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SOUTHERN COMPANY
Energy to Serve Your World℠

August 28, 2009

Docket Nos.: 50-424
50-425

NL-09-1317

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant
Supplemental Information for License Amendment Request to Revise Technical Specification (TS) Sections 5.5.9, "Steam Generator (SG) Program" and TS 5.6.10, "Steam Generator Tube Inspection Report" for
Permanent Alternate Repair Criteria

Ladies and Gentlemen:

Southern Nuclear Company (SNC), in the subject proposed license amendment request submitted May 19, 2009, documented the technical basis for an H* depth of 11.2 inches. The accepted industry requirements (Reference 1) for tube integrity are to show that the worst case tube meets the performance criteria (Reference 2) at a probability of 0.95 at 50% confidence (95/50). Since the H* technical basis assumed that all tubes in the bundle were severed at the H* depth, the probabilistic requirement was modified to apply to the whole bundle rather than to just the worst case tube. In addition to the 11.2 inch 95/50 whole bundle H* depth specified by the technical basis, SNC added 1.9 inches of margin. Thus, the license amendment request proposed an H* depth of 13.1 inches. In a conference call on August 11, 2009, between the NRC, Westinghouse, SNC and other industry representatives, the NRC requested that this additional 1.9 inch margin be provided in the context of statistical probabilities and confidence levels rather than tubesheet depth in inches.

In response to the NRC's request, the industry participants requested that Westinghouse prepare the attached White Paper which provides a sensitivity evaluation of various statistical probabilities and confidence levels for a whole bundle and whole plant analysis.

Enclosure 1 contains the "White Paper on Probabilistic Assessment of H*" dated August 13, 2009. This report applies to steam generator models F, D5, 44F, and 51F. This document was provided by Westinghouse Electric Company LLC (Westinghouse) and contains information that is proprietary to Westinghouse. Therefore, this information is supported by affidavits, signed by Westinghouse, the owner of the information. The affidavits set forth the bases on which the

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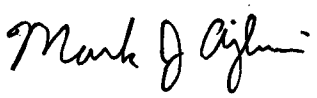
information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information, which is proprietary to Westinghouse, be withheld from public disclosure in accordance with 2.390 of the Commission's regulations. The affidavit is included in Westinghouse authorization letter CAW-09-2647, "Application for Withholding Proprietary Information from Public Disclosure", which also includes Proprietary Information Notices and Copyright Notices. The Westinghouse authorization letters are provided in Enclosure 3. Correspondence with respect to the copyright or proprietary aspects of the Westinghouse information noted above or the supporting Westinghouse affidavits should reference the applicable authorization letter and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355. The redacted, non-proprietary version of the Westinghouse White Paper is provided in Enclosure 2.

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,



M. J. Ajluni
Manager, Nuclear Licensing

MJA/TAH/daj

Reference:
1. EPRI 1012987, "Steam Generator Integrity Assessment Guidelines, Revision 2," July 2006.
2. NEI 97-06 [Revision 2], "Steam Generator Program Guidelines," May 2005.

Enclosures:
1. Westinghouse Electric Company LLC, LTR-SGMP-09-104-P Attachment "White Paper on Probabilistic Assessment of H*" dated August 13, 2009
2. Westinghouse Electric Company LLC, LTR-SGMP-09-104-NP Attachment "White Paper on Probabilistic Assessment of H*" dated August 13, 2009
3. Westinghouse Electric Company LLC, LTR-CAW-09-2634, "Application for Withholding Proprietary Information from Public Disclosure"

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. T. E. Tynan, Vice President – Vogtle
Ms. P. M. Marino, Vice President – Engineering
RType: CVC7000

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
Ms. D. N. Wright, NRR Project Manager – Vogtle
Mr. M. Cain, Senior Resident Inspector – Vogtle

Vogtle Electric Generating Plant Units 1 and 2
Supplemental Information for License Amendment Request to Revise Technical Specification (TS) Sections 5.5.9, "Steam Generator (SG) Program" and TS 5.6.10, " Steam Generator Tube Inspection Report" for Permanent Alternate Repair Criteria
Enclosure 2

Westinghouse Electric Company LLC, LTR-SGMP-09-104-NP Attachment "White Paper on Probabilistic Assessment of H*" dated August 13, 2009.

