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SOUTHERN COMPANY
Energy to Serve Your World℠

May 27, 2002

CONTAINS PROPRIETARY INFORMATION

LCV-1563-B

Docket Nos. 50-424
50-425

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

VOGTLE ELECTRIC GENERATING PLANT
REQUEST TO REVISE TECHNICAL SPECIFICATIONS
REACTOR TRIP SYSTEM INSTRUMENTATION OVER TEMPERATURE DELTA TEMPERATURE (OTDT) REACTOR TRIP FUNCTION
REQUEST FOR ADDITIONAL INFORMATION

Ladies and Gentlemen:

By way of letter LCV-1563, dated October 30, 2001, Southern Nuclear Operating Company (SNC) requested to amend Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications (TS) Table 3.3.1-1, "Reactor Trip System Instrumentation," and associated Bases B 3.3.1. The revision to the Technical Specifications and associated Bases is to place a limit or "clamp" on the Over Temperature Delta Temperature (OTDT) reactor trip function to address design issues related to fuel rod design under transient conditions.

The Staff sent SNC a request for additional information (RAI) dated January 17, 2002. SNC responded to the RAI by way of letter LCV-1563-A, dated February 11, 2002.

Subsequent to the RAI and response referenced above, the Staff requested SNC to address additional questions. The proposed responses to these questions were discussed in phone calls with the Staff on March 14, 2002, and May 9, 2002. This letter provides SNC's responses to the additional questions.

A001

The responses to some of the questions in the RAI contain information proprietary to Westinghouse Electric Corporation. The notation used to indicate proprietary information is explained in paragraph (4)(ii) of the affidavit in Enclosure 1 of this letter. Enclosure 2 of this letter contains the proprietary responses to the RAI. Enclosure 3 of this letter contains the non-proprietary responses to the RAI.

SNC has reviewed the previously submitted 10 CFR 50.92 evaluation and has determined that the conclusion that no significant hazards will result from the proposed license amendment remains valid.

In the amendment request in letter LCV-1563, dated October 30, 2001, SNC requested that the proposed changes be approved by February 14, 2002, and provided an implementation schedule. SNC has revised its proposed implementation schedule. The changes are planned to be implemented during the Unit 2 refueling outage in Fall 2002, and the Unit 1 refueling outage in Fall 2003.

Mr. J. B. Beasley, Jr., states that he is a Vice President of Southern Nuclear Operating Company and is authorized to execute this oath on behalf of Southern Nuclear Operating Company and that, to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

J. B. Beasley, Jr.

Sworn to and subscribed before me this 28 *day of* May *2002.*

Angela R Stone
Notary Public

My commission expires: 12-27-02

JBB/RJF

Enclosures

1. Affidavit Pursuant to 10 CFR 2.790
2. Responses to the RAI (Proprietary)
3. Responses to the RAI (Non-Proprietary)

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser
Mr. M. Sheibani
SNC Document Management

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
Mr. F. Rinaldi, Project Manager, NRR
Mr. John Zeiler, Senior Resident Inspector, Vogtle

State of Georgia
Mr. L. C. Barrett, Commissioner, Department of Natural Resources

ENCLOSURE 1

AFFIDAVIT PURSUANT TO 10 CFR 2.790

Westinghouse

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

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

Direct tel: (412) 374-5282
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Attention: Mr. Samuel J. Collins

Our ref: CAW-02-1529

May 14, 2002

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Responses to NRC Follow-up Questions on OTDT Clamp License Amendment Request for Vogtle Units 1 and 2" (Proprietary)

Dear Mr. Collins:

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-02-1529 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 2.790 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying Affidavit by Southern Nuclear Operating Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-02-1529 and should be addressed to the undersigned.

Very truly yours,

H. A. Sepp, Manager
Regulatory and Licensing Engineering

Enclosures

cc: G. Shukla/NRR

CAW-02-1529

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared H. A. Sepp, 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:

KAY E. GONGAWARE COMMONWEALTH OF PENNSYLVANIA NOTARY PUBLIC

H. A. Sepp, Manager
Regulatory and Licensing Engineering

Sworn to and subscribed
before me this 15th day
of May, 2002

Notary Public

Notarial Seal
Kay E. Gongaware, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Feb. 7, 2005
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory and Licensing Engineering, 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 the Westinghouse Electric Company LLC.

