STP Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

November 30, 2004
NOC-AE-04001819
10CFR50.90

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN-499
Complete Response to Request for Additional Information Regarding a
License Amendment Request for Approval of a Change in Analytical Methodology

Reference: Letter, T. J. Jordan to NRC Document Control Desk, "Response to Request for Additional Information Regarding a License Amendment Request for Approval of a Change in Analytical Methodology," dated October 6, 2004 (NOC-AE-04001799)

The referenced letter provided responses to approximately half of the NRC's request for additional information regarding the use of a revised methodology described in WCAP-14882-S1-P for the loss of normal feedwater/loss of offsite power transient analysis. This letter provides complete responses for all of the requested additional information. The new information is annotated with change bars.

Because Attachment 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 NRC and addresses with specificity the considerations listed in 10CFR 2.390(b)(4). Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR2.390. Attachment 2 to this letter provides a non-proprietary version of the responses.

Correspondence with respect to the proprietary aspects of the application for withholding or the supporting Westinghouse affidavit should reference the Westinghouse authorization letter (CAW-04-1917) 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.

If there are any questions regarding the additional information, please contact John Conly at (361) 972-7336 or me at (361) 972-7902.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 30, 2004

T. J. Jordan
Vice President
Engineering & Technical Services

jtc

Attachments:
1. Response to Request of Additional Information (Proprietary)
2. Response to Request of Additional Information (Non-Proprietary)
3. Application for Withholding Proprietary Information from Public Disclosure

cc: without proprietary Attachment
(paper copy)

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ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (PROPRIETARY)

ATTACHMENT 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (NON-PROPRIETARY)

Response to Request for Additional Information
(Non-Proprietary)

1. The licensee states that the proposed analytical methods will be used for analyses of long-term heatup events such as loss of normal feedwater, loss of offsite power, and feedwater line break events. Please list all of the transient and accident analyses for which the proposed RETRAN thick metal mass heat transfer model and NOTRUMP - based steam generator mass calculation methods will be applied.

   Response:

   The proposed RETRAN thick metal mass heat transfer model and NOTRUMP-based steam generator mass calculation methods will only be applied to the analyses of long-term heatup events listed in the WCAP. These events are the loss of normal feedwater, loss of offsite power, and feedwater line break events.

2. WCAP-14882-S1-P, "RETRAN-02 Modeling and Qualification For Westinghouse Pressurized Water Reactors Non-LOCA Safety Analyses, Supplement 1 - Thick Metal Mass Heat Transfer Model and NOTRUMP-Based Steam Generator Mass Calculation Method," Revision 0, provides the technical basis for the proposed analytical methods. This WCAP provides discussions and analyses which are generic. Please justify the application of these methodologies for South Texas Units 1 and 2. Are there any restrictions or limitations associated with the application of these proposed analytical methods for South Texas Units 1 and 2?

   Response:

   The thick metal model discussed in WCAP-14882-S1-P uses the generic nodalization model for the reactor coolant system (RCS) discussed in WCAP-14882-P-A and applied to a wide range of plants, including Westinghouse-designed 2-loop, 3-loop and 4-loop plants, Framatome-designed 3-loop plants and adapted for CE-designed plants. Given that the approved RCS nodalization was used and given that a limited number of RCS nodes were credited in the thick metal model, the model is an acceptable model to be used in the South Texas Unit 1 and 2 safety analyses. The nodalization from WCAP-14882-P-A has been used consistently in the safety analyses, however future models may subdivide the hot leg into a 3-node arrangement to allow for more accurate interaction with the pressurizer. In the case that a 3-node hot leg would be used with the thick metal model discussed in WCAP-14882-S1-P, the hot leg metal masses would be appropriately distributed across the three nodes. Restrictions and limitations associated with the application of the thick metal model are those identified in WCAP-14882-P-A and to those accidents identified in the response to question #1.

3. Various versions of the RETRAN code have been reviewed and approved by the NRC staff. The staff generic safety evaluation reports (SERs) and technical evaluation reports (TERs) for the various RETRAN versions include a number of limitations, restrictions and items identified as requiring additional user justification regarding the use of RETRAN. As part of the staff's review of the Westinghouse RETRAN model (WCAP-14882-P-A), Westinghouse addressed these items through RAI responses which are documented in Appendix B of WCAP-14882-P-A. Do the proposed analytical modeling changes invalidate any of the responses to the RETRAN limitations, restrictions and items identified as requiring additional user justification in Appendix B of WCAP-14882-P-A?

   Response:

   No. As part of the creation of the thick metal model as discussed in WCAP-14882-S1-P, the RETRAN limitations, restrictions, and items identified requiring user justification in Appendix B were examined. This included such things as performing time step sensitivities, heat transfer coefficients sensitivities, etc., to ensure that the model is conservative in its application to the heatup transients previously identified. Again, for conservatism, a limited number of RCS nodes/RCS sections were considered.

Thick-Metal Mass Heat Transfer Model

4. Section 2.0 of WCAP-14882-S1-P, Revision 0, states that the simplified thick-metal mass heat transfer model used in the steam line break mass and energy release calculations would overestimate the heat transfer to the thick-metal and is inappropriate for use in the proposed application. Please discuss how the simplified thick-metal heat transfer model is different from the thick-metal mass model to be used in the heatup event calculations.

