Westinghouse Electric Corporation Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

December 22, 1992
CAW-92-388

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555

Attention: Dr. Thomas Murley, Director

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: WCAP-13575 "LOFTTR2 Analysis for a Steam Generator Tube Rupture for Watts Bar Nuclear Units 1 and 2" (Proprietary)

Dear Dr. Murley:

The proprietary information for which withholding is being requested in the above-referenced letter is further identified in Affidavit CAW-92-388 signed by the owner of the proprietary information, Westinghouse Electric Corporation. 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 Tennessee Valley Authority.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-92-388, and should be addressed to the undersigned.

Very truly yours,

P. J. Morris / for

N. J. Liparulo, Manager
Nuclear Safety & Regulatory Activities

/cld
Enclosures

cc: M. P. Siemien, Esq.
Office of the General Counsel, NRC

C983:DLC/122292

Tennessee Valley Authority
Letter for Transmittal to the NRC

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

Enclosed are:

1. xx copies of WCAP-13575, "LOFTTR2 Analysis for a Steam Generator Tube Rupture for Watts Bar Nuclear Plant Units 1 and 2" (Proprietary).

2. xx copies of WCAP-13576, "LOFTTR2 Analysis for a Steam Generator Tube Rupture for Watts Bar Nuclear Plant Units 1 and 2" (Non-Proprietary).

Also enclosed are a Westinghouse authorization letter, CAW-92-388, accompanying affidavit, Proprietary Information Notice, and Copyright Notice.

As Item 1 contains information proprietary to Westinghouse Electric Corporation, 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 2.790 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 2.790 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-92-388 and should be addressed to N. J. Liparulo, Manager of Nuclear Safety & Regulatory Activities, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

C983:DLC/122292

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 (g) 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)(g) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.790(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 2.790 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. The NRC is not authorized to make copies for the personal use of members of the public who make use of the NRC public document rooms. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

CAW-92-388

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

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COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Peter J. Morris, 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 Corporation ("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:

Peter J. Morris

Peter J. Morris, Manager
Strategic Safety and Regulatory Issues

Sworn to and subscribed
before me this 29th day
of December, 1992

Pamela Long Moore

Notary Public

Notarial Seal
Pamela Long Moore, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Aug. 15, 1995
Member, Pennsylvania Association of Notaries

(1) I am Manager, Strategic Safety and Regulatory Issues, in the Nuclear and Advanced Technology Division, of the Westinghouse Electric Corporation 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 rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Energy Systems Business Unit.

(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 Energy Systems Business Unit 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 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 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 "LOFTTR2 Analysis for a Steam Generator Tube Rupture for Watts Bar Units 1 and 2", WCAP-13575 (Proprietary), December, 1992 for Watts Bar Units 1 and 2. being transmitted by the Tennessee Valley Authority (TVA) letter and Application for Withholding Proprietary Information from Public Disclosure, Mr. R. L. Gridley, TVA to the Document Control Desk, Attention Dr. Thomas Murley. The proprietary information as submitted for use by TVA for the Watts Bar 1 and 2 is expected to be applicable in other licensee submittals in response to certain NRC

requirements for justification of the design basis analysis for a steam generator tube rupture accident.

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

(a) Provide documentation of the methods, assumptions, and analysis for a design basis steam generator tube rupture accident.

(b) Establish the margin to steam generator overfill for a design basis steam generator tube rupture.

(c) Establish the thermal and hydraulic analysis results for use in calculating the offsite radiation doses for a design basis steam generator tube rupture.

(d) Assist the customer to obtain NRC approval.

Further this information has substantial commercial value as follows:

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

(b) Westinghouse can sell support and defense of the 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 analytical documentation 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.

Further the deponent sayeth not.

ENCLOSURE 1

SUMMARY REPORT OF THE STEAM GENERATOR TUBE RUPTURE (SGTR) ANALYSIS FOR WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2

The following report summarizes the principal results of the plant-specific SGTR analysis for WBN. It is arranged to address each of the itemized requirements that were established by NRC in WBN's Safety Evaluation Report (NUREG-0847) Supplement No. 5 (SSER 5), dated November 1990.