(2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 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 the Westinghouse Electric Company LLC 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 2.790 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, and 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, which 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 10CFR Section 2.790, 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 "Responses to NRC Follow-up Questions on OTDT Clamp License Amendment Request for Vogtle Units 1 and 2" (Proprietary), being transmitted by the Southern Nuclear Operating Company letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk, Attention Mr. Samuel J. Collins. The proprietary information as submitted for use by Westinghouse Electric Company LLC for Vogtle Units 1 and 2 is expected to be applicable in other licensee submittals in response to certain NRC requirements for OTDT Clamp Implementation.

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

(a) Provide responses to NRC questions on OTDT clamp implementation for Vogtle Units 1 and 2.

(b) Provide a quantitative technical justification for how the OTDT clamp results in fuel clad stress margin.

(c) Assist Southern Nuclear Operating Company in obtaining a license amendment for implementation of the OTDT clamp methodology.

Further this information has substantial commercial value as follows:

(a) Westinghouse Electric Company LLC plans to sell this methodology to its customers to support generation of fuel clad stress design margin via implementation of an OTDT clamp. In particular, development of the OTDT clamp methodology represents a substantial company investment and also a significant competitive advantage.

(b) Westinghouse Electric Company LLC can sell, support, and defend the technology derived from this methodology.

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 for developing analytical methods and performing tests.

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 2.790 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) contained within parentheses 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 2.790(b)(1).

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ENCLOSURE 3

RESPONSES TO RAI

(NON-PROPRIETARY)

"Responses to NRC Follow-Up Questions on OTDT Clamp License Amendment Request for Vogtle Units 1 and 2 (Non-Proprietary)"

Follow-up Question 1: Please explain exactly how the [ ]^{a,b,c} MWD/MTU value was chosen as the appropriate point to perform the analysis. Please address why later times in core life would not be more limiting due to increased concentration of fission products.

Response: The [ ]^{a,b,c} MWD/MTU was not chosen as the appropriate point to perform the analysis, but was the burnup at which the minimum cladding stress margin occurred. Cladding stress analyses are performed over the *entire burnup range* that each fuel region in the core could experience during the specific cycle design being analyzed. The [ ]^{a,b,c} MWD/MTU is the approximate burnup corresponding to the time of [ ]^{a,c}. The [ ]^{a,c} is typically the limiting time for cladding stress. With the closed pellet-cladding gap, the thermal expansion of the pellet during the Condition II transient totally expands into the cladding resulting in high cladding stresses. (Prior to pellet-cladding contact, part of the thermal expansion of the pellet during the transient is closing the pellet-clad gap and thus not contributing to the cladding stress.) At low rod burnups, the change in power during the transient is high due to the available fissile material in the pellet. This change in power and the resulting thermal expansion of the pellet during the transient is the force that causes the high cladding stresses. At higher burnups, the available fissile material is less and the change in power during the transient is typically not as great as at lower burnups. Thus, the thermal expansion of the pellet into the cladding during a transient at the higher burnups is less and this results in lower cladding stresses. The increased concentration of fission products in the rod at higher burnups and the associated higher rod internal pressure are not significant contributors to cladding stresses during a Condition II transient.

Follow-up Question 2: Provide justification that the DNB design basis is satisfied for the slope reduction on the positive side of the OTDT function.

