

**James A. Spina**  
Vice President

Calvert Cliffs Nuclear Power Plant, Inc.  
1650 Calvert Cliffs Parkway  
Lusby, Maryland 20657  
410.495.5200  
410.495.3500 Fax



December 22, 2006

U. S. Nuclear Regulatory Commission  
Washington, DC 20555

**ATTENTION:** Document Control Desk

**SUBJECT:** Calvert Cliffs Nuclear Power Plant  
Unit No. 1; Docket No. 50-317  
Response to NRC Request for Additional Information Regarding our letter dated  
May 31, 2006, "ASME Code Section XI Flaw Evaluation of Dissimilar Metal  
Weld Flaws Identified by Ultrasonic Testing"

**REFERENCES:**

- (a) Letter from Mr. P. D. Milano (NRC) to Mr. J. A. Spina (CCNPP), dated October 27, 2006, Calvert Cliffs Nuclear Power Plant, Unit No. 1 (CCNPP 1 – Request for Additional Information Regarding Flaw Evaluation of Dissimilar Metal Welds (TAC Nos. MCD2351)
- (b) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated May 31, 2006, ASME Code Section XI Flaw Evaluation of Dissimilar Metal Weld Flaws Identified by Ultrasonic Testing

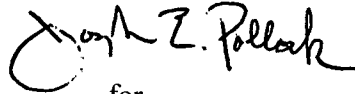
The purpose of this letter is to provide Calvert Cliffs Nuclear Power Plant, Inc.'s (CCNPP's) responses to Nuclear Regulatory Commission's request for additional information (Reference a) regarding CCNPP's submittal of the subject flaw evaluation data (Reference b). The requested information is provided as attachments to this letter. Attachments (1) and (2) contain the requested non-proprietary information.

Please note that Attachment (3) is considered by Westinghouse Electric Company to be proprietary information as defined by 10 CFR 2.390. Westinghouse Electric Company has requested the contents of Attachment (3) to be withheld from public disclosure as attested in the accompanying affidavit (Attachment 4). The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses the considerations in 10 CFR 2.390(b)(4). Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure. There is no non-proprietary version of this Attachment.

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Should you have questions regarding this matter, please contact Mr. J. S. Gaines at (410) 495-5219.

Very truly yours,



for

James A. Spina

Vice President - Calvert Cliffs Nuclear Power Plant

JAS/MJY/bjd

- Attachments:
- (1) Calvert Cliffs Nuclear Power Plant Response to the NRC Request for Additional Information dated October 27, 2006 (Non-Proprietary)
  - (2) Ultrasonic Examination Evaluation Sheets for Subject Welds
  - (3) LTR-MRCDA-06-220, Rev. 1, Responses to the NRC Request for Additional Information (RAI) Regarding Flaw Evaluation of Hot Leg Surge Line and Drain Nozzle Welds at Calvert Cliffs, dated December 8, 2006 (Proprietary)
  - (4) Westinghouse Electric Company Affidavit from B. F. Maurer

cc: P. D. Milano, NRC  
S. J. Collins, NRC  
Resident Inspector, NRC

**(Without Attachments)**  
R. I. McLean, DNR

**ATTACHMENT (1)**

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**CALVERT CLIFFS NUCLEAR POWER PLANT RESPONSE TO THE  
NRC REQUEST FOR ADDITIONAL INFORMATION**

**DATED OCTOBER 27, 2006**

**(Non-Proprietary)**

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## ATTACHMENT (1)

### CALVERT CLIFFS NUCLEAR POWER PLANT RESPONSE TO THE NRC REQUEST FOR ADDITIONAL INFORMATION DATED OCTOBER 27, 2006 (NON-PROPRIETARY)

#### **Requested Information 1:**

*In Table 1, the wall thicknesses of the surge line and drain line area are identified as 1.313 inches and 0.375 inches, respectively. In Table 2, the wall thicknesses of the surge line and drain line are identified as 1.6 inches and 0.54 inch, respectively.*