(1) Each utility in the SGTR subgroup must confirm that it has in place simulators and training programs that provide the required assurance that the necessary actions and times can be taken consistent with those assumed for the WCAP-10698 design-basis analysis. Demonstration runs should be performed to show that the accident can be mitigated within a period of time compatible with overall prevention, using design-basis assumptions regarding available equipment, and to demonstrate that the operator action times assumed in the analysis are realistic.

Response

A control room simulator for training WBN Operations personnel is installed at the WBN site. This simulator was used to perform various SGTR scenarios so that the resulting operator responses could be monitored and evaluated against WCAP-10698 (Reference 1). The selection process used to identify scenarios for simulation is described in Section IX of the report "Steam Generator Tube Rupture" (Reference 2). A copy of this report is provided as Enclosure 2. The equipment failures were selected from those which were considered in WCAP-10698 and which were shown to be limiting or potentially limiting. Seven scenarios of a SGTR event were selected for simulator demonstration runs.

The first demonstration runs were performed during the requalification training of control room operators that was begun in January 1992. The selected SGTR scenarios were initially performed using the then-current version of WBN's Emergency Operating Instructions (EOIs). However, during the course of the simulator runs these EOIs were revised to be more consistent with the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs), Revision 1A. Subsequent discussions in this response will refer to these revised EOIs as WBN's Emergency Operating Procedures (EOPs). The new EOPs were used during later performances of SGTR scenarios. Note that neither the "old" EOIs nor the "new" EOPs that were used during the simulator demonstration runs were formally approved procedures. The final version of the EOPs must be approved before WBN is licensed, but until that time the use of draft procedures for training purposes simplifies the incorporation of enhancements that are identified during training activities.

SGTR simulator runs using the new draft EOPs generally resulted in longer operator action times from event initiation to safety injection (SI) termination. These increased action times are attributed to lack of familiarity with using the new EOPs and also the additional amount of detail in the new EOPs, as compared to the old EOIs. The longer times from the simulator runs using the new EOPs are considered to be conservative with respect to the action times expected for a more experienced operator crew.

The times that were determined in WBN's simulator demonstration runs for the seven SGTR scenarios were compared with the operator action times that were assumed in WCAP-10698. The following conclusions can be drawn from this comparison:

1. The average WBN-specific operator action times are in agreement with those that were assumed in the generic Westinghouse SGTR study contained in WCAP-10698 and its Supplement 1 (Reference 3).

2. The average WBN-specific operator action times for the base case are comparable with the reference plant input values for SGTR analyses. Though times were longer in some of the subintervals, the overall operator action times are in agreement with those of WCAP-10698 and its Supplement 1.

3. SGTR scenarios that included loss of offsite power and single equipment failures did not add significantly to operator action times, except for Scenario 3 where the ruptured steam generator (SG) power-operated relief valve (PORV) block valve had to be closed manually. The additional action time required for Scenario 3 was addressed in the Westinghouse analyses for WBN. The plant's response during this scenario does not invalidate the conclusions regarding the margin to SG overfill and the acceptability of the calculated offsite radiation doses.

Details of the simulator results are provided in the report "Steam Generator Tube Rupture Scenarios Utilizing Operator Crews and EOPs on Plant Simulator" (Reference 4). A copy of this report is provided as Enclosure 3.

(2) A site-specific SGTR radiation offsite consequence analysis which assumes the most severe failure identified in WCAP-10698, Supplement 1 should be performed using the methodology in SRP Section 15.6.3 (NUREG-0800), as supplemented by the guidance in WCAP-10698, Supplement 1.

Response

Site-specific SGTR analyses were performed for WBN Units 1 and 2 using the methodology developed in WCAP-10698 and its Supplement 1. The LOFTTR2 computer program was used to perform these analyses for WBN. LOFTTR2 is an updated version of the LOFTTR1 program that was used for the generic SGTR analyses in WCAP-10698 and its Supplement 1. A thermal and hydraulic analysis was also performed to determine the input to be used in calculating the offsite radiation doses, assuming the limiting single failure relative to offsite doses without SG overfill. The limiting single failures assumed

in these analyses are consistent with the methodology of WCAP-10698 and its Supplement 1. The above WBN-specific analyses are described in detail in WCAP-13575 (Reference 5). A copy of this report is provided as Enclosure 4. A non-proprietary version of this report, WCAP-13576, is provided as Enclosure 5.