   Response:

   The primary difference is in the sub-nodalization applied to the metal lumps in the thick metal model. In the case of the steam line break mass and energy release calculations, the intent is to maximize the primary RCS heatup to thereby maximize the secondary side mass and energy release. Therefore, one node is assumed for each metal lump, which acts to rapidly transfer the energy in the thick metal masses to the RCS coolant. Conversely, since the intent of the thick metal model discussed in WCAP-14882-S1-P is to credit the thick metal masses to retard the heatup of the primary coolant, each thick metal node has sub-nodes such that the heat transfer from the coolant to the thick metal is conservatively minimized. In both instances, the model used is conservative in its intended application. The details of the thick metal model are presented in the approved LOFTRAN Thick Metal Mass Heat Transfer Models report (WCAP-7907-S1-P), which is referenced in WCAP-14882-S1-P.

5. Please discuss how the thick-metal mass heat transfer model is incorporated into RETRAN. Is any information written into the source code (hard-wired into the code) or is all information entered via user input options? Provide a listing and descriptions of the RETRAN input parameters needed to implement the thick-metal mass heat transfer model and discuss how any numerical values are calculated. Is this work performed under a quality assurance program?

Response:

The thick metal mass heat transfer model is incorporated into RETRAN via the input deck only. A sample RETRAN input listing of the thick metal mass model is provided separately. There are no changes made to the RETRAN source code to support the thick metal mass heat transfer model. As shown by the RETRAN input listing, the thick metal mass heat transfer model is composed of heat conductor cards (defined by the 15XXXY cards) and the heat conductor geometry cards (17XXYY cards). There are a total of [ ] a,c heat conductor cards; [ ] a,c identified with the hashed marking in Figures 2-1 and 2-2 of Supplement 1 to WCAP-14882. In addition, there are a total of [ ] a,c heat conductor geometry cards, each one modeling the thick metal masses as a [ ] a,c. Tables 5-1 and 5-2 below discuss each of the inputs for these two sets of RETRAN input cards.

The values chosen for the inputs on the 15XXXY and 17XXYY cards are based on sensitivity runs that examined various inputs, such as [ ] a,c, to ensure that the overall model was conservative for its intended application. In addition to ensuring that the model was conservative, it was purposely decided to credit only a portion of the thick metal masses. Thick metal masses associated with the [ ] a,c for conservatism.

Finally, the analyses performed in support of the information presented in Supplement 1 to WCAP-14882 were performed under the NRC-approved Westinghouse Quality Management System.

Table 5-1

Information for the Heat Conductor (15XXXY) Cards

a,c

Table 5-2

Information for the Heat Conductor Geometry (17XXYY) Cards ^{a,c}

6. Heat transfer from the coolant to the RCS metal mass is modeled using the [ ]^{a,c} Please justify the application of the [ ]^{a,c} for each of the [ ]^{a,c} RCS metal mass regions included in the thick-metal mass heat transfer model and listed in Section 2.0 of WCAP-14882-S1-P, Revision 0.

<u>Response:</u>

RETRAN automatically applies an appropriate heat transfer correlation as warranted by the analysis conditions (e.g., at relatively high Reynolds numbers the [ ]^{a,c} correlation is used and at low Reynolds numbers the [ ]^{a,c} correlation is used). A review of the cases with natural circulation identified that RETRAN used the [

] ^{a,c} for all the regions. Additionally, the overall model is conservative in that only a portion of the RCS is modeled.

7. Heat transfer from the coolant to the RCS metal mass is modeled using the [ ] ^{a,c} The form of this equation used in the LOFTRAN thick-metal mass heat transfer model (WCAP-7907-S1-P, Revision 1) applies an [

] ^{a,c}

Response:

The RETRAN computer code, as approved by the NRC, is programmed with the [ ] ^{a,c} and therefore, does not alter the calculation based on the direction of the energy flow. This is considered to be acceptable based on the following discussion.

The RETRAN thick metal mass heat transfer model was compared to the LOFTRAN model, which was extensively tested against the information presented in *Temperature Response Charts*, Dr. P.J. Schneider, 1963 John Wiley & Sons, Inc. In this reference, numerous charts are presented that reflect increases/decreases in the metal temperature due to an increase/decrease in the fluid temperature for various metals, fluids, and geometries. For the purposes of benchmarking the LOFTRAN thick metal mass heat transfer model, charts were selected from the reference for the situation where water with an increasing temperature passes through metal piping and the temperature of the piping changes accordingly. Based on a comparison of the LOFTRAN thick metal model to the chart data for the situation where [

] ^{a,c} This is considered to be acceptable and conservative for the application of this thick metal model in transients for which it is conservative to [ ] ^{a,c}

In addition, as was noted in the response to RAI #5, it was purposely decided to credit only a portion of the thick metal masses. Thick metal masses associated with the [

] a,c for conservatism.

The results generated by the RETRAN thick metal mass model were in good agreement with the LOFTRAN results. Therefore, based upon the good agreement between the LOFTRAN/RETRAN models and given the fact that a large portion of the thick metal masses are ignored for conservatism, the thick metal model is considered to be acceptable for use in the licensing basis loss of normal feedwater and feedline break transients.

8. Section 2.0 of WCAP-14882-S1-P, Revision 0, states that the RETRAN thick-metal mass heat transfer model includes [ ] a,c RCS regions, with the metal mass associated with each region [
] a,c The LOFTRAN thick-metal mass heat transfer model (WCAP-7907-S1-P, Revision 1) incorporates the same RCS regions, but each region can contain [
] a,c

a. Please clarify the definition of node and subnode as used in the RETRAN topical report WCAP-14882-S1-P, Revision 0. Are they consistent with the terms metal sections and lumps as used in the LOFTRAN topical report WCAP-7907-S1-P, Revision 1?

Response:

The conductor model in the RETRAN code is described in the RETRAN Theory Manuals (see the reference to McFadden below). In the RETRAN code, [

] a,c The following table is presented to more clearly show the relationship of the RETRAN noding versus the LOFTRAN noding.