Westinghouse Electric Company

White Paper on Probabilistic Assessment of H*

August 13, 2009

Westinghouse Electric Company LLC
P.O. Box 158
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White Paper on Probabilistic Assessment of H*

References:

1. EPRI 1012987, "Steam Generator Integrity Assessment Guidelines, Revision 2," July 2006.
2. WCAP-17071-P, Rev. 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model F)," April 2009.
3. WCAP-17072-P, Rev. 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model D5)," May 2009.
4. WCAP-17091-P, Rev. 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model 44F)," June 2009.
5. WCAP-17092-P, Rev. 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model 51F)," June 2009.
6. LTR-SGMP-09-100, "Responses to NRC Request for Additional Information on H*; Model F and Model D5 Steam Generators," August 2009.

1. Background

Industry guidelines (Reference 1) establish the probabilistic requirements for evaluating degraded tubes against the possibility of burst. The requirements specified are that the worst case tube in the bundle must be shown to have at least a 95% probability at 50% confidence that tube burst could not occur over the full range of normal operating conditions and design basis accidents. This includes retaining a safety factor of 3 against burst under normal steady-state full power operation primary to secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary-to-secondary pressure differentials. The same requirements apply when projecting the condition of undetected flaws until the next inspection.

Although these requirements do not address a "degraded" condition under which tube burst is not possible, such as the case of stress corrosion cracking (SCC) in the tubesheet expansion region, the requirements are, nevertheless, applied to the technical justification of H* (References 2, 3, 4 and 5). Tube burst cannot occur within the tubesheet expansion region because postulated cracks are restrained from burst by the tubesheet. The 95/50 criteria are applied to the definition of the H* value, the length of undegraded tube required to hold the tube within the tubesheet without slippage when subjected to the greater of 3 times the normal operating pressure differential across the tube or 1.4 times the accident condition pressure differential across the tube. Further, the requirements are applied to every tube in the bundle, not just the worst case tube as is the case for SCC above the tubesheet. These requirements are applied to every tube/tubesheet combination present in the bundle in the H* evaluation process.

This, in fact, makes the application of the probabilistic requirements more severe for the H* analysis than for the typical SCC evaluation outside the tubesheet. The probabilistic comparison between the SCC and H* analyses is best understood in terms of conditional probabilities. There are three basic risk components associated with probability of failure to meet performance criteria for steam generator tubes. The first is [PF] which is the probability of a flaw being present. The second is [P(S/F)] which is the

conditional probability of severity given the presence of a flaw. The third [PH*] relates to the probability of an inadequate tube engagement length. In the case of SCC the third probability relates to a burst pressure less than 3 ΔP_{NOP}. The combined risk can be viewed as a combination of the three components:

$$PTOTAL = PF * P(S/F) * PH*$$

In the case of SCC, the first two components are much less than unity for most analyses. This has the effect of markedly reducing the population-at-risk for most SCC analyses. In turn, the severity of extreme value effects present in full bundle analyses is reduced. For H* analyses, the first two probability components are assumed to be unity. These very conservative assumptions result in a maximization of extreme value effects in the H* analyses.

During the review of the analyses documented in References 2, 3, 4 and 5, the NRC staff requested that more restrictive probabilistic criteria be evaluated and that these results be provided to show the sensitivity of the H* value to the applied criteria. Specifically, the additional requested information is:

- Evaluation of the whole bundle probabilistic H* at 95% probability and 95% confidence.
- Evaluation of H* for the entire plant complement of tubes at 95% probability and 95% confidence.

This White Paper provides the requested information.

2. Methods

The recommended values of H* in References 2, 3, 4 and 5 were developed by combining uncertainties by the Square Root of the Sum of the Squares (SRSS)methods. The efficacy of this approach is discussed in Reference 1 and also in the WCAP reports for H*. In response to a question raised by the NRC during its review of the H* technical justification, the results of Monte Carlo sampling from the interaction surface of the significant variables was provided in Reference 6. The Monte Carlo approach also quantified several conservatisms inherent to the SRSS results that were not specifically quantified in the SRSS approach. The SRSS results are a significantly conservative estimate of the more accurate value for H* represented by the Monte Carlo approach.

The following sections discuss the results for the H* values at 0.95 probability at 95% confidence when all the tubes in a SG and all of the tubes in the limiting plant for each of the models of SGs in the population of H*candidate plants are considered. Table 1 summarizes the models of SGs considered and provides the tube populations per SG and per plant for the limiting plant for each model SG.

