NMC
Committed to Nuclear Excellence

Prairie Island Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

L-PI-03-040

April 25, 2003

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
DOCKET 50-282
LICENSE NO. DPR-42
TRANSMITTAL OF WESTINGHOUSE PRAIRIE ISLAND UNIT 1 – LOWER ROW
TUBE DENT ROOT CAUSE ANALYSIS

Nuclear Management Company, LLC, hereby submits the root cause analysis report for Unit 1 lower row tube denting identified during the 2002 Unit 1 refueling outage. During discussions with NRC staff related to the steam generator tube inspection conducted during the 2002 Unit 1 refueling outage, NRC staff requested a copy of the report after its completion.

Enclosed are:
1. One copy of WCAP-16059-P, "Prairie Island Unit 1 – Lower Row Tube Dent Root Cause Analysis Report" (Proprietary)
2. One copy of WCAP-16059-NP, "Prairie Island Unit 1 – Lower Row Tube Dent Root Cause Analysis Report" (Nonproprietary)

Also enclosed are a Westinghouse authorization letter, CAW-03-1604, accompanying affidavit, Proprietary Information Notice, and Copyright Notice.

As Item 1 contains information proprietary to Westinghouse Electric Company, it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b) (4) of Section 2.790 of the Commission's regulations.

Accordingly, it is respectfully requested that the information that is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations.

ATTACHMENT CONTAINS PROPRIETARY INFORMATION TO BE WITHHELD FROM PUBLIC DISCLOSURE IN ACCORDANCE WITH 10 CFR PART 2, SECTION 2.790

A079

1717 Wakonade Drive East • Welch, Minnesota 55089-9642
Telephone: 651.388.1121

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-03-1604 and should be addressed to H. A. Sepp, Manager of Regulatory and Licensing Engineering, Westinghouse Electric Company, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

This letter contains no new commitments and no revisions to existing commitments. Please contact Jeff Kivi (651-388-1121) if you have any questions related to this letter.

Joseph M. Solymossy
Site Vice President, Prairie Island Nuclear Generating Plant

CC Regional Administrator, USNRC, Region III
Project Manager, Prairie Island Nuclear Generating Plant, USNRC, NRR
NRC Resident Inspector – Prairie Island Nuclear Generating Plant

Attachments

Westinghouse Non-Proprietary Class 3

WCAP-16059-NP
Revision 0

February 2003

Prairie Island Unit 1-

Lower Row Tube Dent Root Cause Analysis

Westinghouse

WCAP-16059-NP

Prairie Island Unit 1
Lower Row Tube Dent Root Cause Analysis

J. M. Hall
SGD&A/EDRE

February 2003

Reviewer: _____
W. K. Cullen
SGD&A/EDRE

Approved: _____
R. J. Sterdis, Manager
SGD&A/EDRE

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

TABLE OF CONTENTS

1.0 BACKGROUND

Eddy current inspections of the Number 11 and 12 steam generators at Prairie Island Unit 1 were performed in the fall of 2002. During these inspections it was determined that 28 tubes had dent signals at the upper support plates. These indications were found on a relatively small population of Row 1 and Row 2 tubes. Indications were found near the topmost tube support plate (TSP 7) and also near the next highest tube support plate (TSP 6). Inspections of these tubes determined that, other than denting, these tubes did not contain any other form of degradation, such as axial or circumferential cracking, near the dent signals. During the winter 2001 refueling outage, all active Row 1 and Row 2 tubes were subjected to a U-bend heat treatment process, and it was initially proposed that these indications could have been a result of some aspect of the heat treatment process. The purpose of this report is to determine the most likely cause of the tube dent signals that were found during the 2002 refueling outage at Prairie Island Unit 1. This report reviews all relevant information in order to identify the most likely root cause of the eddy current indications found on those tubes. This report does not to determine the consequences of these signals with respect to tube integrity since the tube integrity issues are typically addressed in the CM/OA report.

