



Westinghouse
Electric Corporation

Energy Systems

Nuclear Technology Division

Box 355
Pittsburgh Pennsylvania 15230-0355

March 8, 1996
CAW-96-941

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

Attention: Mr. William T. Russell

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Virgil C. Summer Residual Heat Removal Data Review and Monitoring Criteria
Development", February 1996, (Proprietary)

Dear Mr. Russell:

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-96-941 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 South Carolina Power and Gas Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-96-941, and should be addressed to the undersigned.

Very truly yours,

N.J. Liparulo, Manager
Regulatory & Engineering Networks

DLC/bbp

Attachment

cc: Kevin Bohrer/NRC(12H5)

NSD114L/CAW941

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PDR

ENGINEERS
TECHNICAL WORK RECORD

SERIAL 15053
ENGINEER C. BARBIER
DATE 2/23/95

Project Title REVIEW-IEB88-08 TEMPERATURE DATA RHR LOOP C Tab -- Page 1 of 2

PURPOSE

This TWR is to document the effects of the current thermal stratification conditions on the RHR piping to the reactor coolant loop "C" by the determination of a forty year fatigue cumulative usage factor. This will provide the basis for the classification of the current stratification condition as "moderate".

REFERENCES

- (1) NRC Bulletin No. 88-08, Supplement 3, Dated 4/11/89, Title "Thermal Stresses in Piping Connected to the Reactor Coolant Systems".
- (2) Westinghouse letter report MT-SME-071, dated February 1990, title "SCE&G VCSNS unit 1 identification of unisolable piping and determination of inspection locations per NRC Bulletin 88-08, Supplement 3" by P. Strauch and D. Testa.
- (3) NRC Bulletin No. 88-08, Supplement 2, Dated 8/4/88, Title "Thermal Stresses in Piping Connected to Reactor Coolant Systems".
- (4) Westinghouse report (preliminary), dated February 1996, titled "V.C. Summer RHR Data Review and Monitoring Criteria Development", by P. L. Strauch.
- (5) Design Engineering Procedure ES-511, "Collection and Review of Data from the ECCS Temperature Monitoring System for Compliance with NRC Bulletin 88-08".
- (6) NRC letter from G. Wunder to J. Skolds, docket no. 50-395, dated 11/27/91.

BACKGROUND

Reference (1) was issued in April of 1989 to alert the industry of possible thermal stratification conditions as a result of out leakage from the reactor coolant system (RCS). A VCSNS plant specific review of this condition was conducted by Westinghouse. Reference (2) documents this review. It concluded that the RHR branch piping from the reactor coolant loop (RCL) was susceptible to adverse stresses due to stratification conditions from RCS out leakage. Should cycling of the adverse stress occur, fatigue damage could result. As a result of this conclusion, and to benchmark the RHR piping in regards to possible fatigue damage, pertinent welds of the RHR piping were inspected per reference (3) during refuel outage 6 in the fall of 1991 and again during refuel outage 7 in the spring of 1993. The inspections revealed no recordable indications of flaws. In addition to these inspections, during refuel 7, top and bottom RTDs were installed on the pipe to monitor the pipe for the presence of thermal stratification. During cycle 7, after the RTD installation, a condition was noticed that did indicate the presence of thermal stratification in the RHR piping to the RCL "C". The top RTD was averaging about 280 degF whereas the bottom RTD was averaging about 160 degF. This indicated a top and bottom stratification with a delta T of about 120 degF. This stratification was constant with no cycles. However, the other RHR piping did not have any indications of stratification and, in that the instrumentation had just been installed, the confidence level in the RTD readings was very low. Since no cycling was observed, and thus no fatigue damage was occurring, a decision was made to wait until refuel 8 to inspect and repair the RTDs. During refuel 8 the RTDs were inspected and the installation was found to be satisfactory. In addition, when the RHR system was in operation with 350 degF flow in the pipe, the top and bottom RTDs recorded the temperature properly. With confidence regained in the RTD temperature readings, during the early part of cycle 8 the RHR loop "C" top and bottom temperature readings were watched closely. Again, thermal stratification of the piping was observed, this cycle with a delta T of about 160 degF. These readings now made believers of us that thermal stratification was indeed occurring in the RHR loop "C" piping. An evaluation of this

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condition was begun by Westinghouse. This evaluation is currently documented in reference (4). It concluded that the fatigue damage for this stratified condition, expressed as a Cumulative Usage Factor (C.U.F.), would be about 0.036 when projected for the forty year plant life. The following review discusses in detail the implications of this fatigue damage.