Conservative assumptions for break size and location, condenser availability, and initial secondary water mass in the ruptured SG were utilized in the LOFTTR2 computer model. The operator action times used in the model were based on the results of the simulator demonstration runs that are described above with the operator actions being governed by WBN's draft EOPs. Note that the time assumed in WCAP-13575 for the operator to isolate the ruptured SG is 15 minutes. This action time was achieved by at least some of the operator crews for all of the SGTR scenarios during the simulator demonstration runs. However, for a few scenarios, the action time required by one or more of the operator crews was slightly longer than 15 minutes. Therefore, TVA will perform additional SGTR simulator runs to assure that this action time is accomplished by all operator crews using the final version of WBN's EOPs when the EOPs are approved and issued.

The modeled accident was a double-ended break of one SG tube located at the top of the tube sheet on the outlet (cold leg) side of the SG. It was also assumed that a loss of offsite power occurred at the time of reactor trip and that the highest-worth control rod stuck in its fully-withdrawn position. Based on the information in Reference 3, the most limiting single failure with respect to offsite doses for WBN is a failed-open PORV on the ruptured SG. The primary-to-secondary break flow and the mass releases to atmosphere were determined using the above assumptions. These break flows and mass releases were then used to calculate the maximum radiation doses that could result from a design-basis SGTR.

The radiation doses to a control room operator and at the offsite boundary were calculated using the mass releases stated in WCAP-13575. The concentration of radioactive nuclides that was released from the primary-side of the ruptured SG was determined by assuming reactor coolant activity at the technical specification (Reference 6) limit with a pre-existing iodine spike of 10. Iodine scrubbing by the water in the SG was conservatively neglected. The resulting 2-hour site-boundary and 30-day low-population-zone doses are less than 10% of the limits in 10 CFR 100 of 25 rem to the wholebody and 300 rem to the thyroid. The radiation dose analysis was performed using the methodology in the Standard Review Plan (NUREG-0800), Section 15.6.3, except for the assumption regarding the iodine spike.

(3) The structural adequacy of the main steam lines and associated supports under water-filled conditions as a result of SGTR overfill should be evaluated.

Response

The structural adequacy of the main steam lines and associated supports under water-filled conditions was confirmed by analysis for WBN Unit 1. Although the ruptured SG is not expected to overfill following a SGTR event, the analysis conservatively considered the case of the main steam line piping filled with water up to the main steam isolation valve (MSIV). The analyzed event was postulated to occur during normal operation with the main steam line spring hangers in their normal unpinned state. To evaluate the stress impact, a separate post-processor computer analysis was run to address the tube rupture deadweight values. This postulated SGTR scenario was evaluated against the applicable ASME Code equations. The analytical results demonstrate that the piping stresses remain within ASME Code limits.

Prior to fuel load for Unit 2, a similar structural analysis will be performed to confirm the adequacy of the Unit 2 main steam lines.

(4) Systems, components, and instrumentation credited for accident mitigation in the plant-specific SGTR emergency operating procedures (EOPs) should be listed. Specify whether each system and component specified is safety grade. For primary and secondary PORVs and control valves specify the valve motive power and state whether the motive power and valve controls are safety grade. For non-safety-grade systems and components, state whether safety-grade backups are available which can be expected to function or provide the desired information within a time period compatible with prevention of SGTR overfill or justify that non-safety-grade components can be used for the design-basis event. Provide a list of all radiation monitors that could be used for identification of the accident and the ruptured steam generator and specify the quality and reliability of this instrumentation if possible. If the EOPs specify steam generator sampling as a means of ruptured steam generator identification, provide the expected time period for obtaining the sample results and discuss the effect on the duration of the accident.