2.0 REVIEW OF AVAILABLE EDDY CURRENT DATA

Both bobbin coil and +Pt eddy current inspections were performed during the most recent Fall 2002 outage at Prairie Island Unit 1. During the bobbin coil inspection of the Row 1 and Row 2 tubes, it was determined that some tubes had indications of signals that could be classified as dents. Table 1 contains a summary of tubes found with signals greater than 2 volts near the upper tube support plates. With relatively few exceptions, signals found near TSP 7 are located near the bottom surface of the plate, and signals found near TSP 6 are located near the top surface of the plate. In addition, it was determined that there are 3 tubes with simultaneous indications on both the 6th and 7th tube support plate. All Row 1 and Row 2 tubes, both with and without dent signals, were examined using the +Pt probe as part of the normal small radius U-bend inspection program. Figure 1 contains a typical +Pt response (horizontal component only) for tube R2 C68, SG11, at 07H. A response is noted to extend for nearly 360 degrees around the tube. The vertical component for this tube shows essentially no dent-like response. The design of the +Pt coil minimizes geometry transition influences from uniformly affected conditions, such as expansion transitions at the top of tubesheet. If the bobbin signals truly represent a geometry change in the tube, the +Pt data can be used to judge that the geometry deformation is more uniform around the circumference, and does not mimic geometry patterns observed for more classical denting conditions resultant from corrosion of the carbon steel TSP. The largest of the dent signals was approximately 6 volts by bobbin. For a circumferentially uniform geometry change of approximately 1 mil, bobbin dent signals exceeding 6 volts are expected.

Indications of denting have been found at other locations in the Prairie Island Unit 1 S/Gs. However, these types of indications are generally biased more toward the center line of the tube support plates and are not localized at either the upper or lower edges of the TSPs. As a result, an initial assessment can be made that most of the Row 1 and 2 tubes do not appear to have dent signals characteristic of the form found elsewhere in the S/Gs.

As U-bend heat treatment was performed on these tubes during the previous 2001 refueling outage, a review of the available eddy current data, obtained both immediately before and immediately after completion of the heat treatment process was performed. A review of the available records indicated that bobbin coil inspections were performed as a matter of course in order to confirm that the heat treatment process was applied at the proper location of the U-bend. As a result, the examination of the post heat treatment data obtained in 2001 was primarily limited to a confirmation examination that the heat treatment was applied at the proper location, and not to re-examine the tube for any other purpose. At the time of the heat treatment process this examination was judged to be a reasonable approach since a complete examination of the tube was performed just prior to the application of the heat treatment process. In addition, the U-bend heat treatment process was completed on many hundreds of tubes at other similar, and non-similar, steam generator models. Hence it was concluded that a complete re-examination of the tube would not be necessary, other than to confirm that the heat treatment occurred at the proper location. As a result, examination of the data to determine if denting, or any other degradation could have been present was not deemed to be necessary and therefore was not performed. However, bobbin coil data was obtained during this period of time and was re-reviewed in the fall of 2002 to determine if dent-like indications or similar types of signals could be present in the data.

A summary of the available bobbin coil inspection data for the affected tubes is contained in Table 2. This table contains a summary of dent-like signals, measured in volts. As indicated in the table, data was obtained during the period of time:

1 – Immediately prior to U-bend heat treatment in 2001

2 – Immediately after U-bend heat treatment in 2001.

3 – During the fall 2002 outage (after 1 cycle of operation, post heat-treat).

From Table 2 it can be determined that, with the exception of two tubes, no indications of denting were found during the inspection performed just prior to the heat treatment process. This data can be found under the column labeled "Dent Volt From 2001 Pre HT". However, bobbin data collected in the 2001 inspection after heat treatment indicates that almost all tubes show the presence of dent-like signals. Note that only voltages greater than 2 volts were reported. This data can be found under the column labeled "Dent Volt From 2001 Post HT".

Table 2 also contains a summary of the dent like signals obtained during the 2002 inspection. Looking at the table it can be generally concluded that for the tubes where a dent-like signal was not called during the inspection immediately following the heat treatment process, the signals were generally near ~2 volts and hence would generally not be called as a dent. As a result, it could be concluded that the uncertainties surrounding eddy current examination methods, along with the relatively small voltages for these tubes are the reason for the dent signals appearing in the 2002 data, and are not expected to be a result of any changes or growth that occurred during operation this past fuel cycle.

