**Entergy Nuclear South**
Entergy Operations, Inc.
17265 River Road
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Tel 504-739-6715
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**Robert J. Murillo**
Licensing Manager
Waterford 3

**Attachment 1 Contains 10 CFR 2.390(a)(4) Proprietary Information**

W3F1-2007-0027

May 29, 2007

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

SUBJECT: Response to NRC Questions Regarding Acceptability of Waterford 3 Steam Generator Degraded Batwings
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

On May 8, 2007, a teleconference was held at 1:00 pm between NRC Staff and Entergy/Contracted personnel to discuss the NRC requested follow-up information from the March 22, 2007 meeting in Rockville, MD. The information involved a brief discussion of the responses to two questions regarding tube wear history in the Steam Generator (SG) central cavity region and potential batwing to SG shroud contact prior to finalizing Entergy's response. Our responses to the questions are contained in Attachment 1.

Attachment 1, Entergy's response to NRC Questions regarding acceptability of Waterford 3 Steam Generator degraded batwings, contains information proprietary to Westinghouse Electric Company LLC. Therefore, it is requested that Attachment 1 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390. Attachment 2 is a nonproprietary copy of Attachment 1 for the public document room. Attachment 3 is the supporting Westinghouse affidavit for withholding the proprietary information in Attachment 1. Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit CAW-07-2283 should be addressed to B.F. Maurer, Acting Manager of Regulatory Compliance and Plant Licensing, Westinghouse Electric Company, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

A001

This correspondence does not contain any new commitments.

If you have any questions or require additional information, please contact Robert Murillo or Ron Williams at (504) 739-6715 and (504) 739-6255, respectively.

Sincerely,

RJM/RLW/

Attachments:
1. Proprietary Copy of Response to NRC Questions Regarding Acceptability of Waterford 3 Steam Generator Degraded Batwings
2. Non-Proprietary Copy of Response to NRC Questions Regarding Acceptability of Waterford 3 Steam Generator Degraded Batwings
3. Westinghouse Affidavit Regarding Proprietary Information

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Waterford Steam Electric Station Unit 3
P.O. Box 822
Killona, LA 70066-0751

U. S. Nuclear Regulatory Commission
Attn: Mr. N. Kalyanam
Mail Stop O-07D1
Washington, DC 20555-0001

Wise, Carter, Child & Caraway
ATTN: J. Smith
P.O. Box 651
Jackson, MS 39205

Morgan, Lewis & Bockius LLP
ATTN: T.C. Poindexter
1111 Pennsylvania Avenue, NW
Washington, DC 20004

**Attachment 2**
**To**
**W3F1-2007-0027**

**Non-Proprietary Copy of Response to NRC Questions**
**Regarding Acceptability of Waterford 3 Steam Generator Degraded Batwings**

Westinghouse Proprietary Class 2

Westinghouse Electric Company
Nuclear Services
Waltz Mill Service Center
P.O. Box 158
Madison, Pennsylvania 15663
USA

Mr. Ron Williams
Entergy Nuclear Operations
Waterford Nuclear Plant
17265 River Road
Killona, LA 70057

Direct tel: 724-722-5692
Direct fax: 724-722-5166
e-mail: stickemm@westinghouse.com

Our ref: CWTR3-07-26

May 18, 2007

Entergy Nuclear Operations, Inc.
Waterford 3

**Transmittal of Response to NRC Questions Regarding Acceptability of Degraded Waterford Batwings and Application for Withholding Proprietary Information from Public Disclosure**

Dear Mr. Williams,

Please find the attached Westinghouse response to NRC questions regarding the acceptability of degraded batwings at Waterford 3. In addition, an application for withholding proprietary information from disclosure and a non-proprietary version of the document have been attached for your use.

Should you have any questions, please contact Jeff Hall at 724-722-5134.