Response

A listing of the systems, components, and instrumentation that are required to carry out each of the steps in WBN's EOP E-3 (Reference 7) has been developed. This list is included as Table VI-2 in Section VI of Enclosure 2. Table VI-2 addresses the equipment referenced in EOP E-3, which is the procedure currently in use at WBN to respond to a SGTR. The table is organized and keyed to correspond with each step in the procedure as a means of ensuring that all of the equipment referred to in the procedure is included. In addition, the applicable backup systems and/or procedures for both safety-related and non-safety equipment addressed in the EOP are identified in the table. Classification of the listed equipment as safety grade or non-safety grade is also provided in the table.

A discussion of the primary (pressurizer) and secondary (SG) PORVs is provided in Section VII of Enclosure 2. This discussion identifies the motive power and the safety classification of the motive power and valve controls.

Radiation monitors that can be used to detect SG tube leakage are provided for each of the main steam lines, the condenser vacuum pump exhaust, and the SG blowdown lines. A description of these radiation monitors is included in Section X of Enclosure 2.

The last part of this item requests information about the potential impact on operator action times if the EOPs require sampling of the secondary coolant to confirm the existence of a SGTR. Similar to other plants, WBN's EOPs do instruct plant operators to draw a secondary coolant sample for laboratory analysis as one of the steps in the process of evaluating a potential SGTR event. It is estimated that analyzing the secondary coolant would take approximately 20 to 30 minutes. However, this laboratory analysis is only used to confirm that a SGTR event has occurred. The results of the analysis are not used as a basis for initiating a response to the SGTR event. WBN's EOPs are written so that mitigating actions will not be delayed while awaiting the results of the laboratory sample. Further discussion of this issue is also provided in Section XI of Enclosure 2.

(5) Provide a survey of plant primary and balance-of-plant systems design to determine the compatibility with the bounding plant analysis in WCAP-10698. Major design differences should be noted. The worst single failure should be identified if different from the WCAP-10698 analysis and the effect of the difference on the margin of overfill should be provided.

Response

A SGTR analysis that incorporated WBN-specific parameters (including operator action times) was performed using the analytical methodology developed in WCAP-10698 and its Supplement 1. The LOFTTR2 computer program and the model discussed in the response to Item 2 were used to perform this analysis. However, unlike the analysis described in Item 2, the objective of this analysis was to verify the applicability of the generic conclusion regarding the margin to SG overfill. Therefore, the worst-case assumptions for this analysis were those that would provide the most severe challenge to the SG overfill margin. The worst-case failure(s) analyzed in this analysis are proprietary to Westinghouse. The details of the analysis are provided in WCAP-13575, which is included as Enclosure 4. This report concludes that SG overfill will not occur at WBN for a design-basis SGTR.

REFERENCES

1. Westinghouse Topical Report WCAP-10698-P-A, "SGTR Analysis Methodology To Determine the Margin to Steam Generator Overfill," August 1987.

2. Ebasco Report "Steam Generator Tube Rupture," Revision 1, dated June 18, 1992 (TVA RIMS No. T80920619841).

3. Westinghouse Topical Report WCAP-10698-P-A, Supplement 1, "Evaluation of Offsite Radiation Doses for a Steam Generator Tube Rupture Accident," March 1986.

4. Ebasco Report "Steam Generator Tube Rupture (SGTR) Scenarios Utilizing Operator Crews and EOPs on Plant Simulator," dated June 18, 1992 (TVA RIMS No. T80920619843).

5. Westinghouse Topical Reports WCAP-13575 (proprietary) and WCAP-13576 (non-proprietary), "LOFTTR2 Analysis for a Steam Generator Tube Rupture for Watts Bar Nuclear Plant Units 1 and 2," December 1992.

6. Proposed Technical Specifications for WBN Unit 1, submitted by TVA letter dated August 27, 1992 (TVA RIMS No. T04920827975).

7. TVA Emergency Operating Procedure E-3 (Draft) for WBN Unit 1, "Steam Generator Tube Rupture," dated February 11, 1992.

ENCLOSURE 2

STEAM GENERATOR TUBE RUPTURE
(Revision 2)