It should also be noted that two of the tubes had indications of denting before the heat treatment process occurred (R2C6 and R2C91). Hence denting associated with these tubes cannot be attributed to any heat treatment process since the dents were present before the process was applied. Note that the denting observed on these two tubes is not located on either the upper or lower edge of the TSPs, hence these signals are not similar to the signals found on other tubes contained in the table. As a result, it could be concluded that these dent-like signals are a result of a different mechanism (i.e., denting of the form found elsewhere in the S/Gs). Also, 4 tubes were reported to contain dents at 07C in the range of 3 to 4 volts. The dent amplitudes for these tubes remained constant after heat treatment.

3.0 SUMMARY OF OTHER MAINTENANCE PROCEDURES

Other maintenance procedures were examined to determine if those operations could result in tube denting, or produce changes in eddy current signal response at the upper support plates.

Typical maintenance procedures, such as sludge lancing operations, or FOSAR occur at locations removed from the subject tube dent sites. Hence, even if an anomalous condition would occur during these types of procedures, such as a pressure excursion, stuck sludge lance probe, or lodged FOSAR tooling, any effects on the tube bundle would be localized in the region where the activities occurred, i.e., near the top of the tubesheet and not near the U-bend.

Other maintenance procedures, such as UBHC (Upper bundle hydraulic cleaning) or HVBF (High Volume Bundle Flush) can produce tube movement at higher locations within the bundle, however, the qualification of these types of activities has determined that these operations are relatively benign with respect to the impact on tubing. Note that in particular, HVBF would tend to displace outer row tubes to a much larger degree than inner row tubes due to the nature and the location of the highest flow rates used in this particular process.

In any event, there were no other maintenance activities performed in that particular region of the S/G, such as UBHC or HVBF, during the 2001 refueling outage. Therefore, maintenance activities such as these could not have produced any tube deformations.

4.0 HEAT TREATMENT PROCESS DESCRIPTION

The process used to perform U-bend heat treatment at Prairie Island Unit 1 is contained in Reference 1. As indicated in the field procedure, the process has been designed to reduce the potential for Row 1 and Row 2 U-bend tubes to experience PWSCC. This was accomplished by [ ]^{a,b,c} The target temperature is achieved by maintaining an established profile of power output to the U-bend heaters over an established minimum time period.

The steam generators are drained and maintained in an empty condition to prevent any accumulation of water on the tubesheet during the process. The sludge lance handhole covers are removed and ventilation ports at the top of the S/G opened 12 hours prior to the start of heat treat operations. This configuration is maintained throughout operations on each steam generator. Note that provisions have been made in the procedure to permit the simultaneous heating of two U-bends provided that:

a. Nine columns separate the two U-bends

b. One U-bend is Row 1 and the other is Row 2

Due to geometry considerations it is necessary to specify different heater power settings for Row 1 and Row 2. The process procedure contained in Reference 1 contains specific details regarding the differences. From this reference it has been determined that the heater wattage settings for the soak period was:

Row 1 – [ ]^{a,b,c} Watts

Row 2 – [ ]^{a,b,c} Watts

Any non-conformances associated with the heat treatment process would be noted and recorded in the data package.

In addition, as required by Section 9.2.16 of the procedure, the process performed on each of the heat-treated tubes was verified by eddy current inspection. This step was performed to provide assurance that each tube was exposed to the proper level of heat treatment necessary to preclude the potential for PWSCC to initiate cracking of the tube. In addition, the post heat treatment integrity of the tubes was confirmed by +Pt inspection

5.0 REVIEW OF ANOMALOUS CONDITIONS DURING APPLICATION OF PROCESS

A record of the process performed for each heat-treated tube was generated and filed in the formal data package (Reference 2, 3) as required by the field procedure (Reference 1). Any abnormality in the heat treatment process which required an Non-conformance Report (NR) would be marked in red within the package. A review of this data package was performed, however no NRs were found that could result in a deleterious impact on the tubes. In addition, discussions were held with the actual field service engineers who were responsible for performing the heat treatment process during the 2001 outage. Through these discussions (Reference 4, 5) it was again verified that no abnormal conditions or anomalous events occurred during the heat treatment process.