Very truly yours,

Mark M. Stickel
Customer Project Manager

Attachments: LTR-SGDA-07-111-P, Rev. 1
LTR-SGDA-07-111-NP, Rev. 1
CAW-07-2283

Cc: R. Putnam/Entergy
R. O'Quinn/Entergy
Dave Morris/Entergy
Jeff Hall/Westinghouse
Tony Dietrich/Westinghouse
Dave Bonadies/Westinghouse

Westinghouse

To: M. M. Stickel
cc: P. R. Nelson
E. P. Morgan
J. S. Ivey
A. L. Dietrich

Date: May 15, 2007

From: J. M. Hall
Ext: 724-722-5134
Fax: 724-722-5889

Your ref:
Our ref: LTR-SGDA-07-111-NP Revision 1

Subject: **Response to NRC Questions Regarding Acceptability of Degraded Waterford Batwings**

A meeting was held March 22 at the US-NRC offices in Rockville, MD with representatives of the US NRC, Entergy and Westinghouse. The purpose of the meeting was to discuss certain aspects of the prior justification developed to support continued operation of the Waterford 3 steam generators with degraded batwings. During the meeting there were two specific questions that required a more detailed response than that provided during the meeting. The first question related to the NRC's requesting additional information regarding tube wear history in the central cavity region. The second question related to requesting additional information regarding the batwing to shroud contact potential.

The attachments to this letter contain these questions and the associated response.

Please forward this letter to Entergy

J. M. Hall
SG Design & Analysis

E.P. Morgan for W. K. Cullen
Chemistry Diagnostics &
Materials Engineering

R. E. Johnson
Nuclear Components Engineering 1

J. S. Baron
SG Design & Analysis

Westinghouse Electric Company LLC
P.O. Box 355
Pittsburgh, PA 15230-0355

**ATTACHMENT A**
**Summary of RF14 BW9 Wear History Review**

**Wear History Review Summary**

The following locations had reported wear scars at BW9 in the stay cavity columns (62 to 114) with Rows 62 or higher. Some were newly reported for the RF14 outage. For those newly reported indications a history review of the RF13 bobbin data was performed to determine if a wear signal was present. As seen from the table below, the overwhelming majority of the signals were present in the RF13 bobbin data indicating that these wear scars were present prior to batwing drop. As seen from the table below, only 1 of these 14 signals was >30%TW at RF14 (R67 C99). Of those between 20%TW and 30%TW the largest growth is 8%TW for Cycle 14.

| | | | | |
|---|---|---|---|---|
| Row | Col | RF14 %TW | RF13 Review Result | Newly Reported at RF14? |
| 98 | 94 | 8 | NDD | Yes |
| 81 | 95 | 20 | Signal Present | Yes |
| 80 | 86 | 16 | Signal Present | No |
| 76 | 88 | 11 | NDD | Yes |
| 74 | 88 | 23 | Signal Present | Yes |
| 74 | 88 | 13 | Signal Present | Yes |
| 68 | 90 | 13 | Signal Present | Yes |
| 67 | 99 | 31 | Signal Present | Yes |
| 67 | 89 | 23 | Signal Present | Yes |
| 65 | 97 | 9 | Signal Present | Yes |
| 65 | 95 | 16 | Signal Present | Yes |
| 65 | 89 | 14 | Signal Present | Yes |
| 64 | 90 | 8 | Signal Present | Yes |
| 63 | 95 | 18 | Signal Present | Yes |

A number of wear locations were also reported in high row locations (>140) in the stay cavity columns, and found on the periphery of the tube bundle. Nine tubes with wear at RF14 are found in this area. All were reported at RF13.

A number of wear locations were also reported near the periphery mainly in Rows 80 to 84. A total of 15 wear scars are reported; 12 were reported in RF13. Considering that 12 of the 15 wear scars were reported in the previous outage, a history review of these 3 was not performed. These 3 were also reported at <20%TW depth at RF14, thus there is nothing exceptional about their presence. An additional two vertical strap supports are present starting at Row 83 and higher; additional support is provided by partial eggcrate 09 starting at Row 84. The additional support provided by the vertical straps and partial

eggcrate 09 explain why additional indications are not found in Rows 85 and higher.

**Conclusion**

The observed tube wear scars at the BW9 location from RF14 do not suggest an uncharacteristic growth rate, do not suggest an abnormal wear condition associated with failed batwings, and do not suggest that an increase in the number of observed indications (above normal expectations) would be expected for RF15.

# ATTACHMENT B
# Evaluation of Wrap-Around Bar to Shroud Contact for the Waterford 3 Steam Generator

## Purpose

The purpose of this document is to discuss the potential for contact between the wrap-around bar and the shroud as a result of broken batwings in the central cavity region. Evaluations in the reference found that each broken batwing may apply a moment to the wrap-around bar up to 200 in-lbs. The cumulative effect of twenty adjacent broken batwings was shown to cause torsional and bending stresses approaching the yield strength in the wrap-around bar. The sense of the applied loads is to twist the wrap-around bar away from the tubes and toward the shroud. A larger postulated number of adjacent broken batwings results stresses greater than the material yield strength, eventually leading to the formation of two plastic hinges in the wrap-around bar. At this point large deformations of the wrap-around bar are possible. These deformations can be large enough to result in contact between the wrap-around bar and the shroud.