Table 8-1

Comparison of the RETRAN versus LOFTRAN Noding Terminology

RETRAN terms	LOFTRAN terms	Discussion
Conductor	Section	Metal with given geometry in thermal contact with water
Nodes (Regions)	Lumps	Sequential layers of the above metal. Each layer may be defined as a different material. Each LOFTRAN lump has an average temperature defined.
Space Steps or "meshes" (Subnodes)	N/A	[RETRAN only] Smaller divisions of a given layer described above. These divisions are sublayers of the same material, but each subnode has its own temperature.

Reference: J. H. McFadden, et. al., "RETRAN-02 --- A Program for Transient-Hydraulic Analysis of Complex Fluid Flow Systems," EPRI NP-1850-CCMA.

b. Please discuss the sensitivity studies performed to determine that this noding configuration option for the RETRAN model are acceptable.

Response:

The RCS nodalizations illustrated in Figure 2-1 and Figure 2-2 of Supplement 1 to WCAP-14882-P-A are identical to those documented in WCAP-14882-P-A. The RCS volumes in contact with the thick-metal conductors are consistent with the regions in which thick-metal heat transfer was assumed in the LOFTRAN enhanced thick metal model, as documented in WCAP-7907-S1-P. As discussed in the response to RAI #7, the LOFTRAN thick metal mass heat transfer model was extensively tested against the information from the *Temperature Response Charts*. Therefore, the LOFTRAN results were used to benchmark the RETRAN model. In performing the benchmark, the RETRAN nodes were made identical to the LOFTRAN lumps in terms of geometry and material properties. Then the required number of subnodes was determined by increasing the number of subnodes used in each node until a good match was obtained. RETRAN sensitivities were also performed to demonstrate that modeling the nodes as [ ] a,c Additionally, sensitivities were performed on the material used to model the thick metal masses. The results of these sensitivities demonstrated that modeling the nodes as [ ] a,c was more conservative when compared to modeling the heat transfer characteristics of [ ] a,c

c. As described in the LOFTRAN topical report WCAP-7907-S1-P, each metal section can be modeled as [

] ^{a,c} Please describe the geometric configurations available in the RETRAN model.

Response:

The geometric configurations available in the RETRAN model include a [

] ^{a,c}

d. Please discuss the approach used to determine which geometry should be applied to a particular metal section, the number of metal sections which should be modeled in each region, and the number of lumps to use in each metal section.

Response:

Sensitivities showed that the geometry chosen for a particular metal section is not critical to the results. However, the results can be sensitive to the number of subnodes modeled for each node. Sensitivities were performed to ensure that a sufficient level of detail (that is, nodalization) was assumed to demonstrate that accurate results were being obtained by comparing the RETRAN results to the LOFTRAN results. Refer also to the response to RAI #8.b.

e. Please provide the South Texas specific input deck for the RETRAN thick-metal mass heat transfer model. The information requested in RAI 5 above will be used to interpret this model input.

Response:

A complete RETRAN input deck (proprietary) has been provided separately to the NRC Project Manager.

9. In the RETRAN thick-metal mass heat transfer model, [

] ^{a,c} Please provide a discussion of the sensitivity studies performed and the results obtained which justify the use of all [ ] ^{a,c} materials.

Response:

Sensitivities have indicated an insignificant difference in the results.

10. Section 2.0 of WCAP-14882-S1-P, Revision 0, states that the RETRAN thick-metal mass heat transfer model uses material properties (e.g., density, thermal conductivity, specific heat capacity) that vary with temperature, whereas the LOFTRAN thick-metal mass heat transfer model (WCAP-7907-S1-P, Revision 1) incorporates [ ] ^{a,c} of the metal. Please provide a table of the material property values as a function of temperature, and discuss how these values are incorporated into the RETRAN thick-metal mass heat transfer model. Include a reference for the material property values.

Response:

The thick-metal mass material properties are provided below in Table 10-1 and 10-2. The material properties were taken from an internal Westinghouse Properties Manual. In the RETRAN thick metal mass model input deck, the thick-metal mass thermal conductivity properties (Table 10-1) are provided by the RETRAN input cards 18070X (where x = 0, 1, 2 and 3) and the thick-metal mass volumetric heat capacity properties (Table 10-2) are provided by the RETRAN input cards 19070X (where x = 0, 1, 2 and 3). These user input lookup tables are used by RETRAN for defining the thick-metal mass material properties.

Table 10-1

Thermal Conductivity for [ ] ^{a,c}

Temperature (°F)	Thermal Conductivity (Btu/ft-hr-°F)

a,c

Table 10-2

Volumetric Heat Capacity for [ ] ^{a,c}

Temperature (°F)	Volumetric Heat Capacity (Btu/°F - ft^3)

a,c

11. Section 3.3 of the LOFTRAN thick-metal mass heat transfer model topical report (WCAP-7907-S1-P, Revision 1) discusses the initialization calculations performed for the LOFTRAN thick-metal mass heat transfer model. Please provide a discussion of the initialization assumptions and calculations performed for the RETRAN thick-metal mass heat transfer model.

    Response:

    The fluid temperature of the volume in contact with the conductor (i.e., metal) is used to define the steady-state conditions of the thick metal mass.

12. At some point in the calculation, the RCS metal mass could "saturate" such that no further energy can be transferred to the metal. Please discuss how this situation is accounted for in the RETRAN thick-metal mass heat transfer model.

    Response:

    When the RCS metal mass temperature approaches the temperature of the RCS fluid at that corresponding location, the heat transfer to the metal mass is reduced. When the conditions are such that the RCS metal mass "saturates," no additional heat is transferred to the metal mass.