Table 1
Summary of SG Models and Tube Populations

Model SG	Limiting Plant	No. Loops	No. of Tubes per SG	No. of Tubes in the Limiting Plant
F	Millstone 3	4	5626	22504
D5	Byron2/Braidwood2	4	4570	18280
44F	Point Beach 1	2	3214	6428
51F	Surry 1 and 2	3	3342	10026

A. Square Root of the Sum of the Squares (SRSS)

WCAP-17071 (Reference 2), Section 8, provides the basis for the calculations of the 95% probability, 50% (95/50) confidence value of H*. The H* report reference basis of the 95/50 value is the simplified statistical method under which the uncertainties are combined by the square root of the sum of the squares (SRSS) method. The same methods are utilized to develop the results for the more restrictive 95/95 criteria requested. For convenience of describing the approach, a single H* report (Reference 2) will be used as the reference. Except for the specific numbers, the approach is identical for all of the models of SGs. A summary that shows the specific values for each model SG follows.

A high confidence H* value can be obtained using the SRSS approach for H* evaluation by using high confidence values for the standard deviations of the input variables. The dominant input variables are the coefficients of thermal expansion (CTE) of the tubes and tubesheets. The Young's moduli of the tubesheet material (SA508) and the tubing material (A600) are also input variables but were shown in Section 8 of the H* WCAPs to have negligible impact on the variability of H*.

The analysis of the test data to establish the CTE of the tubesheet and tubing material are contained In Appendix B of Reference 2. The standard deviation of the CTE values for the tubing are based on 227 data points while the standard deviation of the CTE values for the tubesheets are based on 82 data points. The sample estimated standard deviations of a normal population, σ_s, are distributed as the chi-square statistic, $\chi 2$. The upper 95% confidence standard deviation is then given by:

$$\sigma_{95} = \sigma_S \sqrt{\left(\frac{n-1}{\chi^2_{n-1,0.95}} \right)}$$

where n is the number of data points. The square root term is the multiplier to be applied to the sample estimated standard deviation to obtain the upper 95% confidence value. The multiplier is 1.08 for the tube CTE standard deviation and 1.15 for the tubesheet CTE standard deviation.

FEA calculations are contained in Section 8 of Reference 2 for H* with input variables at the 4.285 σ_s and 5σ_s levels. The 4.285σ_s H* value provides an estimated probability of no slip of 0.95 at 50% confidence for a tube population of 5626 (Model F) assumed to have a 360 degree throughwall crack at the location of H*. By standard binomial distribution calculations, it is determined that an H* value at 4.584 σ_s is required for a whole plant tube population of 22504 (Model F) to meet the 95/50 criterion assuming that each tube includes a throughwall circumferential crack at the H* distance.

To obtain a 95/95 estimate of no slip on a per steam generator (whole bundle) basis, an H* based on a 1.08*4.285σ_s CTE value for tubing and a 1.15*4.285σ_s CTE value for tubesheets are needed. The 5σ_s H* value exceeds these requirements since 1.08*4.285 = 4.628 and 1.15*4.285 = 4.928. The 5σ_s H* value also includes effects of the tubing and tubesheet elastic moduli at 5σ_s levels which is more than sufficient in providing a 95/95 H* on a per steam generator (whole bundle) basis.

Table 2 summarizes the required standard deviations to develop the 95/95 H* values for a single SG tube population and for the entire plant tube population for the limiting plant for each model of SG.

Table 2
Variance Required for Single Bundle and Whole Plant 95/95 H* Values

Case	Parameter	Sigma for 95/50	Applicable Factor for 95/95	Sigma for 95/95
Model F				
Whole Bundle 5626 tubes	CTE_{tube}	4.285	1.08	4.628
	$CTE_{tubesheet}$	4.285	1.15	4.928
Whole Plant 22504 tubes	CTE_{tube}	4.584	1.08	4.951
	$CTE_{tubesheet}$	4.584	1.15	5.272
Model D5				
Whole Bundle 4570 tubes	CTE_{tube}	4.237	1.08	4.576
	$CTE_{tubesheet}$	4.237	1.15	4.873
Whole Plant (4 loop plant) 18280 tubes	CTE_{tube}	4.541	1.08	4.904
	$CTE_{tubesheet}$	4.541	1.15	5.222
Model 44F				
Whole Bundle 3214 tubes	CTE_{tube}	4.157	1.08	4.490
	$CTE_{tubesheet}$	4.157	1.15	4.781
Whole Plant (2 loop plant) 6428 tubes	CTE_{tube}	4.315	1.08	4.660
	$CTE_{tubesheet}$	4.315	1.15	4.962
Model 51F				
Whole Bundle 3342 tubes	CTE_{tube}	4.166	1.08	4.499
	$CTE_{tubesheet}$	4.166	1.15	4.791
Whole Plant (3 loop plant) 10026 tubes	CTE_{tube}	4.412	1.08	4.765
	$CTE_{tubesheet}$	4.412	1.15	5.075