## Discussion

The top sketch in Figure 1 shows a section view of the shroud with the wrap-around bar projected into the plane of the section. The significant dimensions of the shroud and wrap-around bar are shown including the radius to the ID of the shroud and the elevations of the top (or apex) of the wrap-around bar and the bottom of the shroud cone. This sketch shows the hypothetical location for plastic hinges in the wrap-around bar. The dashed line represents the deformation of the wrap-around bar subsequent to the formation of the plastic hinges resulting to contact with the shroud.

The lower sketch in this figure shows a view normal to the plane of the wrap-around bar and indicates the location of the plastic hinges and the contact point with the shroud. In this sketch all batwings between the plastic hinge points are postulated to be broken in the central cavity. Further analysis shows that contact with the shroud will occur if the plastic hinges form 4 inches or more below the apex of the wrap-around bar; that is, if the rise between the axis of rotation and the apex of the bar as shown in the lower sketch is at least 4 inches. This corresponds to approximately 38 broken batwings between the plastic hinge locations. In other words, if more than 38 adjacent failed batwings are required to cause plastic hinges in the wrap-around bar, the projection of the bar above the axis of rotation would be long enough to result in contact with the shroud. If less than 38 are required, contact would not be expected.

Based on the conservative analysis reported in the Reference, it would be expected that plastic hinges would form with slightly fewer than 38 adjacent failed batwings. Therefore, the assumption that each failed batwing exerts a 200 in-lb moment on the wrap-around bar leads to the conclusion that contact between the bar and the shroud would be unlikely.

The premise that each broken batwing exerts a 200 in-lb moment on the wrap-around bar is quite conservative. It is based on the maximum moment each batwing can apply before a plastic hinge forms in the batwing itself. Visual inspection in the central cavity has indicated that many of the broken batwings

are still restrained by the cap plate on the slotted bar. Also many broken batwings are twisted and wedged in between tubes at the tube bundle inner periphery. Both these observations suggest that some, if not most, of the flow loads on many broken batwings are not reacted at the wrap-around bar but at other support points. The fact that most of the original undersized welds between the broken batwings and the wrap-around bar did not fail provides further support for this conclusion. It can also be observed that rotation of the wrap-around bar from plastic deformation would actually relieve any moment applied by the batwing if there is another support point in the central cavity region. Taking some credit for these effects, the average moment exerted by a broken batwing is expected to be considerably less than 200 in-lbs.

This leads to the conclusion that significantly more than 20 broken batwings are required to initiate plastic deformation of the wrap-around bar and more than 38 broken batwings will be required to develop plastic hinges in order to initiate contact with the shroud. Thus, contact between the wrap-around bar and the shroud is considered to be possible under ideal conditions, but not likely due to the conservatisms involved with the analysis.