13. Please discuss how the RETRAN thick-metal mass heat transfer model accounts for a feedwater line break that involves two-phase discharge. Include a discussion of the impacts on the results of interest for this type of break including RCS pressure, Pressurizer water level and DNBR.

    Response:

    Heat transfer to the thick metal mass only occurs on the primary and the primary conditions are currently limited to subcooled conditions. Likewise for the "other" heatup events analyzed, there is no two-phase flow in the primary system throughout the events. Therefore, there is nothing specific to the feedline break event that would affect the thick-metal mass model.

14. WCAP-14882-S1-P, Revision 0 provides the technical basis for the proposed RETRAN thick-metal mass heat transfer model. This topical report does not provide any information regarding verification or validation of the proposed RETRAN thick-metal mass heat transfer model. Please provide a discussion of the work performed to verify that the model performs as expected and that the amount of energy transferred to and absorbed by the RCS metal is accurate and realistic. Include results of any comparisons

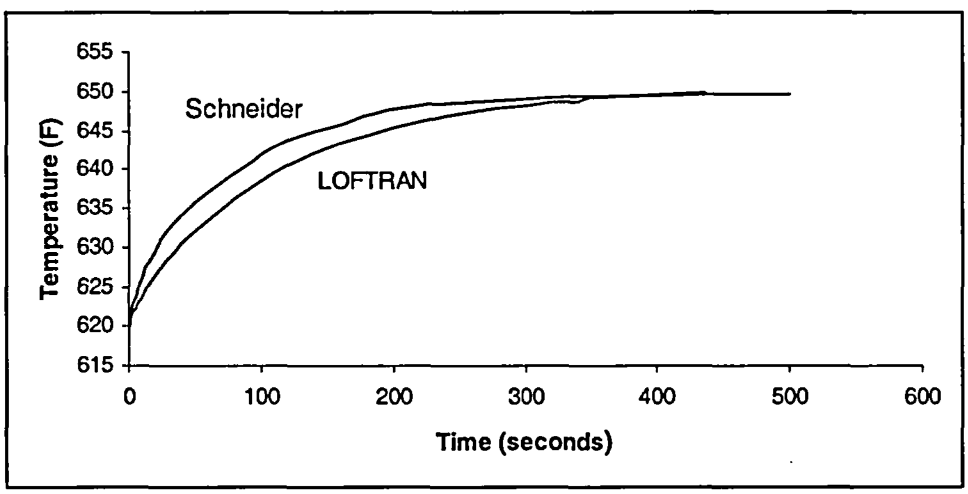
made to test data or other benchmarking, and demonstrate that the RETRAN thick-metal mass heat transfer model is not overestimating heat transfer to the RCS metal.

Response:

As discussed in the response to RAI #5, Westinghouse performed extensive comparisons of the LOFTRAN thick metal model to the expected response. A comparison of the LOFTRAN thick metal model results for the steam generator inlet metal section to what would be expected based on the data obtained from *Temperature Response Charts*, Dr. P.J. Schneider, 1963 John Wiley & Sons, Inc., was performed for an increase in temperature from 618°F to 650°F. As can be seen in Figure 14-1, the LOFTRAN thick metal model response to an increase in the fluid temperature results in a very similar increase in the metal mass temperature, with the LOFTRAN results being slightly conservative. This conservative response, in addition to the fact that a large portion of the RCS thick metal masses is completely ignored, ensures that the thick metal model is conservative for use in heatup transients.

Figure 14-1

Comparison of the LOFTRAN Thick Metal Model to the Schneider Predicted Results



15. The RETRAN thick-metal mass heat transfer model accounts for convection and conduction heat transfer. Other heat transfer mechanisms exist (radiation heat transfer) that could influence the energy transferred to the RCS metal and the RCS metal temperatures. Please discuss how any other heat transfer mechanisms impact the results of the RETRAN thick-metal mass heat transfer model.

Response:

Radiation heat transfer is not modeled since the effect would be small in comparison to the energy lost to the containment atmosphere.

The effect of heat losses from the RCS to the containment environment is conservatively ignored in the non-LOCA analyses.

16. Are heat losses from the pressurizer modeled as part of the RETRAN thick-metal mass heat transfer model? Modeling these heat losses would be non-conservative for the heatup events for which the thick-metal mass heat transfer model is being applied. If such losses are modeled and credited, please quantify the conservatism associated with this approach.

Response:

[ ]^{a,c}

NOTRUMP-Based Steam Generator Mass Calculation Method

17. The licensee states that WCAP-9230 was submitted to the NRC along with, and makes reference to, WCAP-9236, and has since been accepted by the NRC as an approved methodology for analyzing feedwater line break transients on many plant-specific licensing applications. Please provide a reference to a similar license amendment request where this methodology has been accepted by the staff. This would assist the staff in its review.

Response:

As an example, the Vogtle plant FSAR presents the analysis of the feedwater system pipe break and references WCAP-9230 on page 15.2.8-8. The NRC's position regarding the application of the WCAP-9230 feedwater system pipe break methodology to the Vogtle plant is noted in Section 15.2.8, Feedwater System Pipe Breaks, of NUREG-1137, *Safety Evaluation Report Related to the Operation of Vogtle Electric Generating Plant, Units 1 and 2.*

> Sensitivity studies, as presented in WCAP-9230, "Report on the Consequences of a Postulated Main Feedline Rupture," have shown that the most limiting feedwater line break is a double-ended rupture of the largest feedwater line. The staff is reviewing WCAP-9230. Staff review at this time indicates reasonable assurance that the conclusions of the Westinghouse submittal will not be appreciably changed by completion of

the review. If the final results of the review indicate that revisions to the applicant's analyses are necessary, the applicant will be required to implement the results of such changes. The staff does not consider this an open item.