To obtain a 95/95 estimate of no slip on a per plant (whole plant) basis, an H* based on a $1.08*4.584\sigma_s$ CTE value for tubing and a $1.15*4.584\sigma_s$ CTE value for tubesheets are needed. The CTE of the tubing dominates the H* calculation. A $5\sigma_s$ effect for CTE of the tubing exceeds the plant basis high confidence requirement of 1.08*4.584 = 4.95. A $5\sigma_s$ effect for CTE of the tubesheet is slightly less than the required value of 1.15*4.584 = 5.272. (A similar observation is made for the Model D5 SGs and the Model 51F SGs, but both are bounded by the Model F situation.) By extrapolation of FEA results, this leads to an underestimation of H* of less than 0.06 inches. This small difference is compensated for by the slight overestimation of the $5\sigma_s$ effect for CTE of the tubesheet. Hence, the $5\sigma_s$ H* provides a 95/95 H* on a per plant basis.

Analyses were performed, using the 3D FEA model for H*, to determine the H*variation for the standard deviation values shown in Table 2 for tube and tubesheet CTE required to achieve 95% probability at 95% confidence for each model of SG. The 5σ variations for the Young's moduli (E) were used in both cases. It is conservative to use 5σ variations in E for the respective materials because they exceed the required values for the 95/95 estimate. These results were then combined by the SRSS method to determine the high probability value of H* (see Table 3). In Table 3, the P_{crev} adjustment is based on Figure 8-1 in each of the respective H* WCAPs (References 2, 3, 4 and 5) for the different models of SG.

Table 3
95/95 H* Values for Whole Bundle and Whole Plant Tube Populations Bases on SRSS Combination of Uncertainties

SRSS-Based Model F Steam Generator H* Values at Higher Probability						
Case	**Description**	**Mean H* (in.)**	**Probabilistic H*at 95/50 (in.)**	**Probabilistic H*at 95/95 (in.)**	**P_{crev} Adjustment**	**Final H* (in.)**
S-2	4.285σ parameter variance combined by SRSS; meets 95/50 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	11.2
S-3	5σ parameter variance combined by SRSS; exceeds 95/95 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	13.1
HS-1	4.628σ variance of CTE_T, 4.928σ variance on CTE_{TS} combined by SRSS; whole bundle (5626 tubes) at .95 probability, 95% confidence	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	12.05
HS-2	4.95σ variance of CTE_T, 5.272 σ variance on CTE_{TS} combined by SRSS; whole plant (22,504 tubes) at .95 probability, 95% confidence	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	13.02
SRSS-Based Model D5 Steam Generator H* Values at Higher Probability						
Case	**Description**	**Mean H* (in.)**	**Probabilistic H*at 95/50 (in.)**	**Probabilistic H*at 95/95 (in.)**	**P_{crev} Adjustment**	**Final H* (in.)**
S-2	4.237σ parameter variance combined by SRSS; meets 95/50 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	13.8
S-3	5σ parameter variance combined by SRSS; exceeds 95/95 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	17.6
HS-1	4.576σ variance of CTE_T, 4.873σ variance on CTE_{TS} combined by SRSS; whole bundle (4570 tubes) at 0.95 probability, 95% confidence	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	15.33
HS-2	4.904σ variance of CTE_T, 5.222σ variance on CTE_{TS} combined by SRSS; whole plant (18,280 tubes) at 0.95 probability, 95% confidence	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	16.95

Table 3 (continued)
95/95 H* Values for Whole Bundle and Whole Plant Tube Populations Bases on SRSS Combination of Uncertainties