With respect to abnormal or anomalous conditions, it can be concluded that the heat treatment process appeared to be implemented according to procedure and that no off-normal events that could affect the tube occurred during the procedure.

6.0 HEAT TREATMENT PROCESS QUALIFICATION BASIS

The effects of U-bend heat treatment on the tube bundle has been evaluated for Series 51 steam generators. References 7 and 8 contain relevant discussions regarding the various analysis performed in support of this process. As indicated in these documents, the effects of heat treatment on S/G tubes would result in various types of actual and potential loadings. The following is a summary of results.

The tube integrity evaluation considered three separate loading conditions resulting from the application of the process. The first loading condition assessed was the resulting heat treatment temperature differential across the U-bend section. The tube temperature differential (deviation from the average tube wall temperature) resulting from the heat treatment process was evaluated to determine whether additional residual stresses are introduced into the Row 1 and Row 2 tubes during initial heatup. The potential for thermal creep during the heat treat period was addressed and determined not to be a concern. The second loading condition assessed the stresses introduced into the tube as a result of the axial variation in temperature which exists at the end of the heater. Cyclic (fatigue) stresses the tubes experience as a result of the above loading conditions were also evaluated.

Pertaining to the first loading condition, an analysis was completed to determine if the heat treatment process would result in increased residual stress elsewhere in the U-bend, particularly at the apex. Analysis results revealed that the maximum induced moment was less than the elastic restoring moment (which exists during the initial bending of the tube), and that the heat treatment process results in only elastic cycling of the tube; therefore tube residual stresses will not be increased. In addition, the strain induced by thermal creep is judged not to be significant in affecting the tube response.

For the second loading condition, a finite element model analysis was used to evaluate the stresses in the tube. The axial variation in temperature at the end of the heater assembly was used to determine the maximum tube stress. This stress was determined to be low and occurred at the end of the tube hot region. This stress occurs in the vicinity of the tube support plate, where tube bending stresses resulting from the heat treatment are low.

In evaluating the structural response of the tubes to the above loadings, consideration was given to the material response as a function of time at temperature. Three response mechanisms were considered in the analysis; cyclic fatigue, thermal creep, and time to rupture. Thermal creep and time to rupture effects were shown to be negligible. In addition, the fatigue usage for the tubes was calculated to be 0.057, which is considerably less than the allowable value of 1.0.

Additionally, the potential for a third loading condition i.e., tube-to-tube contact during the U-bend heat treatment process was evaluated. An analysis revealed that steam generator tube-to-tube contact would not be expected to occur during the U-bend heat treatment process. It was determined that the minimum tube-to-tube gap which can exist between Row 1 and Row 2 tubes is 0.191 inches. During the U-bend heat treatment process the tube-to-tube gap may decrease to 0.144 inches when a Row 1 tube is heated, and to 0.131 inches when a Row 2 tube is heated. These calculations incorporated the expansion of the neighboring tube which is expected to reach an average temperature of ~ 500 degrees F.

Note that other off-nominal conditions were also considered in additional analysis. In particular, the effects of a fixed boundary condition and the resulting potential for tube buckling was also addressed. This analysis determined that although buckling would not be projected for conditions where the tubes were locked at TSP 6 and TSP 7, buckling loads were determined to be very near the critical values. As a result, even though buckling would not be projected to occur, it could be concluded that for this particular boundary condition, relatively large compressive forces would be developed in the tube.

7.0 POTENTIAL ROOT CAUSE DISCUSSION

From the eddy current history it is clear that the dent-like eddy current indications were not present immediately prior to the heat treatment process, but were determined to be present immediately after the process. As indicated earlier, since there was no compelling reason to review the eddy current data for other anomalies, other than to verify the proper location of the heat-affected zone, the post heat treatment data was not fully evaluated until the following outage. Since the dent-like signals were not present prior to the process, but were observed in data obtained directly after the process was performed, and that no other maintenance activities were performed that could influenced that particular region of the S/G, it could be concluded that the heat treatment process was an influencing factor for producing the dent-like eddy current signals for those particular tubes.