18. Both the licensees submittal and WCAP-14882-S1-P, Revision 0 reference WCAP-9236, "NOTRUMP, A Nodal Transient Steam Generator and General Network Code," dated February 1978. NOTRUMP was reviewed and approved by the staff in 1985 under WCAP-10079-P-A, "NOTRUMP, A Nodal Transient Small Break and General Network Code." Why is WCAP-9236 referenced rather than the approved WCAP-10079-P-A?

Response:

Westinghouse agrees that it is probably more appropriate to reference both NOTRUMP WCAPs since WCAP-10079-P-A refers to the more recent version of the NOTRUMP computer code. The primary reasons that WCAP-10079-P-A was not mentioned are that it was not referenced in the feedline break topical (WCAP-9230) and that WCAP-10079-P-A was written for the application of the NOTRUMP computer code to small break loss of coolant accidents. The SER for WCAP-10079-P-A specifically states the following:

> This SER documents the staff review of the NOTRUMP computer code program for calculating small break loss of coolant accidents (LOCA). Our review concludes that NOTRUMP is acceptable for calculating small break LOCA events.

The responses to RAI #17 and #19 provide additional information concerning the use of the NOTRUMP code for performing feedline break transients.

19. Section 3.1 of WCAP-14882-S1-P, Revision 0, states that the application of the steam generator masses in the RETRAN analysis is similar to the method currently employed in the analyses of secondary-side transients using the LOFTRAN computer code. Please provide a reference to the staff approval of the application of this methodology using LOFTRAN.

Response:

The application of the NOTRUMP code for defining steam generator masses in the LOFTRAN computer code is noted on page 4-2 of WCAP-9230:

> "The heat transfer area is reduced as a function of <u>secondary water inventory as verified using the NOTRUMP simulation</u>."

Also, as shown on Figure 4-2 of WCAP-9230, the NOTRUMP code provides the data that can be used to verify the steam generator level trip and heat transfer models in the LOFTRAN computer code. The water level trip is modeled in the LOFTRAN code as a secondary side water inventory since the LOFTRAN code does not have a detailed indicated narrow range water level model. The reference for the NRC acceptance of the application of the WCAP-9230 methodology using the LOFTRAN computer code is noted in the response to RAI #17.

20. Section 3.1 of WCAP-14882-S1-P, Revision 0, states that using the NOTRUMP code will result in more realistic but conservative secondary side steam generator water masses. Please discuss how this methodology remains conservative.

Response:

As noted in Section 3.1 of WCAP-14882-S1-P, the NOTRUMP code is used to provide a more realistic estimate of the amount of mass in the steam generator at the low-low steam generator water level reactor trip setpoint. Since there is some uncertainty as to what the actual mass is, the predicted NOTRUMP mass at the reactor trip setpoint is [ ]^{a,c} before it is used in the LOFTRAN or RETRAN computer codes. This [ ]^{a,c} primarily accounts for any uncertainty in the drift-flux model, which can affect the NOTRUMP calculated mass. Conservatism also exists in the use of the low-low steam generator water level reactor trip assumption, which accounts for the instrumentation uncertainties associated with the reactor trip function. The typical assumption for the safety analysis value for the low-low steam generator water level setpoint for the feedline break event is 0% of narrow range span. A higher value may be used for transients such as the loss of normal feedwater since no adverse environmental errors are present. This accounts for a number of uncertainties associated with the setpoint, e.g., adverse environmental errors (for feedline break), the process measurement term, and reference leg heatup uncertainties. Based on this conservatism, the mass value used in the RETRAN safety analyses is considered to be sufficiently conservative.

21. Please discuss how the following elements are addressed in the NOTRUMP-Based Steam Generator Mass Calculation Method:

a. Heat transfer between the primary and the secondary side once the steam generator tubes begin to uncover.

Response:

The NOTRUMP-based steam generator mass calculations are used to define the mass in the steam generators at the time of reactor trip, which is well before steam generator tube bundle uncovery occurs. In the RETRAN model, when the steam

generator tubes are uncovered, the heat transfer from the primary to the secondary degrades.

b. Steam superheating once the steam generator tubes begin to uncover.

Response:

Again, this is beyond the point where the NOTRUMP-based steam generator mass calculations are used.

c. Steam generator secondary side water level/inventory calculation after the low water level trip is reached.

Response:

The water level indication is not tracked following receipt of the low water level trip. The mass inventory is strictly a mass balance calculation.

d. Feedwater line break discharge quality and the associated impact on the transient.

Response:

The feedwater line discharge quality calculated by RETRAN is nearly identical to NOTRUMP before the feedring uncovers. Following feedring uncovery and reactor trip, the RETRAN-calculated discharge quality is more conservative than NOTRUMP since the RETRAN-calculated discharge quality is lower. This maximizes the mass discharge out of the break and thereby maximizes the RCS heatup.

22. Figures 3-1 to 3-3 of WCAP-14882-S1-P, Revision 0 illustrate the nodalization of the plant-specific Westinghouse NOTRUMP steam generator model, and Table 3-1 provides a description of the fluid node composition. Was this steam generator model previously reviewed and approved by the staff as part of the NOTRUMP model review? Also, please discuss any plant-specific changes incorporated for application of the model to South Texas Units 1 and 2.