SRSS-Based Model 44F Steam Generator H* Values at Higher Probability						
Case	**Description**	**Mean H* (in.)**	**Probabilistic H*at 95/50 (in.)**	**Probabilistic H*at 95/95 (in.)**	**P_{crev} Adjustment**	**Final H* (in.)**
S-2	4.157σ parameter variance combined by SRSS; meets 95/50 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	13.31
S-3	5σ parameter variance combined by SRSS; exceeds 95/95 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	17.28
HS-1	4.490σ variance of CTE_T, 4.781σ variance on CTE_{TS} combined by SRSS; whole bundle (3214 tubes) at 0.95 probability, 95% confidence	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	14.35
HS-2	4.660σ variance of CTE_T, 4.962σ variance on CTE_{TS} combined by SRSS; whole plant (6428 tubes) at 0.95 probability, 95% confidence. This applies for the bounding Model 44F plant, a 2-loop plant.	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	15.09
SRSS-Based Model 51F Steam Generator H* Values at Higher Probability						
Case	**Description**	**Mean H* (in.)**	**Probabilistic H*at 95/50 (in.)**	**Probabilistic H*at 95/95 (in.)**	**P_{crev} Adjustment**	**Final H* (in.)**
S-2	4.166σ parameter variance combined by SRSS; meets 95/50 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a}	NA	[ ]^{a,c,e}	13.14
S-3	5σ parameter variance combined by SRSS; exceeds 95/95 whole bundle requirement	[ ]^{a,c,e}	[ ]^{a}	NA	[ ]^{a,c,e}	16.67
HS-1	4.499σ variance of CTE_T, 4.791σ variance on CTE_{TS} combined by SRSS; whole bundle (3342 tubes) at 0.95 probability, 95% confidence	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	14.42
HS-2	4.765σ variance of CTE_T, 5.075σ variance on CTE_{TS} combined by SRSS; whole plant (10026 tubes) at 0.95 probability, 95% confidence. This applies for the Model 51F plant, a 3-loop plant.	[ ]^{a,c,e}	NA	[ ]^{a,c,e}	[ ]^{a,c,e}	15.58

B. Monte Carlo Sampling from Interaction Surface

In response to RAI#20 (Reference 6), a Monte Carlo simulator was developed utilizing the interaction surfaces defined by Figure 8-5 in each of the respective model-specific reports for H* (References 2, 3, 4 and 5). This approach provided increased transparency in the underlying probabilistic processes and permitted a more realistic regionalization of the H* analysis. The Monte Carlo analysis described in Reference 6 was extended to produce the values of H* at the 95/95 level for both the whole bundle and whole plant bases.

The response to RAI#20 in Reference 6 quantified some of the conservative assumption inherent to the values of H* recommended in References 2, 3, 4 and 5 for the different models of SG in addition to applying the Monte Carlo method and sampling from the defined interaction surface. The intent of response to RAI#20 in Reference 6 was to show that the recommended values of H* are significantly conservative. The significant conservative assumptions in the recommended values of H* that were quantified in terms of differential H* lengths were:

- The assumption that all tubes are located at the single worst-case position for H* in the bundle.
- The assumption that the number of tubesheets sampled is the same as the number of tubes sampled. The sampling scheme was modified to address the limited actual population of tubesheets in the population of H* candidate plants.
- The conservative adjustment made for the NOP thermal distribution in the tubesheet. This applies only to the Model F and Model D5 SGs.
- The assumption that the hydraulic expansion pressure provides no residual pull-out force. The recommended values of H* in Reference 2, 3, 4 and 5 assume that the residual pull-out force is zero.

The final values of H*at 0.95 probability at 90% confidence from the response to RAI#20 (Reference 6) are the best available estimates of the values of H*. The recommended values of H* from References 2, 3, 4 and 5 are significantly conservative compared to best estimate values of H* based on the Monte Carlo approach. Table 4 summarizes the recommended whole bundle values of H* and the values resulting from the response to RAI#20.

The Monte Carlo analysis described in Reference 6 was extended to determine the higher probability values (95/95) of H*on the whole bundle and whole plant bases, except that the correction for NOP tubesheet thermal distribution is not included. This was done to provide a common basis of comparison among the different models of SGs. Table 5 summarizes the results of this analysis.