- (a) Discuss whether the discrepancies of the wall thicknesses between Tables 1 and 2 are due to cladding in the pipe.*
- (b) Discuss which thicknesses were used in the flaw evaluation.*

#### **CCNPP Response:**

- a) Dimensional data in Table 1 [Reference 1] was taken from Westinghouse drawings and represents the design dimensions. This data does not include the cladding thickness and is used for calculation of applied stresses. As-built wall thickness dimensions in Table 2 are at the flaw locations and obtained from the ultrasonic examinations (UT) performed at Calvert Cliffs Nuclear Power Plant (CCNPP) during the spring 2006 outage. The as-built wall thickness was taken in the weld area which does not have cladding.
- b) Ultrasonic examinations dimensions at the flaw locations (Table 2) were used in the fracture mechanics evaluation of as-found indications. American Society of Mechanical Engineers (ASME) Section XI Article IWA-3200 permits use of component thickness dimensions observed values and flaws detected by nondestructive examinations of flaw evaluations per IWB-3000.

#### **Requested Information 2:**

*The surge nozzle piping loads, as shown in Table 3, did not include loads from the transients such as heatup, cooldown, and reflood. Discuss why transient loads were not considered in the flaw evaluation of the surge line nozzle.*

#### **CCNPP Response:**

The flaw evaluation performed in Reference 1 assessed the acceptability of as-found flaws during the pre-outage operation prior to the Mechanical Stress Improvement Process (MSIP) repair. This acceptability represents the end-of-evaluation period just prior to the outage. The flaw evaluation does not include the crack growth; therefore, the thermal transients such as heat-up, cooldown, and reflood are not included in Table 3.

#### **Requested Information 3:**

*In Figures 2 and 3, the NRC staff observed that if the ratio of flaw depth ( $a$ ) versus wall thickness ( $t$ ) of the indication in the surge line were 1.0 (i.e., 100% through wall), the flaw would still be acceptable. The same observation is true for the drain line in Figures 10 and 11. This observation contradicts the limit (i.e., 0.75) on the  $a/t$  ratio, as specified in Table C-5310-1 of Appendix C to Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). Discuss whether the upper limit of 0.75 for  $a/t$  ratio should be included in Figures 2, 3, 10, and 11.*

#### **CCNPP Response:**

American Society of Mechanical Engineers Code Section XI Table C-5310 limits the maximum allowable flaw depth to thickness ratios of 75% through-wall. Analytical equations in ASME Appendix C were used to generate the allowable limits in Figures 2, 3, 10, and 11 for the Calvert Cliffs'

**ATTACHMENT (1)**

**CALVERT CLIFFS NUCLEAR POWER PLANT RESPONSE TO THE NRC REQUEST FOR  
ADDITIONAL INFORMATION DATED OCTOBER 27, 2006 (NON-PROPRIETARY)**

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plant-specific geometry and loading. These figures represent the analytical limits and not the ASME Code Table limits. Code limits of 75% are reflected by the upper range in Figures 4 and 6.

**Requested Information 4:**

*On page 2, it is stated that Article C-5321 and Tables C-5310-1 through C-5310-4 of Appendix C to the ASME Code, Section XI were used for the flaw evaluation. However, prior to the use of the flaw evaluation methodology in the Article C-5000 procedures, certain screening criteria in Article C-4000 should be satisfied. Provide information to show that the screening criteria of Article C-4000 have been satisfied such that the flaw evaluation methodology of Article C-5000 can be appropriately applied to the surge and drain line nozzles.*

**CCNPP Response:**

Calvert Cliffs currently invokes the 1998 edition of ASME Code Section XI for Inservice Inspection. The 1998 edition of the ASME Code Section XI Appendix C, does not have screening criteria. The screening criteria available in 2004 edition of the Code, Article C-4000, were not used in the flaw evaluation. Instead, a conservative approach was used that included the normal thermal and stratification loads in the stress ratio and compared with the bending stress allowable values in Article C-5000 using the limit load approach.

