



Westinghouse
Electric Corporation

Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

May 10, 1994
CAW-94-627

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555

Attention: William T. Russell, Director
Office of Nuclear Reactor Regulation

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Determination of the Design DNBR Limits for Haddam Neck Plant," (Proprietary)

Dear Mr. Russell:

The proprietary information for which withholding is being requested in the above-referenced letter is further identified in Affidavit CAW-94-627 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 authorized the utilization of the accompanying Affidavit by Connecticut Yankee Atomic Power Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-94-627, and should be addressed to the undersigned.

Very truly yours,

Nicholas J. Liparulo, Manager
Nuclear Safety Regulatory and Licensing
Activities

Enclosures

cc: Kevin Bohrer / NRC (12H5)

9406070197 940601
PDR ADDCK 05000213
P PDR

- (1) I am Manager, Regulatory and Licensing Initiatives, in the Nuclear 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 Units.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR 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 Units 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 10 CFR 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 "Determination of the Design DNBR Limits for Haddam Neck Plant," (Proprietary), June 1994, for information in support of Connecticut Yankee Atomic Power Company's submittal to the Commission, transmitted via letter, Connecticut Yankee Atomic Power Company, CYAPCO-B14842, dated June 1994, "Determination of the Design DNBR Limits", and Application for Withholding Proprietary Information from Public Disclosure, Nicholas J. Liparulo, Westinghouse, Manager Nuclear Safety Regulatory and Licensing Activities to the attention of William T. Russell, Director, Office of Nuclear Reactor Regulation. The proprietary information as submitted for use by the Connecticut Yankee Atomic Power Company for the Westinghouse reload cores is expected to be applicable in other licensee submittals in response to certain NRC requirements for justification of statistical thermal design procedures.

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

- (a) Justify the statistical methodology associated with the MINI-Revised Thermal Design Procedures.
- (b) Assist its customers to obtain licenses.
- (c) Optimize reactor design and performance while maintaining a high level of fuel integrity.

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 future fuel upgrades.
- (b) Westinghouse can sell support and defense of the product 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 improved core thermal performance methodology 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 the enclosed improved core thermal performance methodology.

Further the deponent sayeth not.

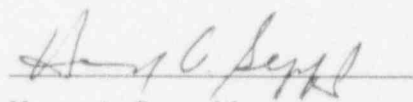
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

§§

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Henry 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 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:



Henry A. Sepp, Manager
Regulatory and Licensing Initiatives

Sworn to and subscribed
before me this 10th day
of May, 1994.

Notarial Seal
Denise K. Henderson, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Oct. 28, 1996
Member, Pennsylvania Association of Notaries



Notary Public

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) 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 for 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 these 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.

Docket No. 50-213
B14842

Attachment 2

Determination of the Design DNBR Limits for Haddam Neck Plant

Non-Proprietary Version

June 1994

DETERMINATION OF THE DESIGN DNBR LIMITS FOR HADDAM NECK PLANT

Introduction

The bases section for Technical Specifications 2.1.1, Safety Limits - Reactor Core is being revised to reflect the use of new Westinghouse fuel, the WRB-1 DNB correlation and a new Thermal Design Procedure (References 1, 2, and 3) being applied to the Haddam Neck Plant for the Cycle 19 reload.

For the Westinghouse fuel, DNBR uncertainties associated with power peaking are statistically combined with the uncertainties of the WRB-1 correlation to determine the DNBR limit. In addition, DNBR penalties associated with rod bow and transition core effects are considered in the determination of a design DNBR limit. For the B&W fuel, the current DNB calculational method is still being used except for the statistical combination of uncertainties associated with power peaking.

The following sections provide more details regarding the statistical combination of uncertainties and the DNBR penalties associated with rod bow and transition core effect.

Statistical Combination of Uncertainties

Only uncertainties associated with power peaking parameters, fuel fabrication parameters, and computer codes are combined. All other uncertainties associated with the plant operating parameters are applied in a conservative direction when used in the safety analyses.

For the W-3L CHF correlation, the results of the statistical combination of the uncertainties associated with power peaking parameters, fuel fabrication parameters, and computer codes is applied as a multiplier to the correlation limit of 1.3 (Ref. 1).

For the WRB-1 correlation, the correlation uncertainty is statistically combined along with the power peaking uncertainties, fuel fabrication uncertainties, and computer code uncertainties (Ref. 3).