Table 4
Summary of Recommended Values of H*and 95/50 Values of H* After Quantification of Conservatism

SG Model	Recommended H* from Reference 2,3,4 and 5 [1] (inch)	95/50 H* Based on Monte Carlo Analysis [2] Without NOP Thermal Distribution Correction (inch)	95/50 H* Based on Monte Carlo Analysis [2] With NOP Thermal Distribution Correction (inch)
F	11.20	[ ]^{a,c,e}	[ ]^{a,c,e}
D5	13.80	[ ]^{a,c,e}	[ ]^{a,c,e}
44F	13.31	[ ]^{a,c,e}	[ ]^{a,c,e}
51F	13.14	[ ]^{a,c,e}	[ ]^{a,c,e}

Notes:
1. References 2, 3, 4 and 5
2. Reference 6

Table 5
Summary of 95/95 Values of H* on Whole Bundle and Whole Plant Bases

SG Model	Loops	No. Tubes (Bundle)	No. Tubes (Plant)	Whole Bundle H* (inch)		Whole Plant H* (inch)	
				95/50[2]	95/95[2]	95/50[2]	95/95[2]
F	4	5626	22504	[ ]^{a,c,e} [3]	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}
D5	4	4570	18280	[ ]^{a,c,e} [3]	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}
44F	2[1]	3214	6428	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}
51F	3	3342	10026	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}

Notes:
1. Based on the limiting Model 44F plant, a 2-loop plant
2. XX/YY : XX refers to the probability as a fraction(i.e., 0.95); YY refers to % confidence
3. Updated correction for NOP thermal distribution is <u>not</u> included. The value for Model F would be [ ]^{a,c,e} inch and for Model D5 would be [ ]^{a,c,e} inch if updated correction were included.

Comparison of Tables 4 and 5 shows that the final 95/95 H* values for H*, based on the Monte Carlo analysis are bounded by the recommended values of H* from Reference 2, 3, 4 and 5. For convenience, Table 6 provides the direct comparison. Coincidentally, the recommended value of H* for the Model D5 SG is equal to the whole plant 95/95 value of H*. However, the adjustment to the NOP thermal distribution is not included in Table 6, which, if included, would reduce the Model D5 95/95 whole plant H* value to [ ]^{a,c,e} inches. Similarly, the Model F 95/95 whole plant value reduces to [ ]^{a,c,e} inches. The other two models of SGs are unaffected because the recommended value of H* already includes the updated NOP thermal distribution correction factor. It is clear from Table 6 that the recommended values of H* in Reference 2, 3, 4 and 5 provide significant conservatism even when compared to the H* values calculated for more restrictive 95/95 probabilistic criteria for the bundle and for the whole plant by the more precise Monte Carlo method.

Table 6
Summary of Probabilistic H* Values for Whole Bundle and Whole Plant

SG Model	Recommended H* from Reference 2,3,4 and 5 (inch)	95/50 Whole Bundle H* Based on Monte Carlo Analysis Without NOP Thermal Distribution Correction (inch)	95/95 Whole Bundle Values of H* Based on Monte Carlo Analysis Without NOP Thermal Distribution Correction (inch)	95/95 Whole Plant Values of H* Based on Monte Carlo Analysis Without NOP Thermal Distribution Correction (inch)
F	11.20	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]$^{a,c,e\ (1)}$
D5	13.80	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]$^{a,c,e\ (1)}$
44F	13.31	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}
51F	13.14	[ ]^{a,c,e}	[ ]^{a,c,e}	[ ]^{a,c,e}

1. If adjustment for NOP thermal distribution is included, the Model F value is [ ]^{a,c,e} inches and the Model D5 value is [ ]^{a,c,e} inches.

3. Summary and Conclusions

a. Values of H* for the different candidate models of steam generators were developed by both a Square Root Sum of Squares (SRSS) combination of uncertainties and by a Monte Carlo sampling from the interaction surface of the principal variables affecting H*.

b. The recommended values of H* were based on the SRSS approach for combining uncertainties and reflect a 0.95 probability at 50% confidence for the population of tubes in a single steam generator.

c. The 95/50 whole plant values (based on the population of tubes in the limiting plant for each model SG) were also calculated using the SRSS method of combining uncertainties. (These are the values that generally have been included in the License Amendment Requests (LAR) issued by the participating utilities.)