With respect to specific details regarding the certainty of the actual mechanism that produced the dent-like signals, it is not currently possible to conclusively identify the specifics of a particular mechanism. This is due to the various potential heat treatment related causes that could occur during the process. For example, it has been noted that although the eddy current voltages are relatively large, the actual depth of involvement in the circumferential direction is relatively shallow (See Figure 2). This could be a result of a very shallow dent, or it also could be a result of a change to the surrounding sludge located in the crevice.

With respect to the scenario where new dents are reported on the tube, it is notable that the dent signals tend to appear on the lower surface of TSP 7, and/or appear on the upper surface of TSP 6. This suggests that whatever mechanism is producing the dent signals appears to be a phenomena that is active only in that particular span. In addition, from a review of the previous analysis justification, it was noted that there is at least one potential scenario that could be active under certain circumstances in that span of tubing. This relates to the relatively large axial force that can develop in the tube during heat treatment if the tube is firmly fixed in the plates. Fixity of this form would require either:

1) Severe tube denting at TSP 6 and 7

2) Significant deposits located in the TSP crevices.

3) A change to the crevice deposits during heat treatment that could firmly fix the tube in place.

With respect to #1 (Severe tube denting at TSP 6 and 7), tube denting was not generally observed in these tubes just prior to application of the heat treatment process, therefore denting would not expected to be a contributing factor. With respect to #2 (Significant deposits located in the TSP crevices), it is not clear that the available eddy current data could indicate that significant levels of deposits are located in the crevices. With respect to #3 (heat treatment induced changes to crevice deposits), since the actual chemical composition of the deposits located in the higher TSP level crevices has not been analyzed to determine the consequences of high temperature exposure, it cannot be conclusively demonstrated that the crevice deposits were not affected by the heat treatment process. As a result, one could not conclude that that the fixity of the tubes did not change as a result of temperature related changes to deposit material.

Note that a significant number of the indications were found on Row 2 tubes and that higher power levels were also used on Row 2 tubes. Although the target temperature range was the same for both Row 1 and Row 2, there may still be some potential that the deposits in the Row 2 crevices would see higher temperatures due to the higher power levels and uncertainties regarding the emissivity of the tubes.

Should large axial forces develop in this span then there would be a potential for tube deformation to occur somewhere along the tube. There is currently no data available to provide a clear description of the deformation, if any, at the TSPs. As a result, it is not possible to develop a tube deformation scenario with a confidence level of 100%. However, it is not unrealistic to assume that a large axial force within a constrained tube could produce deformation at the point of fixity (TSP), especially TSP 7. Since yield stress is a function of temperature, and it would be expected that higher temperatures at TSP 7 would occur, it would be expected that most deformations would also occur at this plate due to the reduced yield stress.

It should be noted that this is only one of the possibilities that could result in the dent-like indications at TSP 6 and 7. However, regardless of the actual details of how the dent-like signals were produced, it appears that these signals were a result of some aspect of the heat-treatment process, and were not induced during operation of the steam generators.

8.0 SUMMARY AND CONCLUSIONS

The following conclusions can be made regarding the dent-like tube indications found at Prairie Island Unit 1 during the 2002 steam generator inspections.

1) The tube dent-like eddy current indications appear to be a result of some aspect of the heat treatment process performed during the prior outage in 2001.

2) If the dent-like signals are truly representative of tube deformation, the denting has likely resulted in less than 1 mil of ID reduction, with a uniform change around the circumference of the tube.

3) It cannot be conclusively demonstrated that the dent-like signals are either an actual shallow deformation of the tube or an artifact of the high temperature exposure of the crevice deposits.

4) Not all of the dent-like signals are result of the heat treatment process. Some of the dents were pre-existing artifacts.