W-3L Correlation

For the W-3L CHF correlation the statistical combination of uncertainties is applied to DNBR as:

$$\text{DNBR Limit} = \left[\quad \right] \text{ (a,c)} \quad \text{(Eq. 2-10, Ref. 2)}$$

σ_y/μ_y is the coefficient of variation where:

- σ_y = the net standard deviation obtained by combining all of the uncertainty distributions
- μ_y = the net mean of the distribution

To calculate σ_y/μ_y :

$$\left(\frac{\sigma_y}{\mu_y} \right)^2 = S_1^2 \left(\frac{\sigma_1}{\mu_1} \right)^2 + S_2^2 \left(\frac{\sigma_2}{\mu_2} \right)^2 \dots S_m^2 \left(\frac{\sigma_m}{\mu_m} \right)^2$$

(Eq. 2-9, Ref 2)

- σ_i = the standard deviation of parameter i
- μ_i = the mean (or nominal value) of parameter i
- S_i = the DNBR sensitivity of parameter i

$$S_i = \frac{\Delta \left(\ln \left(\frac{\text{DNBR}_{\text{variable}}}{\text{DNBR}_{\text{nominal}}} \right) \right)}{\Delta (\ln x_i)}$$

(Eq. 2-4, Ref. 2)

Where x_i is the value of the i^{th} design parameter ($F_{\Delta H}^N$ or $F_{\Delta H}^E$). The parameters that are included in the statistical combination of the uncertainties and their statistical properties are summarized in Table 1. The nominal value for the nuclear enthalpy rise hot channel factor ($F_{\Delta H}^N$) is based on a value of 1.7 less a 4 percent calculational uncertainty. The engineering uncertainties ($F_{\Delta H}^E$) used are 6.7 percent and 2.1 percent for the B&W and Westinghouse fuel,

respectively. Uncertainties with the VIPRE01 code and the transient code (RETRAN02) of 4 percent and 1 percent, respectively, have also been applied. Using the worst sensitivities from Table 2, the DNBR limit determined for W-3L = 1.54.

WRB-1 Correlation

For the WRB-1 correlation, a similar set of equations is used for the statistical combination.

For WRB-1 the DNBR limit is:

$$DL = \left[\dots \right] \text{ (a,c)} \quad \text{(Eq. 2-23, Ref. 2)}$$

where:

$$\left[\dots \right] \text{ (a,c)} \quad \text{(Eq. 2-19, Ref. 2)}$$

and

$$\left[\dots \right] \text{ (a,c)} \quad \text{(Eq. 2-18, Ref. 2)}$$

From page 13 of Reference 4,

$$K = 1.783$$

$$S_{MIP} = 0.0883$$

$$\mu_{MIP} = 1.0124$$

Using the worst sensitivities from Table 2, DNBR limit determined for WRB-1 = 1.21.

Table 1: Values Used for W-3L and WRB-1 DNBR Limit Determination

Parameter	Nominal Value (μ)	W-3L (B&W fuel)		WRB-1 (W fuel)	
		σ	σ/μ	σ	σ/μ
F _{ΔH}	[]
F ^E _{ΔH}					
VIPRE					
RETRAN	[]

(a,c)

Table 2: Calculated Sensitivities for W-3L and WRB-1

Correlation	W-3L		WRB-1	
Case	$F_{\Delta H}^{\Delta H} = 1.632$ $F_{\Delta H}^{E_{\Delta H}} = 1.067$	$F_{\Delta H}^{\Delta H} = 1.70$ $F_{\Delta H}^{E_{\Delta H}} = 1.0$	$F_{\Delta H}^{\Delta H} = 1.632$ $F_{\Delta H}^{E_{\Delta H}} = 1.03$	$F_{\Delta H}^{\Delta H} = 1.70$ $F_{\Delta H}^{E_{\Delta H}} = 1.0$
	S_i	S_i	S_i	S_i
High Power, High Pressure	[]
High Power, Low Pressure				
Low Power, High Pressure				
Low Power, Low Pressure				
Loss of Flow				
Dropped Rod				
Uncontrolled Rod Withdrawal				
Sheared Shaft	[]

(a,c)

Rod Bow DNBR Penalty

Westinghouse has determined that the DNBR penalty due to the effect of fuel rod bowing is less than 0.2 percent (Ref. 5). This DNBR penalty is directly added to the Mini-RTDP DNBR limit in the determination of a design DNBR limit for the Westinghouse fuel core.

Transition Core DNBR Penalty

The method used to calculate the Cycle 19 transition core DNBR penalty is consistent with the methods used by Westinghouse (Ref. 6) and NUSCO (Ref. 7). In this approach, 3x3 transition core assembly arrays consisting of B&W fuel and Westinghouse fuel are modeled using the VIPRE computer code over a wide range of system parameters including transients. The transition core patterns are shown in Figure 1. A comprehensive review of all transition core patterns versus an all Westinghouse fuel core showed that a 3 percent DNBR penalty is sufficient. The 3 percent DNBR penalty is applied to the Westinghouse fuel assemblies. This penalty is included in the design DNBR limit such that sufficient margin over the design limit DNBR will exist to accommodate the transition core DNBR penalty.