d. The Monte Carlo analysis based on sampling from the variable interaction surface quantified a number of conservatisms, expressed in differential values of H*, inherent to the recommended 95/50 values of H*. The resulting 95/50 values of H*based on Monte Carlo analysis show that the recommended values of H* are significantly conservative.

e. Extension of the Monte Carlo analysis to provide H* values at a more restrictive criteria, 0.95 probability at 95% confidence on a whole bundle population basis, showed that the recommended values of H* are significantly greater, and, therefore, conservative compared to the higher probability values based on the Monte Carlo analysis.

f. A further extension of the Monte Carlo analysis to provide H* values at the even more restrictive criteria, 0.95 probability at 95% confidence on a whole plant population basis, showed that the recommended values of H* are also significantly conservative compared to the higher probability values on a whole plant basis calculated using the Monte Carlo analysis.

Vogtle Electric Generating Plant Units 1 and 2
Supplemental Information for License Amendment Request to Revise Technical Specification (TS) Sections 5.5.9, "Steam Generator (SG) Program" and TS 5.6.10," Steam Generator Tube Inspection Report" for Permanent Alternate Repair Criteria

Enclosure 3

Westinghouse Electric Company LLC, CAW-09-2647, Application for Withholding Proprietary Information from Public Disclosure"

Westinghouse Electric Company
Nuclear Services
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Direct tel: (412) 374-4643
Direct fax: (412) 374-3846
e-mail: greshaja@westinghouse.com

Our ref: CAW-09-2647

Date August 14, 2009

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGMP-09-104 P-Attachment, Rev. 1 "White Paper on Probabilistic Assessment of H*," dated August 2009 (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-09-2647 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 Southern Nuclear Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse Affidavit should reference this letter, CAW-09-2647, and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

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

Enclosures

cc: G. Bacuta, (NRC OWFN 12E-1)

bcc: J. A. Gresham (ECE 4-7A) 1L
R. Bastien, 1L (Nivelles, Belgium)
C. Brinkman, 1L (Westinghouse Electric Co., 12300 Twinbrook Parkway, Suite 330, Rockville, MD 20852)
RCPL Administrative Aide (ECE 4-7A) 1L (letter and affidavit only)
G. W. Whiteman, Waltz Mill
H. O. Lagally, Waltz Mill
C. D. Cassino, Waltz Mill
J. T. Kandra, Waltz Mill
J. M. Robinson, ECE 557A

CAW-09-2647

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, Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before me
this 14th day of August, 2009

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Joyce A. Szepessy, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires April 16, 2013
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 constitute Westinghouse policy and provide 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 LTR-SGMP-09-104 P-Attachment, Rev. 1 "White Paper on Probabilistic Assessment of H* ," dated August 2009 (Proprietary), for submittal to the Commission, being transmitted by Southern Nuclear 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 Vogtle Units 1 and 2 is expected to be applicable to other licensee submittals in support of implementing an alternate repair criterion, called H*, that does not require an eddy current inspection and plugging of steam generator tubes below a certain distance from the top of the tubesheet.

This information is part of that which will enable Westinghouse to:

(a) Provide documentation of the analyses which support the implementation of an alternate repair criterion, designated as H*, for a portion of the tubes within the tubesheet of the Vogtle Units 1 and 2 steam generators.

(b) Assist the customer in obtaining NRC approval of the Technical Specification changes associated with the alternate repair criterion.

Further this information has substantial commercial value as follows:

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

(b) Westinghouse can sell support and defense of the technology to its customers in the licensing process.

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 calculation, evaluation 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).

COPYRIGHT NOTICE

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

Southern Nuclear Company
Letter for Transmittal to the NRC

The following paragraphs should be included in your letter to the NRC:

Enclosed are:

1. 1 copy of LTR-SGMP-09-104 P-Attachment, Rev. 1, "White Paper on Probabilistic Assessment of H*," dated August 2009 (Proprietary).

2. 1 copy of LTR-SGMP-09-104 NP-Attachment, Rev. 1, "White Paper on Probabilistic Assessment of H*," dated August 2009 (Non-Proprietary).

Also enclosed is Westinghouse authorization letter CAW-09-2647 with accompanying Affidavit, Proprietary Information Notice, and Copyright Notice.

As Item 1 contains information proprietary to Westinghouse Electric Company LLC, it is supported by an Affidavit signed by Westinghouse, the owner of the information. The Affidavit 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 Section 2.390 of the Commission's regulations.

Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-09-2647 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.