Evaluation of the same flaws using the elastic-plastic fracture mechanics (EPFM), per Article C-6000, also shows that the as-found flaws at the Calvert Cliffs surge line are well within the EPFM allowable bending stresses and are considered acceptable.

**Requested Information 5:**

Provide sketches or diagrams to show the locations of the indications in the surge and drain line nozzles. The sketches should include the nozzle, safe end, weld, and pipe. The sketches should show whether the indications are surface connected or embedded.

**CCNPP Response:**

The requested documentation is included as Attachment 2.

**ATTACHMENT (1)**

**CALVERT CLIFFS NUCLEAR POWER PLANT RESPONSE TO THE NRC REQUEST FOR  
ADDITIONAL INFORMATION DATED OCTOBER 27, 2006 (NON-PROPRIETARY)**

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**Requested Information 6:**

Identify the ASME Code material specifications of the nozzle, safe end, weld, and pipe.

**CCNPP Response:**

The following table provides material information extracted from the manufacturing data [Reference 2] for the pressurizer surge nozzle and the hot leg drain nozzle.

<b>Component Description</b>	<b>Material Designation - Pressurizer Surge Nozzle</b>	<b>Material Designation - Drain Nozzle</b>
Nozzle	SA-508 Cl. 2	SA-105 Gr. 2
Nozzle Butter	Inconel 182	Inconel 182
Cladding	E308	E308
Nozzle to Safe End Weld	Inconel 182	Inconel 182
Safe End	SA-351 CF8M	SA-182 F316
Pipe to Safe End Weld	E308L	E308L
Pipe	SA-351 CF8M	SA-376 TP316

**Requested Information 7:**

Submit copies of References 1, 2a, 2b, and 2c.

**CCNPP Response:**

Reference 1 is included in Attachment (2). References 2a, 2b, and 2c are Westinghouse proprietary and are included in Attachment (3) as a Westinghouse proprietary document. Attachment (4) contains the Westinghouse request for withholding proprietary information.

**References:**

- 1) Westinghouse Letter, LTR-CI-06-26, Rev. 0, "Evaluation of As-found Flaws in Surge, Drain and Relief Valve Nozzle Safe-end Welds at Calvert Cliffs Unit 1 during March 2006 Outage," March 20, 2006
- 2) Westinghouse Letter, LTR-RCUMP-05-69, Rev. 0, "Calvert Cliffs Unit 1 & 2, Engineering Data," October 18, 2005

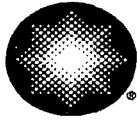
**ATTACHMENT (2)**

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**ULTRASONIC EXAMINATION EVALUATION SHEETS**

**FOR SUBJECT WELDS**

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**Constellation Energy®**

Calvert Cliffs Nuclear Power Plant, Inc.

February 27, 2006

Edward A. Ray  
Westinghouse Electric Co.  
P.O. Box 355  
Pittsburgh, PA. 15230

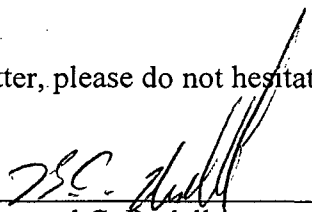
Subject: Flaw evaluation of Calvert Cliffs Unit 1 Reactor Coolant System Pressure Retaining Welds

Enclosures: 1. WesDyne Ultrasonic Examination Evaluation Sheet for Reportable Indications, Weld Number 12CC9-1001 (W13)  
2. WesDyne Ultrasonic Examination Evaluation Sheet for Reportable Indications, Weld Number 2CC9-1007 (W1)  
3. WesDyne Ultrasonic Examination Evaluation Sheet for Reportable Indications, Weld Number 4CC10-1006 (W1)

Ed,

The enclosed information is provided to Westinghouse to perform the analytical evaluation of flaws found in Dissimilar Metal Welds. Refer to each Ultrasonic Examination Evaluation Sheet for Reportable Indications for information regarding the geometry, size and orientation of each flaw. Complete analytical evaluations in accordance with ASME Code Section XI IWB-3600 for flaws exceeding the acceptance standards of IWB-3500 are requested by March 10, 2006 to support plant start up. From preliminary comparison to the acceptance standards the flaw in weld number 12CC9-1001(W13) and weld number 2CC9-1007(W1) will require analytical evaluation. The evaluations should reflect pre and post Mechanical Stress Improvement Process results.