REVIEW

For temperature readings determined to be unsatisfactory, reference (5) requires an evaluation to identify a classification for the severity of the condition. For the current condition of RHR line C a classification of "moderate" is assigned. This is based on the evaluation contained in reference (4). This evaluation concluded that the governing location in regards to fatigue caused by this stratification condition is the weld between the upstream pipe and valve 8702B. The current system design basis includes fatigue considerations at this location for normal RHR system functions such as RHR system startup, plant startup, etc. 200 cycles of this type are included in the design basis which create a calculated fatigue cumulative usage factor (C.U.F.) of 0.097 at this location. Per the pipe top and bottom temperatures recorded over the past several years, as plant startup occurs, the piping heats up to a stratified condition of a top and bottom temperature, delta T, difference of about 160°F and then remains constant at these temperatures until the next plant cooldown when the top and bottom temperatures return to ambient. Therefore, one thermal stratification cycle occurs for each plant startup and cooldown. The fatigue developed by these cycles had not been included in the design basis values of C.U.F. To date the VCSNS has had about 28 startups and 27 cooldowns. Therefore, the RHR loop C piping has experienced a total of about 28 thermal stratification cycles with a difference in delta T of 160°F. Table 4-4 of reference (4) notes that the allowable number of cycles for this condition is 5556. The fatigue C.U.F. developed to date for these stratification cycles can be approximated as 28 divided by 5556, or 0.005. Consistent with the current system design basis, 200 of these cycles are postulated to occur over the life of the plant. The fatigue C.U.F. for these stratification cycles can be approximated as 200 divided by 5556, or 0.036. Adding this to the current design basis C.U.F. of 0.097 calculates a total postulated C.U.F. of 0.133 at the end of forty years. This is well below the ASME Code allowable of 1.0 and represents a significant margin to accommodate this stratification condition for the life of the plant. Per references (5) and (6), this stratification must be classified as moderate (C.U.F. between 0.001 and 0.700). Follow-up actions as required by reference (5), section 6.4.2, are required and have been instigated.

Note: To assist the observation of this condition in the future, the monitoring of the top and bottom temperature data for the RHR loop C piping is being added to the on-line cycle count data acquisition system.

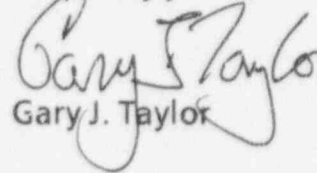
CONCLUSION

The temperature readings for the RHR, loop C, indicate the presence of fluid thermal stratification. An engineering evaluation of this condition has been completed. The C.U.F. for the governing component of this piping has been determined to be 0.133 for a forty year plant life. This is well below the ASME code C.U.F. allowable of 1.0 and indicates a significant margin to accommodate this stratification condition for the life of the plant. Per ES511, this condition has been given a classification of "moderate". As such, follow-up actions as required by ES511, section 6.4.2, have been instigated.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-96-941 and should be addressed to N. J. Liparulo, Manager of Regulatory & Engineering Networks, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

We expect that this submittal will answer questions you may have concerning the subject issue. If not, please call Jim Proper at (803) 345-4088.

Very truly yours,


Gary J. Taylor

RKM/GJT/nkk
Enclosures

c: (w/o enclosures)
J. L. Skolds
W. F. Conway
R. R. Mahan
R. J. White
S. D. Ebner
A. R. Johnson
NRC Resident Inspector
S. F. Fipps
J. B. Knotts Jr.
DMS (RC-96-0054) (w/enclosures)
RTS (IEB 880008)
File (815.02) (w/enclosures)

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).

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. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

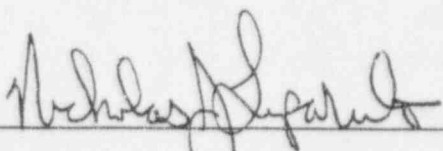
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

§§

COUNTY OF ALLEGHENY:

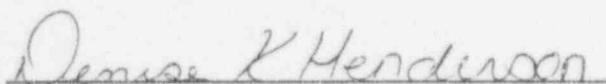
Before me, the undersigned authority, personally appeared Nicholas J. Liparulo, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this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



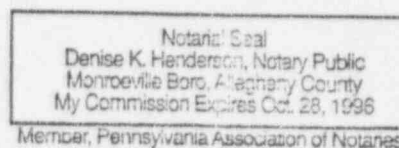
Nicholas J. Liparulo, Manager

Regulatory and Engineering Networks

Sworn to and subscribed
before me this 8th day
of March, 1996



Notary Public



- (1) I am Manager, Regulatory and Engineering Networks, in the Nuclear Services 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 "Virgil C. Summer Residual Heat Removal Data Review and Monitoring Criteria Development," (Proprietary), February, 1996 for V. C. Summer, being transmitted by the South Carolina Power and Gas Company letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk, Attention Mr. William T. Russell. The proprietary information as submitted for use by the South Carolina Power and Gas Company for V. C. Summer is expected to be applicable in other licensee submittals in response to certain NRC requirements for temperature monitoring of identified unisolable piping

connected to the Reactor Coolant System (RCS), including effects of thermal and other stresses.

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

- (a) Provide documentation of the residual heat removal data and monitoring criteria development.
- (b) Establish applicable analytical technologies.
- (c) Establish the transient and temperature profiles.
- (d) Establish the applicable codes and standards which are to be applied.
- (e) 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 structural and thermal stratification evaluation services 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 testing and analytical methods and performing tests.

Further the deponent sayeth not.