial Axial Force (lbf)	Dilation Axial Force (lbf)	Net Axial Force (lbf)	Net / Initial Ratio	Equiv. No-Dilate Length (in)	Cum. No-Dilate Length (in)

Table 5: Rough Bore 'First Slip' Pullout Test Data from Task 1154 (Room Temperature, Ambient Internal Pressure)

Tube ID	Test Lab	As-Built Engaged Length(in.)	0.25" First Slip Load(lbf) (adj for grip slip)	Note

a,b,c

Table 6: WCAP-16208-P, Table 6-10: Effect of Tubesheet Deflection for St. Lucie 2 Steam Generators: Revised for Change of Hot Leg Temperature from 600°F to 596.5°F and Use of First Slip Loads

a,b,c

Depth in Tubesheet (in)	TS Joint Axial Force (lbf)	RCS Pressure and Diff. Thermal Axial Force (lbf)	Initial Axial Force (lbf)	Dilation Axial Force (lbf)	Net Axial Force (lbf)	Net / Initial Ratio	Equiv. No-Dilate Length (in)	Cum. No-Dilate Length (in)

a,b,c

Figure 1: Sample 1 Blowout During Room Temperature Leak Test (1-Inch Joint Length)

a,b,c

Figure 2: Sample 3 Pullout Screening Test (2-Inch Joint Length)

a,b,c

Figure 3: Sample 4 Pullout Screening Test (3-Inch Joint Length)

a,b,c

Figure 4: Revised WCAP-16208-P, Figure 4-2: Plot of Leak Rate vs. Joint Length at 596.5°F, ΔP=SLB

a,b,c

Figure 5: First Slip Pullout Force for 48 mil Wall Rough Bore Task 1154 Tests

3.0 REFERENCES

1. Westinghouse Report, WCAP-16208-P, Revision 0, "NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions," October, 2004.

2. Westinghouse Report LTR-CDME-05-14, Revision 1, "Responses to NRC Requests for Additional Information on WCAP-16208-P, Rev. 0, "NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions," January 2005 (Proprietary/Non-Proprietary)," February 14, 2005.

3. "St. Lucie Plant, Unit 2 – Second Request for Additional Information Regarding Proposed License Amendment to Define the Depth of Required Tube Inspections and Clarify the Plugging Criteria Within the Tubesheet Region of the Original Steam Generators (TAC NO. MC5084)," NRC Letter from B.T. Moroney (NRC) to J.A. Stall (FPL), November 23, 2005.

4. FPL Document ENG/JB-CSI-05-027, FPL Letter from G. Boyers (FPL) to P. Nelson (Westinghouse), January 20, 2006.

5. "St. Lucie Unit 2 – PSL-ENG-SESJ-04-042, Rev. 0 – 'Degradation Assessment for St. Lucie Unit 2 Steam Generators Update for End-Of-Cycle 14 Refueling Outage' (Tracking # 04118)," FPL Document ENG-SPSL-04-0180, FPL Letter from R.D. Gil (FPL) to M. Williford (FPL), November 10, 2004.

6. "St. Lucie Unit 2 Measurement of Locations of Hot Leg Expansion Transitions," J.S. Brockman, Framatome ANP Document Identifier 51-5027055-00, May 19, 2003.

7. "Nuclear Services Policies & Procedures," Westinghouse Quality Management System - Level 2 Policies and Procedures, Effective 03/31/04.

8. Westinghouse Report WCAP-15720, Revision 0, "NDE Inspection Strategy for Tubesheet Regions in CE Designed Units," CEOG Task 1154, July 2001.

9. Westinghouse Report LTR-CDME-05-180, Revision 2, "Steam Generator Tube Alternate Repair Criteria for the Portion of the Tube Within the Tubesheet at Catawba 2," December 2005.

10. W. C. Young and R. G. Budynas, "Roark's Formulas for Stress and Strain," Seventh Edition, Mc-Graw-Hill, New York, New York, 2002.

11. FPL Report PSL-ENG-SENS-05-018, Rev. 0, Engineering Evaluation for St. Lucie Unit 2 Cycle 15 Tcold Temperature Reduction, June 9, 2005.

12. "Braidwood Station, Units 1 and 2 – Issuance of Exigent Amendments RE: Revision of Scope of Steam Generator Inspections for Unit 2 Refueling Outage 11 (TAC NOS. MC6686 and MC6687)," NRC Letter from G.F. Dick to C.M. Crane (Excelon), April 25, 2005.

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Our ref: CAW-06-2090
Your ref: TAC No. MC5084

January 25, 2006

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: Responses to NRC Requests for Additional Information on WCAP-16208-P, Rev. 0, "NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions," January 2006 (Proprietary/Non-Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-06-2090 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Florida Power & Light.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-06-2090, and should be addressed to B. F. Maurer, Acting Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

R. M. Span

R. M. Span, Acting Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: B. Benney
L. Feizollahi

bcc: B. F. Maurer (ECE 4-7A) 1L
T. P. Magee (Windsor)
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RCPL Administrative Aide (ECE 4-7A) 1L, 1A (letter and affidavit only)

CAW-06-2090

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared J. A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

J. A. Gresham
J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed
before me this 25th day
of January, 2006

Sharon L. Fiori
Notary Public

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
Member, Pennsylvania Association Of Notaries

(1) I am Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in "Revision 1 to Responses to NRC Requests for Additional Information on WCAP-16208-P, Rev. 0, 'NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions,' dated January 23, 2006" (Proprietary), being transmitted by the Florida Power & Light Company letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted for use by Westinghouse for St. Lucie Unit 2 enables Westinghouse to support utilities with NSSS plants in the identification and application of a steam generator tubesheet inspection model, and in particular, to the application of the model to determining the tubesheet inspection length appropriate to the St. Lucie Unit 2 steam generators, including:

(a) The identification of important factors relevant to the determination of the recommended steam generator tubesheet inspection length, and

(b) Development of a generic methodology for the applicability of the inspection length model to utilities with NSSS plants.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purposes of meeting NRC requirements for licensing documentation.

(b) Westinghouse can sell support and defense of the inspection model.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar inspection models and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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