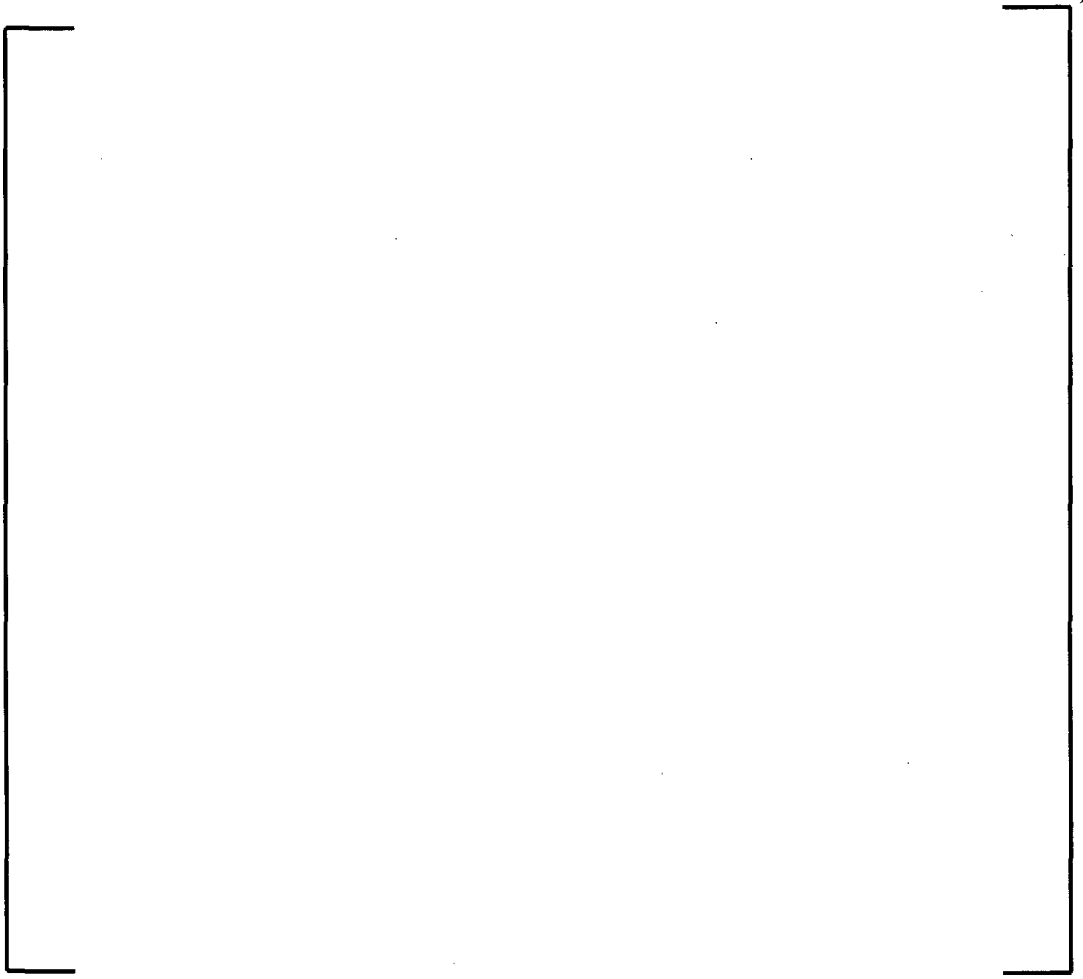
## Reference

CN-SGDA-06-92, Rev. 0, Waterford 3 Batwing Upper Weld Evaluations in Support of the RF14 Outage.

## Wrap-Around Bar & Shroud Elevation View

(Not to Scale)

a,c



## View Normal to Plane of Wrap-Around Bar

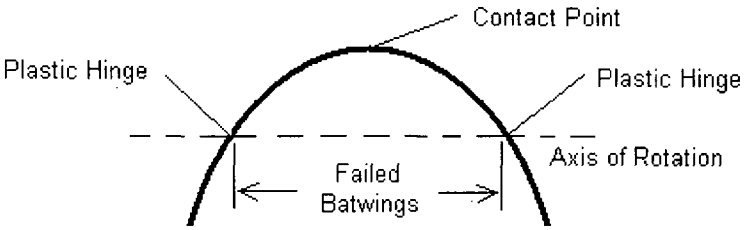



**Figure 1**
**Wrap-Around Bar and Shroud Geometry**

**Attachment 3**
**To**
**W3F1-2007-0027**

**Westinghouse Affidavit Regarding Proprietary Information**

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

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Direct tel: (412) 374-4419
Direct fax: (412) 374-4011
e-mail: maurerbf@westinghouse.com

Our ref: CAW-07-2283

May 17, 2007

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGDA-07-111-P, Revision 1, "Response to NRC Questions Regarding Acceptability of Degraded Waterford Batwings"

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-07-2283 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Entergy.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-07-2283 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Jon Thompson (NRC O-7E1A)

Enclosures

CAW-07-2283

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, Acting Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before me
this 17th day of May, 2007

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Sharon L. Markle, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Jan. 29, 2011
Member, Pennsylvania Association of Notaries

(1) I am Acting Manager, 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 in LTR-SGDA-07-111-P, Revision 1, "Response to NRC Questions Regarding Acceptability of Degraded Waterford Batwings" (Proprietary), for submittal to the Commission, being transmitted by Entergy letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the NRC's Request for additional information.

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

(a) Respond to the NRC's request for additional information regarding tube wear history in the central cavity region of Waterford 3 steam generators.

(b) Respond to the NRC's request for additional information regarding batwing to shroud contact potential.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of providing additional engineering support of steam generator maintenance.

(b) Westinghouse can sell support and defense of the use of this information in performing services of steam generator components

(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 calculations 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.

## 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 2.390 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 2.390(b)(1).

## Copyright Notice