Results

As discussed above, for Cycle 19, the design DNBR limits are determined as:

Design DNBR Limit for B&W Fuel Core = 1.54

Design DNBR Limit for Westinghouse Fuel Core = 1.25

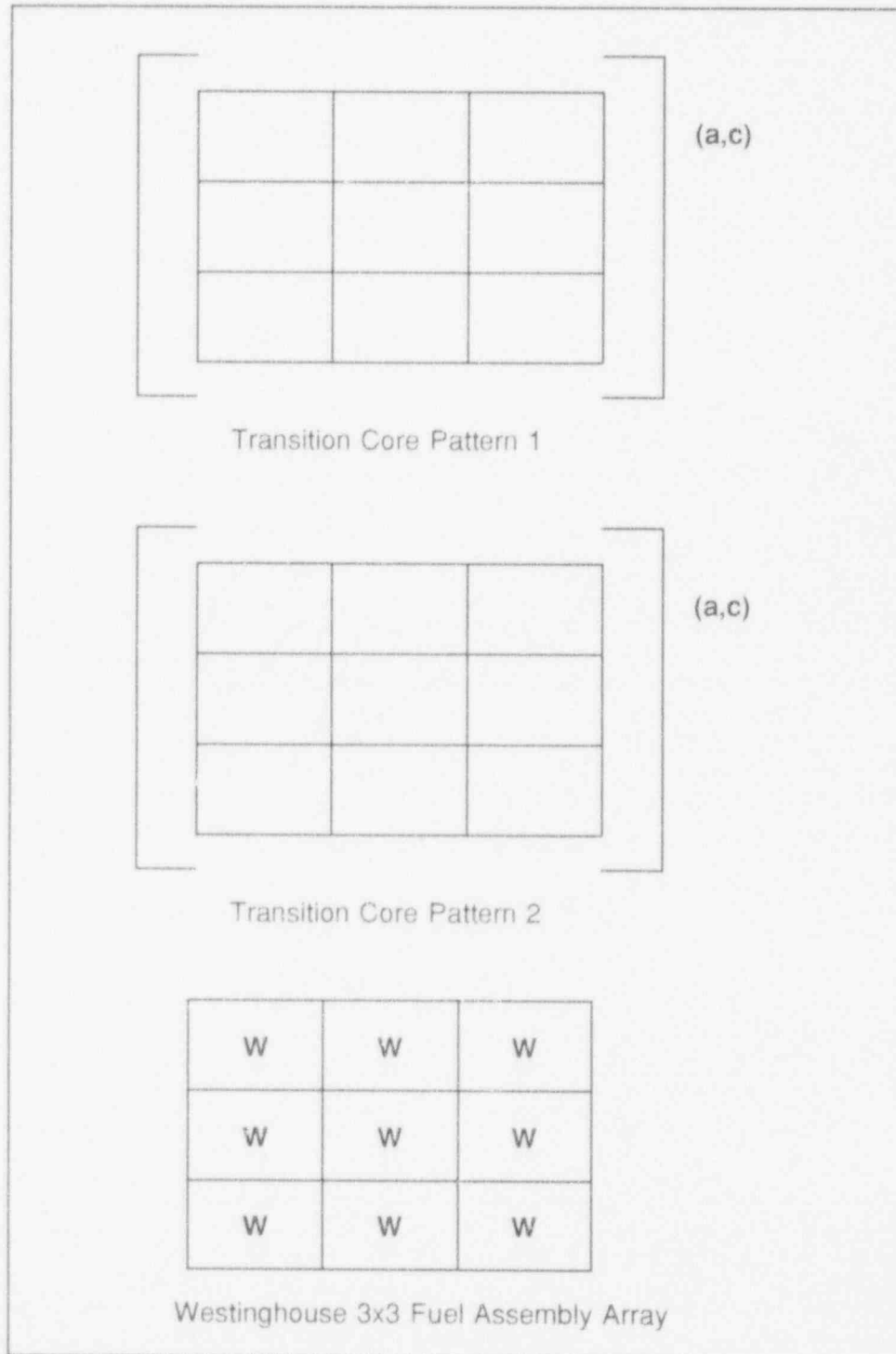


Figure 1

References

1. WCAP-8567-P-A, Improved Thermal Design Procedure (ITDP), Westinghouse Electric Corporation, February 1989.
2. WCAP-11397-P-A, Revised Thermal Design Procedure (RTDP), Westinghouse Electric Corporation, April 1989.
3. WCAP-12178-P-A, Mini-Revised Thermal Design Procedure, Westinghouse Electric Corporation, October 1989.
4. J. F. Opeka letter to U.S. NRC, Haddam Neck Plant Transmittal of Topical Report, VIPRE/WRB-1 DNBR Thermal Limit for Westinghouse Fuel Types, Northeast Utilities System, October 1993, Docket No. 50-213 B14663, dated November 29, 1993.
5. D. J. Petrarca letter to C. H. Wu, "Northeast Utilities Service Company, Connecticut Yankee, Rod Bow DNBR Penalty," 94CY*-G-0051, dated March 24, 1994.
6. E. P. Rahe, Jr. letter to J. R. Miller, "Supplement to WCAP-9500 and WCAP-9401/9402, NRC Safety Evaluation Report Mixed Core Compatibility Items - Supplemental Information," letter NS-EPR-2643, dated August 17, 1982.
7. NUSCO Report NUSCO-173, "Connecticut Yankee Atomic Power Company - Haddam Neck Plant, Technical Report Supporting Cycle 17 Operation," June 1991.