Response: The K1, K2 and K3 gains of the OTDT reactor trip function are generated independent of any transients and cover a multitude of thermal hydraulic conditions. The f(DI) portion of the OTDT reactor trip function is generated based upon skewed axial power shapes. A specific DNB analysis is not performed like it would be for a Complete Loss of Flow or some other DNB related transient. The OTDT function is calculated to cover a range of thermal hydraulic conditions which are encompassed by the safety analysis high and low pressurizer pressure reactor trips, by the Overpower DT (OPDT) reactor trip function, the steam generator safety valve setpoint and for thousands of potential axial power shapes. A locus of conditions at the safety analysis DNBR limit (core thermal limits - see WCAP-8745 Figure 4-1) in temperature versus power space, for various pressures based on a reference axial power shape (i.e., 1.55 chopped cosine) is

used as an input in calculating (or verifying) the OTDT K1, K2 and K3 terms. The relationship among these various parameters is illustrated in the DT versus Tavg figure presented in the Vogtle FSAR (see Figure 15.0.6-1).

The f(DI) penalty function provides protection against skewed axial power shapes, which can be limiting for DNB considerations, by reducing the OTDT trip setpoint. The reduced OTDT trip setpoint provides protection from adverse axial power shapes thereby ensuring that the DNB design basis is satisfied.

The f(DI) penalty function is established based on the DNB evaluation of thousands of Condition II axial power shapes that are initiated from normal operation shapes within the RAOC AFD band. For the purpose of establishing the f(DI) penalty function, the only axial power shape screening performed is based on the maximum power attained. No skewed axial power shapes are eliminated. The reduced f(DI) slope of 1.95 is based on a different initial RAOC band than the original f(DI) slope (2.70). The thousands of skewed axial power shapes used in defining the original OTDT f(DI) penalty function were conservatively based on a wider RAOC band of +10%, -20% AFD at HFP and +30%, -35% AFD at 50% power which is wider than the currently proposed RAOC band for the Vogtle units. Also, the nuclear model for the original RAOC analysis addressed a fuel feature that was never implemented (i.e., natural uranium blankets in the top and bottom six inches of the fuel). These two differences (narrower RAOC band and no natural uranium axial blankets) resulted in less limiting axial power shapes for use in defining the new f(DI) penalty function. For the new analysis, it was demonstrated that the reduced slope of the positive side of the f(DI) function bounded the conditions (i.e., limiting axial power shapes) for which the DNB design basis is satisfied.

Follow-up question 3: What are the affects of relaxing the axial power distribution on Condition III and IV events. The discussion presented in the proposal was limited to Condition II events and did not address the adverse affects of increased axial power distributions on Condition III and IV events.

Response: The basis for the OTDT and OPDT reactor trips is to provide protection for Condition I and II events. They are not specifically designed to provide protection for Condition III and IV events, although the OPDT reactor trip function does provide protection for full power steamline break events. There are no Condition III or IV events which credit the OTDT reactor trip function for primary protection. In addition, the OPDT reactor trip function does not have an explicit axial power distribution component (i.e., f(DI) function) like the OTDT reactor trip function. As far as the effects of axial power distributions on Condition III and IV events are concerned, specific analyses are performed, such as Rod Ejections and Large and Small Break LOCA events, which specifically consider the effects of peaking and axial power distributions on an event specific basis. These events use conservative assumptions that would bound the axial power distribution relaxation.

Follow-up question 4: Demonstrate, by providing tabulated data for higher and lower burnups, that the [ ]^{a,b,c} MWD/MTU burnup limit results in the worst case values of

yield stress, cladding effective stress, and cladding stress margin. The data provided should be calculated for the case of no OTDT clamp and the current RAOC limits for Vogtle. Additionally, identify all codes used and the NRC approvals of these codes.

Response: The following table shows the yield stress, cladding effective stress, and cladding stress margin for additional burnup steps about the minimum clad stress burnup step for the example case of no OTDT clamp and the current RAOC limits for Vogtle.