In summary, from the available data it appears that some aspect of the heat treatment process was a primary causative factor that produced the dent-like indications in the Row 1 and 2 tubes at TSP 6 and 7. Whether or not these signals are actual tube deformations, or are a result of some other mechanism, such as crevice deposit changes as a result of high temperature exposure, cannot be made without further information.

It should be noted that as part of the alternate repair criterion per GL 95-05, all dents >5V are inspected using a rotating probe. No stress corrosion degradation of >5V dent signals were reported at the 2001 or 2002 Prairie Island Unit 1 inspection. All Row 1 and Row 2 U-bends were inspected using a +Pt coil at the 2001 and 2002 inspections. The standard practice for application of this probe in small radius U-bends requires that the inspection be performed from "structure to structure". That is, the inspection is performed from 07H to 07C for data collected on the pull. As all collected eddy current data is subsequently analyzed for the presence of degradation, all new dent-like signals were inspected with the +Pt coil at both the 2001 and 2002 inspections, with no stress corrosion cracking degradation reported. The geometric deformation potentially present in these tubes is small, and would be expected to result in less severe residual stresses than classic denting of similar magnitude do to the localized geometry disturbance associated with more classical denting phenomenon. As stress corrosion cracking of dented TSP intersections has not been reported at Prairie Island, it is unlikely that these new dents would be expected to develop stress corrosion cracking during the final operational cycle of the Prairie Island Unit 1 SGs.

9.0 REFERENCES

1) MRS-GEN-1049, Rev. 0, "Model 51 Remote U-Bend Heat Treat Field Procedure", Dated December 2000.

2) LTR-SGDA-03-20, "Heat Treatment Corrective Work Order Records For Prairie Island Unit 1 S/G 11", January 31, 2003

3) LTR-SGDA-03-21, "Heat Treatment Corrective Work Order Records For Prairie Island Unit 1 S/G 12", January 31, 2003

4) Telephone Discussion: J. M. Hall and J. Boynton, January 17, 2003.

5) Telephone Discussion: J. M. Hall and F. Ponko, January 17, 2003.

6) Letter LTR-SGDA-03-8, "Eddy Current Summary For Selected Prairie Island Unit 1 S/G Tubes", January 21, 2003.

7) SECL-00-051, "Steam Generator U-Bend Heat Treatment", May 10, 2000.

8) WCAP-11378, Row 1 and Row 2 Heat Treatment Licensing Report For Sequoyah Units 1 and 2., January 1987.

Table 1- Summary of Tubes Found With Upper Support Plate "Dings" During 2002 Inspection