Response:

The nodalization of the plant-specific Westinghouse NOTRUMP steam generator model as presented in Figures 3-1 through 3-3 of WCAP-14882-S1-P, Revision 0, is based on providing an equivalent arrangement as the NOTRUMP steam generator nodalization identified in Appendix B of WCAP-9230. As far as any plant-specific changes, the biggest difference is the location of the feedwater inlet. The steam generator presented in Appendix B of WCAP-9230 is a pre-heat steam generator, which injects feedwater at the

bottom of the steam generator. Baffles located in the bottom of the steam generator direct the flow across the steam generator tubes on the crossover leg (cold-leg) side of the steam generator tubes. The water then passes up through the remainder of steam generator tubes. The steam generator presented in Supplement 1 of WCAP-14882 is a feedring steam generator, which injects feedwater near the top of the downcomer of the steam generator. The feedwater then travels down the downcomer before it travels up through the steam generator tubes. The other major difference is the increased number of nodes modeled in the steam generator presented in Supplement 1 of WCAP-14882 versus the steam generator model presented in WCAP-9230. This is primarily due to the greater computer speeds available, which allow for greater nodalization to be applied when performing computer modeling of systems. Finally, the steam generator model used for the South Texas Project Unit 1 and 2 incorporates the plant-specific volumes, elevations, flow areas, flow rates, steam pressures, etc.

23. Section 3.2 of WCAP-14882-S1-P, Revision 0, states that the plant-specific NOTRUMP steam generator model has been benchmarked against a Westinghouse thermal-hydraulic steam generator steady-state performance code, which has been extensively compared to actual plant data. Please provide the name of this code, and discuss the types of actual plant data used for the comparisons. Also, discuss the NOTRUMP steam generator model performance and comparisons to any available plant data under transient conditions.

<u>Response:</u>

The steam generator steady-state performance code is the GENF computer code, which has been used by Westinghouse for years to define steam generator design and performance characteristics. The types of actual plant/test data that the code has been compared against includes [ ] a,c as well as ensuring that both primary and secondary side volumes/dimensions are verified.

24. Table 3.2 of WCAP-14882-S1-P, Revision 0, provides a comparison of the NOTRUMP model results with a Westinghouse thermal-hydraulic steam generator steady-state performance code. The comparisons are made for key system parameters for one steady state data point only, and certainly the differences between the two codes are small. Please provide similar comparisons which cover the expected range of application of the NOTRUMP code for the purpose described in this License Amendment Request. Also, please provide the technical basis for acceptance of the calculated differences between the two codes.

Response:

The Westinghouse thermal-hydraulic steam generator steady-state performance code is used to define the boundary conditions for the NOTRUMP computer code. The steady-state performance code has been used for many years by Westinghouse to accurately predict steam generator performance characteristics associated with power upratings, increases in steam generator tube plugging levels, reductions in RCS flows, etc. The code has been verified and validated against actual plant/test data and has been shown to accurately predict the steam generator behavior, such as the steam pressure and circulation ratio. Boundary conditions, as defined by this steady-state performance code (not shown in Table 3-2 but used as input to the NOTRUMP code) include the primary side pressure, RCS flow rate and steam generator inlet enthalpy and secondary side conditions, such as the feedwater enthalpy and the steam/feedwater flow rate. Using these boundary conditions, the NOTRUMP model was created and initialized. A comparison of the steady-state performance code results to the NOTRUMP code results is presented in Table 3-2 for those parameters that are not input. As shown by this comparison there is good agreement between the two codes.

The technical basis for the small differences in the results comparison shown in Table 3-2 are justified primarily by the fact that, for conservatism and due to potential uncertainty in the drift-flux model, the resulting NOTRUMP-calculated mass is [ ] a,c. This [ ] a,c is specified by the Westinghouse methodology for analyzing long-term heat removal transients, i.e., the loss of normal feedwater and feedline break events. In addition, many other conservatisms exist in both the loss of normal feedwater and feedline break analyses, including the application of uncertainties on the initial power, RCS Tavg and pressure, and assuming a low-low steam generator water level trip minus the worst uncertainties. The Westinghouse methodology does not credit any of the control systems to mitigate the consequences of the event. Further, the analysis methodology assumes minimum conservative auxiliary feedwater flows. This maximizes the long-term heatup effects. Westinghouse also applies a very restrictive requirement of not filling the pressurizer for the loss of normal feedwater event and the no-hot-leg-boiling criterion for the feedline break event, as described in WCAP-9230, to ensure that the core remains covered with water and maintains a coolable geometry.

The analysis is very conservative when compared to a loss of normal feedwater event at a plant. Based on operating experience, a loss of feedwater event at a plant is typically a cooldown concern due to the operation of the control systems, including the steam dumps (which are not credited in the safety analyses) and the initiation of all the auxiliary feedwater pumps. Therefore, given the conservatism in the analyses and based on an understanding of the extreme difference in the results of an actual transient at the plant versus what the analyses predict, the safety analyses, including the use of the NOTRUMP code, remain bounding even considering the application of the thick metal masses.

Concerning the expected range of application of the NOTRUMP code, the primary purpose of running the NOTRUMP code is to determine the steam generator trip mass associated with the low-low steam generator water level reactor trip setpoint while at full power steam flow conditions. The limiting heatup events that utilize the NOTRUMP trip mass are the loss of normal feedwater and the feedline break events, which are analyzed at full power conditions with uncertainties applied to the initial conditions and to the low-low steam generator water level trip setpoint. It is at full power conditions where the behavior and the thermal hydraulic characteristics of the steam generator are important to the transient. Extensive work has been performed to demonstrate that the models applied in the NOTRUMP code, and in particular the drift flux model, are accurately predicting steam generator behavior. This is discussed further in the response to RAI #29.