Burnup (Mwd/Mtu)	Yield Stress (psi)	Cladding Effective Stress (psi)	Cladding Stress Margin (psi)
[ ] a,b,c	[ ] a,b,c	[ ] a,b,c	[ ] a,b,c
[ ] a,b,c	[ ] a,b,c	[ ] a,b,c	[ ] a,b,c
[ ] a,b,c	[ ] a,b,c	[ ] a,b,c	[ ] a,b,c
[ ] a,b,c	[ ] a,b,c	[ ] a,b,c	[ ] a,b,c
[ ] a,b,c	[ ] a,b,c	[ ] a,b,c	[ ] a,b,c

As previously stated, the cladding stress analyses are performed over the entire burnup range that each fuel region in the core could experience during the specific cycle design being analyzed. These analyses are performed to ensure that the minimum stress margin is analyzed and that the cladding stress criterion is met. The Westinghouse fuel performance code, the PAD code, is used in the cladding stress analyses. The PAD 3.4 code fuel performance models are documented and approved in WCAP-10851-P-A (Proprietary), WCAP-11873-A (Non-proprietary) (August 1988) and the PAD 4.0 fuel performance models are documented and approved in WCAP-15063-P-A Revision 1, (Proprietary), WCAP-15064-NP-A, Revision 1 (Non-proprietary) (July 2000). The above example results were performed with the PAD 3.4 fuel performance models which are the models used for the cladding stress analyses for the Vogtle units. The PAD 4.0 fuel performance models will be phased into the analysis during a future cycle of the Vogtle units.

Follow-up question 5: Provide a detailed description of transient evaluations performed by SNC/Vendor to demonstrate that the OTDT clamp will not result in a reactor trip for plant events where a trip is neither intended nor desired.

Response: In designing the reactor protection system, there is a balance that must be maintained allowing the plant sufficient operating margin to maneuver and ensuring that safety criteria are satisfied during accident conditions. Normal operating maneuvers (i.e., Condition I events, such as a step load increase) are specifically examined to help ensure that plants have sufficient operating margin. These events were specifically examined for the OTDT clamp. The safety analyses of events such as an uncontrolled RCCA bank withdrawal event, demonstrate that the reactor protection system trips the plant in a timely manner ensuring applicable acceptance criteria, such as satisfying the DNB design basis, are met. Defining reactor trip setpoints that are too restrictive may result in undesired reactor trips while defining setpoints that are too relaxed may result in the violation of applicable acceptance criteria.

The OTDT clamp results in a more restrictive reactor trip setpoint, but there is still a significant amount of margin from normal operating conditions to the OTDT reactor trip setpoint. In the case of a cooldown event from full power conditions, the OTDT setpoint will relax by 3°F times the K2 term (2.24%) or 6.72%. This would raise the OTDT setpoint to an effective power level of 118.72%. This is significantly higher than either the power range neutron flux setpoint (109% of rated power) or the OPDT setpoint (109.5% of rated power). Within the dead-band of the OTDT f(ΔI) function (that is, from an axial flux difference of -23% to 10%), this would effectively be ~20% margin in power space. In axial flux difference space, this would translate into nearly 14% margin in axial flux difference (-23% - 18.72%/3.3% or -28.7% axial flux difference versus the RAOC negative limit of -15%). Note that typically the plant operates closer to 0% axial flux difference which would result in a significant amount of margin to the OTDT setpoint in axial flux space.

In addition to the above, the control systems are designed to maintain the plant within certain operating parameters. If for some reason, these systems don't perform their task, there are built in control grade "stops" that attempt to prevent a reactor trip from occurring if it is not required. Examples of these "stops" include the rod stop on C-2 (Power range high flux rod stop) which is set to 103% of full power, the C-3 (Overtemperature ΔT (OTDT) rod stop and turbine runback) and C-4 (Overpower ΔT (OPDT) rod stop and turbine runback) "stops" which attempt to preclude the generation of a reactor trip, if it is not required. The C-3 and C-4 "stops" are typically set 3% lower than the corresponding OTDT and OPDT reactor trip setpoints.

If an event were to occur, such as a stuck open steam generator power operated relief valve, and the OTDT setpoint were approached, the turbine would runback on the C-3 "stop" and would offset the increase in the load to the reactor thereby minimizing and/or eliminating the chance of a reactor trip. If the event were significant such that the runback and rod stops, etc., did not turn around the event, a reactor trip would occur, as designed and as expected and all the applicable acceptance criteria would be satisfied. Therefore, based on margins as discussed above, the OTDT clamp will not result in a reactor trip for plant events where a trip is neither intended nor desired.