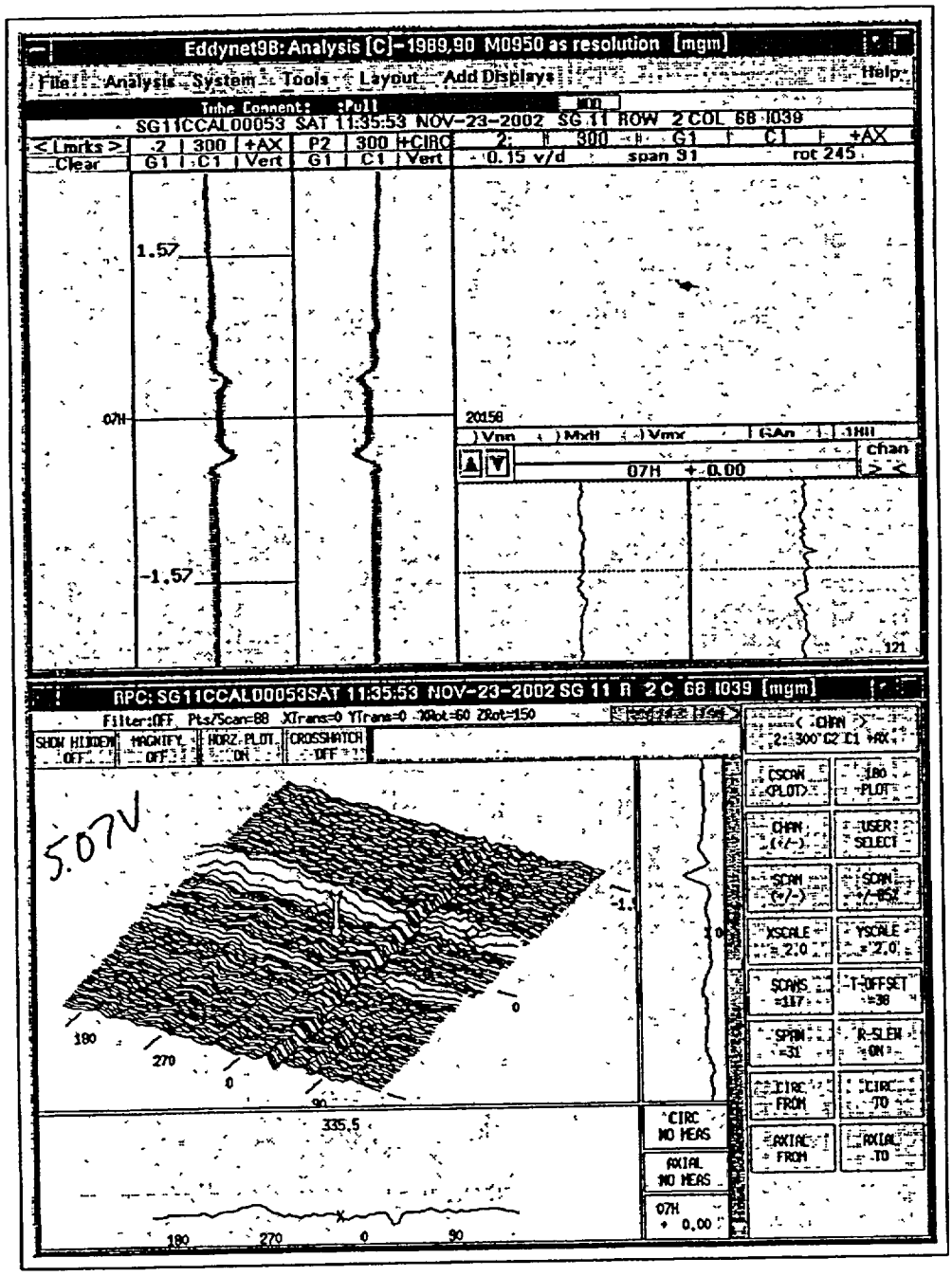
Tube No	S/G	Row	Column	Location	Elevation
1	SIG 11	1	25	07H	-0.34
2	SIG 11	1	28	06H	0.36
3	SIG 11	1	31	06H	0.34
4	SIG 11	1	62	06H	-0.03
5	SIG 11	2	3	06H	0.40
6	SIG 11	2	4	06H	0.40
7	SIG 11	2	5	06H	0.37
8	SIG 11	2	6	07H	0.26
9	SIG 11	2	19	06H	0.37
10	SIG 11	2	52	06H	0.37
11	SIG 11	2	58	06H	0.34
				07H	-0.32
12	SIG 11	2	59	07H	-0.32
13	SIG 11	2	63	06H	0.37
				07H	-0.37
14	SIG 11	2	68	07H	-0.31
15	SIG 11	2	69	07H	-0.31
16	SIG 11	2	71	07H	-0.31
17	SIG 11	2	72	07H	-0.31
18	SIG 11	2	73	07H	-0.25
19	SIG 11	2	74	07H	-0.34
20	SIG 11	2	75	06H	0.39
				07H	-0.36
21	SIG 11	2	76	07H	-0.36
22	SIG 11	2	77	07H	-0.36
23	SIG 11	2	78	07H	-0.33
24	SIG 11	2	80	07H	-0.36
25	SIG 11	2	81	07H	-0.31
26	SIG 11	2	83	07H	-0.39
27	SIG 11	2	91	06H	0.06
28	SIG 12	2	61	06C	0.31