Should you require any further information regarding this matter, please do not hesitate to contact us.

  
Bernard C. Rudell  
Engineering Programs

cc: Douglass Warren, Westinghouse  
Greg Turley, Westinghouse  
Reddy Ganta, Westinghouse  
Andrew Henni



ATTACHMENT (2)

ULTRASONIC EXAMINATION EVALUATION SHEETS FOR SUBJECT WELDS

4" RV-201  
Weld No. CC10-1006(W-1)



WESDYNE INTERNATIONAL, LLC

Attachment to : PDI-10-004  
UT Sheet No. \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

**ULTRASONIC EXAMINATION  
EVALUATION SHEET FOR REPORTABLE INDICATIONS**

Weld Number 4" CC10-1006 (W-1)

Indication Number(s) 1

Size of Indication:

Length: 0.6 estimate  
Width: N/A

Depth: 1.2 Remaining Ligament  
Mat'l. Thickness: 1.3 (Ultrasonic)

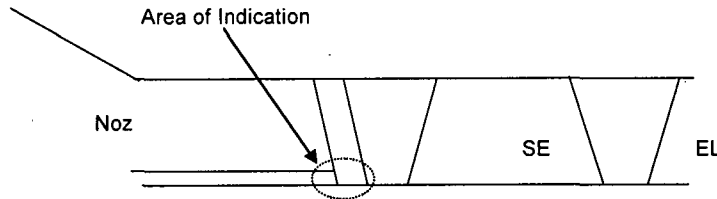
Characterization of Flaw Indication per Para. IWA-3300

Type of Flaw : Suspect PWSCC

Datum Zero : TDC

Sketch of Indication:

Axial Indication detected on Nozzle Side at approx. 1.0" CW



Flaw Characteristics Calculations:

a = 0.1 Surface   
b = 0.6  
s = 0 Subsurface

EXAMINER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

EXAMINER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

APPROVAL \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

Client REVIEWER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

Authorized Inspection Agency \_\_\_\_\_ DATE \_\_\_\_\_

**ATTACHMENT (2)**

**ULTRASONIC EXAMINATION EVALUATION SHEETS FOR SUBJECT WELDS**

**2" Hot Leg Drain to 11 Hot Leg  
Weld No. CC9-1007(W-1)**



**WESDYNE INTERNATIONAL, LLC**

Attachment to : PDI-10-007  
UT Sheet No. \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

**ULTRASONIC EXAMINATION  
EVALUATION SHEET FOR REPORTABLE INDICATIONS**

Weld Number 2" CC9-1007 (W-1)

Indication Number(s) 1

Size of Indication:

Length: .450"  
Width: N/A

Depth: 0.45 Remaining Ligament  
Mat'l. Thickness: 0.54 (Ultrasonic)

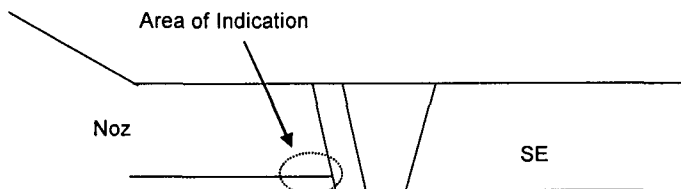
Characterization of Flaw Indication per Para. IWA-3300

Type of Flaw : Suspect PWSCC

Datum Zero : TDC

Sketch of Indication:

Circ Indication located on Nozzle side at pipe TDC



Flaw Characteristics Calculations:

a = 0.1 Surface   
 □ = 0.45  
 s = 0 Subsurface

EXAMINER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

EXAMINER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

APPROVAL \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

Client REVIEWER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

Authorized Inspection Agency \_\_\_\_\_ DATE \_\_\_\_\_

ATTACHMENT (2)

ULTRASONIC EXAMINATION EVALUATION SHEETS FOR SUBJECT WELDS

12" Surge line to 11 Hot Leg  
Weld No. CC2-1001(W-1)



WESDYNE INTERNATIONAL, LLC

Attachment to : PDI-10-002  
UT Sheet No. \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

**ULTRASONIC EXAMINATION  
EVALUATION SHEET FOR REPORTABLE INDICATIONS**

Weld Number 12 CC2-1001 (W13)

Indication Number(s) 1

Size of Indication:

Length: 2.4"  
Width: N/A

Depth: 1.2" Remaining Ligament  
Mat'l. Thickness: 1.6 (Ultrasonic)

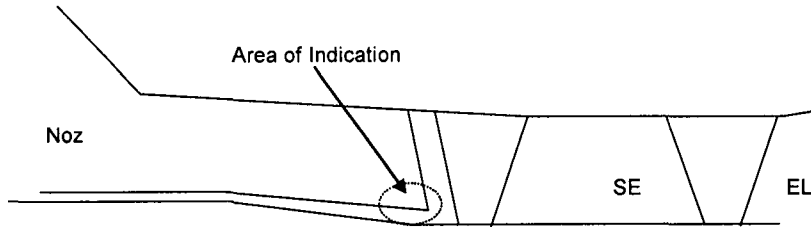
Characterization of Flaw Indication per Para. IWA-3300

Type of Flaw : Suspect PWSCC

Datum Zero : Elbow Extradose

Sketch of Indication:

Indication recorded on Nozzle side at 11.6" to 14.0" CW



Flaw Characteristics Calculations:

a = 0.4 Surface   
l = 2.4  
s = 0 Subsurface

EXAMINER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

EXAMINER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

APPROVAL \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

Client REVIEWER \_\_\_\_\_ LEVEL \_\_\_\_\_ DATE \_\_\_\_\_

Authorized Inspection Agency \_\_\_\_\_ DATE \_\_\_\_\_

**ATTACHMENT (4)**

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**Westinghouse Electric Company Affidavit from B. F. Maurer**

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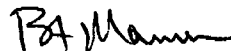
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

SS

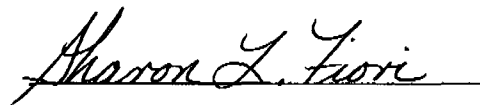
COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared B. F. Maurer, 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:

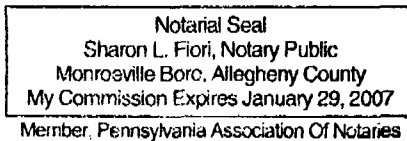


B. F. Maurer, Principal Engineer  
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before me  
this 8th day of December, 2006



Notary Public



- (1) I am Principal Engineer, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
  - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
  - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

    - (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
- (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
- (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
- (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
- (f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
- (b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.
- (c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.
- (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

- (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.
- (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.
- (iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.
- (v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked Proprietary in LTR-MRCDA-02-220, Rev. 1, "Responses to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) Regarding Flaw Evaluation of Hot Leg Surge Line and Drain Line Nozzle Welds at Calvert Cliffs," being transmitted by the Calvert Cliffs Nuclear Power Plant letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse for the Calvert Cliffs Nuclear Power Plant is expected to be applicable for other licensee submittals in response to certain NRC requirements for justification of Information requested on nozzles.

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

- (a) Provide information on the stress distribution on the nozzles that can be used to develop methodology for determining crack evaluations.

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 flaw analysis.
- (c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar weld overlay designs and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.