25. Section 3.3 of WCAP-14882-S1-P, Revision 0, discusses the method used to calculate and apply the NOTRUMP steam generator masses to RETRAN. Initially, the RETRAN steam generator mass is initialized [

] a,c

a. Please discuss the use of computational time steps for this methodology and how transient time differences between the two computer codes are accounted for.

Response:

Differences in time steps are not significant because the codes are not linked. The important consideration is that the computational time step size used in each of the codes is sufficiently small to ensure that the codes are predicting reasonably accurate results. The RETRAN code uses a Courant limit, which limits the volume mass transport with respect to the total mass. In effect, the time step must be smaller than the time interval required for the fluid to traverse any control volume. Likewise, the NOTRUMP code has a similar type of time step selection to ensure that the time size is not too large for the condition being analyzed. Given that both codes have internally adjusted time step calculations, a one-for-one comparison of the time step size is not meaningful. The transient conditions generated with RETRAN were input to the NOTRUMP code via arrays of the boundary conditions (that is, primary and secondary-side temperature, pressure, and flow). NOTRUMP performs a linear interpolation of the data. Given that the RETRAN time steps are relatively small and the response of the important transient conditions are smooth, it is concluded that this is a reasonable approach for modeling the transient.

b. Figure 3-10 provides a plot of total steam generator mass, and shows a linear decrease over time. Are the NOTRUMP steam generator masses calculated at only two state points (initial conditions and low-low level reactor trip setpoint)? If so, please justify any assumptions on steam generator mass for times between these two state points, and for times after the reactor trip.

Response:

The NOTRUMP steam generator masses are calculated throughout the transient. The plot shows a linear response since the normal feedwater flow is terminated for the loss of AC power transient and the steam generator mass drops at a constant rate as steam continues to the turbine (see Figure 3-9 for the secondary-side steam mass flow rate), which remains constant until a turbine trip occurs.

c. Please discuss how the NOTRUMP steam generator masses (liquid, steam and total) are input to the RETRAN model. Please provide a sample of the RETRAN input.

Response:

The NOTRUMP steam generator mass at the reactor trip condition is input with a RETRAN trip card. This mass corresponds to [ ] a,c of the NOTRUMP steam generator mass for a given low-low steam generator water level trip setpoint. When the total mass in the RETRAN model reaches a condition that equals the input steam generator trip mass, a reactor trip is generated. It should be noted that individual liquid and steam masses are not used as input, i.e., it is only the total mass that is used.

The RETRAN trip card associated with this modeling approach is shown in the example below where [ ] a,c is the assumed trip mass and -959 defines the control block calculation for the transient total mass in the steam generator. When the transient mass reaches [ ] a,c in any one steam generator, a reactor trip signal is generated. The example RETRAN trip card is:

44060 40 -14 -959 0 [ ] a,c 2.00 * Low SG Trip Mass

d. The report states that the [ ] a,c in the RETRAN steam generator model could be used as an alternative method for increasing the mass on the secondary side of the steam generator. Please discuss how this would be accomplished and the modeling changes necessary to implement this method. Would the expected results be the same as for [ ] a,c

Response:

[

]a,c

e. Figures 3-5 to 3-10 are labeled as being for a LOAC event. The text of Section 3.3 states that these figures are for a loss of feedwater event. Please clarify.

Response:

The case analyzed and presented in WCAP-14882-S1 is the loss of normal feedwater without offsite power available.

f. Please discuss the significance of the [ ]a,c Why is this different from the NOTRUMP results?

Response:

The very slight [ ]a,c as calculated by RETRAN is caused by inertial effects in the feedwater line as the feedwater is terminated using a step change. Due to the inertia of the flow in the feedwater line, the pressure in the feedwater line following the termination of feedwater drops relative to the pressure just inside the steam generator, thereby causing the [

]a,c

g. Please discuss the modeling changes made to the RETRAN steam generator level trip function to compensate for changes in the steam generator volume / mass, and to allow this trip function to activate on mass rather than level. Discuss how these changes are verified to be functioning properly.

Response:

There were no "adjustments" made to the level trip function to compensate for changes in the steam generator volume / mass; rather, the steam generator volume was increased so the resulting initial steam generator mass matched the NOTRUMP initial mass. The trip cards were modified to trip on steam generator total mass versus on the indicated steam generator water level to match the NOTRUMP code results. Specifically, as noted in the response for RAI #20, the NOTRUMP code is used to calculate the mass in the steam generator when the indicated narrow range level is at the safety analysis low-low steam generator water level reactor trip setpoint. In terms of heat removal capacity, the amount of mass in the steam generator at the time of reactor trip is an important parameter in determining if there is sufficient heat removal capability in the steam generators following reactor trip. As long as the mass assumed at the time of reactor trip is conservatively low, the fact that a larger volume has been used to ensure a correct initial mass in the steam generator exists is of insignificant importance to the results.

26. The licensee provides results for the Loss of Normal Feedwater Flow event reanalysis which incorporates the proposed methodology changes. To remove some of the conservatism in the steam generator water mass, the NOTRUMP steam generator water mass calculation increases the initial secondary side steam generator water level. This is demonstrated in revised UFSAR Figure 15.2-10, as the transient is initialized with approximately [ ] a,c of additional mass. Table 15.2-1 provides the sequence of events for the reanalysis, and shows that the low-low steam generator water level trip occurs approximately 10 seconds earlier than in the previous RETRAN analysis (without the higher initial steam generator mass). Please discuss why the low-low steam generator water level trip occurs earlier in the updated analysis with a higher initial steam generator mass.

Response:

It occurs earlier because in addition to [

] a,c

27. Please provide similar discussions and results of the reanalyses for the other events for which the methodology of WCAP-14882-S1-P will be applied. Include results which

demonstrate that the acceptance criteria for these events, as listed NUREG-0800, "Standard Review Plan" will be satisfied.