Table 2 - Historical Summary Of Dent Voltage Signals

Tube No.	S/G	Row	Col	LOCN	Dent Volt From 2001		2002 Inspection	
					Pre HT	Post HT*	VOLTS	ELEV
1	11	1	25	07H	0	4.10	3.02	-0.34
2	11	1	28	06H	0	N/A	2.10	0.36
3	11	1	31	06H	0	N/A	2.82	0.34
4	11	1	62	06H	0	2.91	2.60	-0.03
5	11	2	3	06H	0	4.08	4.34	0.40
6	11	2	4	06H	0	2.48	2.76	0.40
7	11	2	5	06H	0	2.93	2.84	0.37
8	11	2	6	07H	1.41	6.58	5.51	0.26
9	11	2	19	06H	0	3.19	2.67	0.37
10	11	2	52	06H	0	2.77	2.44	0.37
11	11	2	58	06H	0	2.33	2.55	0.34
				07H	0	4.10	2.61	-0.32
12	11	2	59	07H	0	2.85	3.12	-0.32
13	11	2	63	06H	0	4.36	2.48	0.37
				07H	0	N/A	4.21	-0.37
14	11	2	68	07H	0	5.38	5.07	-0.31
15	11	2	69	07H	0	4.52	4.45	-0.31
16	11	2	71	07H	0	6.52	6.11	-0.31
17	11	2	72	07H	0	2.99	2.99	-0.31
18	11	2	73	07H	0	6.67	6.00	-0.25
19	11	2	74	07H	0	4.95	5.06	-0.34
20	11	2	75	06H	0	N/A	2.76	0.39
				07H	0	5.05	4.68	-0.36
21	11	2	76	07H	0	5.90	5.34	-0.36
22	11	2	77	07H	0	5.32	4.84	-0.36
23	11	2	78	07H	0	6.17	4.33	-0.33
24	11	2	80	07H	0	3.09	2.76	-0.36
25	11	2	81	07H	0	5.28	4.93	-0.31
26	11	2	83	07H	0	3.38	2.86	-0.39
27	11	2	91	06H	0.80	N/A	4.23	0.06
28	12	2	61	06C	N/A	N/A	2.37	0.31

* - Voltages < 2 volts not recoreded for post heat treatment 2001.

Figure 1 +Pt Eddy Current Response of a Typical Tube



Westinghouse

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) 374-5282
Direct fax: (412) 374-4011
e-mail Sepp1ha@westinghouse.com

Our ref· CAW-03-1604

February 28, 2003

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: WCAP-16059-P, "Prairie Island Unit 1 – Lower Row Tube Dent Root Cause Analysis" dated February 2003 (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-03-1604 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 2.790 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Nuclear Management Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-03-1604 and should be addressed to the undersigned.

Very truly yours,

H. A. Sepp, Manager
Regulatory and Licensing Engineering

Enclosures

cc: S. J. Collins
G. Shukla/NRR

CAW-03-1604

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared H. 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 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:

H. A. Sepp, Manager
Regulatory and Licensing Engineering

Sworn to and subscribed
before me this 4th day
of March, 2003

Sharon L. Fiori
Notary Public

SHARON L. FIORI
COMMONWEALTH OF PENNSYLVANIA
NOTARY PUBLIC

Notarial Seal
Sharon L. Fiori, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires January 29, 2007
Member, Pennsylvania Association Of Notaries

(1) I am Manager, Regulatory and Licensing Engineering, 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 the Westinghouse Electric Company LLC.

(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 Electric Company LLC 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 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 2.790, 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 WCAP-16059-P, "Prairie Island Unit 1 – Lower Row Tube Dent Root Cause Analysis" (Proprietary), dated February 2003, being transmitted by the Nuclear Management Company letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted for use by Westinghouse Electric Company LLC for Prairie Island Unit 1 is expected to be applicable for other licensee submittals in response to certain NRC requirements for justification of continued safe operation of Prairie Island Unit 1.

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

(a) Determine the most likely cause of lower row tube dent signals.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purposes determining the root cause of the lower row tube dent signals that were found during the 2002 refueling outage at Prairie Island Unit 1.

(b) Westinghouse can sell support and defense of the results and root cause of the lower row tube dent signals.

(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 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 2.790 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