Response:

The only other event that the models described in WCAP-14883-S1-P will be utilized for is the feedline break event, which results in the same type of transient as the loss of normal feedwater event; that is, the initial SG mass decreases until the low-low SG water level reactor trip setpoint (modeled as a total mass value) is reached.

28. Energy discharged from a feedwater line break into containment can lead to heatup and subsequent flashing in the steam generator level instrumentation reference legs. Please discuss how this effect and the associated false high steam generator level indication is accounted for in the NOTRUMP - based steam generator water level calculation.

Response:

The effects of the energy discharge from the feedwater line break into containment and on the SG instrumentation reference legs are accounted for in the uncertainty calculations for the low-low SG water level reactor trip setpoint. An allowance is specifically included for the effects of reference leg heatup. The safety analyses typically use a low-low steam generator water level setpoint corresponding to 0% of span for this reason. The plant value would then be defined to include instrumentation uncertainties, adverse environmental effects, and any reference leg heatup effects. This is the reason that the safety analyses typically have two different setpoints, one for the loss of normal feedwater events where an adverse environment does not exist, and one for the feedline break event where an adverse environment can affect the indicated low-low steam generator water level setpoint.

29. We understand that analyses using a stand alone NOTRUMP model of the South Texas steam generators will be used to determine the steam generator water mass that will be present when a low level reactor trip occurs. This mass will then be used to set the reactor trip logic in the RETRAN model that will be used to analyze plant response to loss of feedwater, loss of offsite power and feedwater line breaks. The NOTRUMP computer code has many options for calculating bubble rise in the fluid nodes and drift flux in the flow links. These models will affect the water mass calculated to be in a steam generator. Please identify which models will be used to determine steam generator water mass for analysis of loss of feedwater, loss of offsite power and feedwater line breaks. Justify that these models have been verified to be accurate for the conditions that would occur within the South Texas steam generators during these events.

Response:

The [ ]^{a,c} correlation is used. This correlation was judged to be the best to use for steam generator analyses since it is based in part on data generated at the [

]^{a,c}

Reference:

[

]^{a,c}

30. For analysis of feedwater line breaks using NOTRUMP, please discuss the models used to predict break flow and liquid entrainment from the broken steam generator. Justify that the models are conservative for determining the low level trip water mass to be input into RETRAN. Provide a comparison of the break flow rate predicted by NOTRUMP to that predicted by RETRAN.

Response:

As part of the NOTRUMP-RETRAN iterations, comparisons were made between the break flows calculated by each code to ensure that the RETRAN flows are in agreement (or are conservative) with respect to the NOTRUMP flows through the point of reactor trip. The same break flow models that are used in RETRAN are used in the NOTRUMP computer code. The [ ]^{a,c} is used for saturated conditions and the [ ]^{a,c} for subcooled conditions.

[

] a,c

Figure 30-1

Comparison of the NOTRUMP Break Flow Rate to the RETRAN Break Flow Rate

a,c

[

]

31. We understand that the RETRAN model of the South Texas steam generators utilizes homogeneous mixing below the steam separators and assumes perfect separation of above the steam separators. The feedwater lines are below the steam separators so that the fluid entering a postulated broken feedwater line would be in the homogeneous flow condition. The assumption of homogeneous flow would be conservative for calculating reactor system overheating following a feedwater line beak. We also understand that break flow is calculated using the [ ] a,c options which are also conservative. Please verify that the staff's understanding is correct or discuss the conservatism of other models that are used.

<u>Response:</u>

The NRC is correct in that the RETRAN model utilizes homogeneous mixing volumes for the volumes below the volume associated with the primary steam separators. This results in homogeneous flow entering the postulated feedwater line break, which is conservative for a heatup transient. In addition, the NRC is correct in that the [

]^{a,c} models were used for modeling the feedwater line break, which, as stated in the question, are conservative models for feedline break analyses. Additional conservatisms that are applied in the modeling of the feedwater line break event include the following:

- No main feedwater is delivered to the intact steam generators from the time the break is initiated.
- The NOTRUMP calculated mass corresponding to the low-low steam generator water level trip setpoint is [ ]^{a,c} to provide a conservative estimate of the trip mass used in the RETRAN code.
- Minimum auxiliary feedwater flow is assumed.
- Maximum reactor coolant pump heat is assumed.
- Maximum decay heat levels are assumed.
- A very conservative criterion of demonstrating that no hot leg boiling occurs to ensure that the core remains covered with water and remains geometrically intact.

ATTACHMENT 3

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Westinghouse

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Our ref: CAW-04-1917

November 10, 2004

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: NOTRUMP/Thick Metal Mass Program: Westinghouse Reponses to NRC Requests for Additional Information (RAIs) on WCAP-14882-S1-P (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-04-1917 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 STP Nuclear Operating Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-04-1917, 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: W. Macon, NRC
E. Peyton, NRC

CAW-04-1917

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 10th day
of November, 2004

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 NOTRUMP/Thick Metal Mass Program: Westinghouse Reponses to NRC Requests for Additional Information (RAIs) on WCAP-14882-S1-P (Proprietary), dated November 2004 being transmitted by STP Nuclear Operating 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 the South Texas Project Nuclear Operating Company is expected to be applicable for other licensee submittals in response to certain NRC requirements for justification of licensing new or updated methodologies.

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

(a) Provide information in support of licensing new or updated methodologies.

(b) Provide plant specific calculations.

(c) Provide licensing documentation support for customer submittals.

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 associated with licensing new or updated methodologies.

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

(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 calculations, evaluations, analysis, 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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