WITHHOLD FROM PUBLIC DISCLOSURE UNDER 10 CFR 2.390
WHEN SEPARATED FROM ENCLOSURE B, THIS DOCUMENT CAN BE DECONTROLLED

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John J. Grabnar
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724-682-5234

October 21, 2022
L-22-200

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

Subject:
Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
Response to Request for Additional Information Regarding a 180-Day Steam Generator Tube Inspection Report – Fall 2021 Refueling Outage (EPID No. L-2022-LRO-0064)

By correspondence dated May 5, 2022 (Accession No. ML22126A089), Energy Harbor Nuclear Corp. submitted to the Nuclear Regulatory Commission (NRC) a steam generator tube inspection report. The report provided information required by the technical specifications that was obtained during the Fall 2021 refueling outage inspections. By email dated August 25, 2022 (Accession No. ML22238A281), the NRC staff requested additional information regarding the report.

The response to the request for additional information is provided in enclosures A and B that present non-proprietary and proprietary versions, respectively, of the attachments to document number EH-22-022, "Transmittal of Responses to Requests for Additional Information on the Beaver Valley 2R22 Steam Generator 180-Day Report."

Enclosure C contains Affidavit CAW-22-046 signed by Westinghouse Electric Company LLC ("Westinghouse"). The affidavit sets forth the basis on which proprietary information owned by Westinghouse that is contained in Enclosure B may be withheld from public disclosure by the Nuclear Regulatory Commission ("Commission") and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations.

Accordingly, it is respectively requested that the information that is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-22-046 and should be addressed to Camille T. Zozula, Manager, Regulatory Compliance and Corporate Licensing.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Manager - Fleet Licensing, at (330) 696-7208.

Sincerely,

John J Grabnar

Digitally signed by John J Grabnar
Date: 2022.10.21 14:24:35 -04'00'

John J. Grabnar

Enclosures:

A. Response to Request for Additional Information (Non-proprietary)
B. Response to Request for Additional Information (Proprietary)
C. Affidavit for Withholding Proprietary Information

cc: NRC Region I Administrator
NRC Resident Inspector
NRR Project Manager
Director BRP/DEP
Site BRP/DEP Representative

Enclosure A
L-22-200

Response to Request for Additional Information
(Non-proprietary)

(9 pages follow)

Westinghouse Electric Company

DMW-NRCD-RF-LR-000002 NP-Attachment
Revision 0

Beaver Valley Power Station, Unit 2 - Responses to Request For Additional Information - Refueling Outage 22 Steam Generator 180 Day Report

September 2022

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Beaver Valley Power Station, Unit 2 - Responses to Request For Additional Information - Refueling Outage 22 Steam Generator 180 Day Report

Background

By letter dated May 5, 2022 (ML22126A089), Energy Harbor Nuclear Corp. submitted the Unit #2 – 2R22 Steam Generator 180 Day Report summarizing the results of the fall 2021 steam generator (SG) inspections performed at Beaver Valley Power Station, Unit 2 (BVPS-2). The inspections were performed during refueling outage 22 (2R22). Technical Specification (TS) Section 5.6.6.2 requires that a report be submitted within 180 days after the initial entry into hot shutdown (MODE 4) following completion of an inspection of the SGs performed in accordance with TS Section 5.5.5.2.

Responses to Request for Additional Information

To complete its review of the inspection, the U.S. Nuclear Regulatory Commission (NRC) staff requests the following additional information:

RAI 1

Table "2R22 Examination Techniques Used for Degradation Detection/Sizing" states that an "Internal Westinghouse Technique Qualification" was used for axial primary water stress corrosion cracking (PWSCC) at dented tube support plates (TSPs) less than 2 volts. It was noted that Electric Power Research Institute Examination Technique Specification Sheet 96012.1 was used in 2R21 (2020) for axial PWSCC at dented TSPs less than 2 volts (ML20287A373). Please provide additional information regarding why a different examination technique was used in 2R22 for axial PWSCC at dented TSPs less than 2 volts.

Response:

EPRI Examination Technique Specification Sheet (ETSS) 96012.1 provides a qualified technique for detection of axial PWSCC at TSP intersections with dents less than 2 volts; however, application of this technique had produced a significant number of overcalls as experienced throughout the industry. To reduce the number of overcalls, a supplemental data screening criterion had been developed by Westinghouse in 2005. Since 2005, BVPS-2 has used ETSS 96012.1 in conjunction with the Westinghouse supplemental screening criterion for the detection of axial PWSCC at dented TSPs with dents less than 2 volts. The supplemental screening criterion establishes the phase angle and voltage amplitude signal responses for when diagnostic +POINT$^{TM(1)}$ probe inspections are required. The performance of the +POINT probe screening criteria was benchmarked to the data set contained in EPRI ETSS 96012.1 and was demonstrated to result in consistent performance statistics provided in ETSS 96012.1. During the inspections since 2005, the EPRI ETSS 96012.1 technique essential variables, calibration, and normalization procedures were used. The development of the bobbin coil probe supplemental screening technique was referred to as an "Internal Westinghouse Technique Qualification" within the 2R22 180-Day report (Reference 1) rather than ETSS 96012.1.

[1] +POINT is a trademark of Zetec, its affiliates and/or its subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners.

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The supplemental screening criterion requires that all TSP intersections [

]^{a,c,e} Application of this screening criterion to the ETSS 96012.1 data set produced consistent detection performance statistics provided in the ETSS, thereby demonstrating acceptability of the criterion.

RAI 2

During 2R22, the +Point™ probe observed circumferential indications in four Alloy 800 nickel banded mechanical tubesheet sleeves (three installed in 2R20 (2018) and one installed in 2R21 (2020)) located at the lower tubesheet hard roll joint at the lower expansion transition below the nickel band region. It was noted that one of the sleeves installed in 2R20 (2018) had a circumferential signal after sleeve installation and prior to being placed in service. While preliminary assessments suggested the signals could be circumferential outside diameter stress corrosion cracking (ODSCC) on the outer surface of the parent tube, it was determined that the circumferential signals may be fabrication related and not flaws because (1) flaws at this location are not likely due to the full-depth hard roll condition of the parent tube, (2) one circumferential signal had a precursor after sleeve installation and prior to being placed in service, and (3) the Ghent Version 2 probe did not observe signals like those observed by the +Point™ probe and did not detect any flaw-like signals. The affected tubes were proactively plugged during 2R22. Please discuss the following:

a. A comparison of the precursor eddy current signal in the one sleeve installed in 2R20 (2018) compared to the circumferential signal observed during 2R22.

Response:

The nickel banded mechanical tubesheet sleeve in SG B Tube R18C24 was installed in 2R20 (2018). The baseline sleeve inspection was performed with the +POINT probe only, as the Ghent Version 2 probe had not been developed at the time of the inspection. A circumferential signal was present below the nickel band region from historical data review of the baseline +POINT probe inspection as shown in Figure 1. During the subsequent in-service inspections (ISI) of this sleeve performed in 2R21 (2020) and 2R22 (2021), the combination Ghent Version 2 probe was used for the inspection of sleeves.

The combination Ghent Version 2 probe contained both magnetically biased Ghent coils and +POINT coils. The +POINT coil response of the circumferential signal changed from 2R20 to 2R21 as shown by comparing the probe responses in Figure 1 and Figure 2. The change in the +POINT probe signal response from the 2R20 baseline inspection is attributed to the strong magnet contained in the Ghent portion of the probe. The strong magnet in the Ghent V2 probe magnetizes the sleeve/parent tube which is detected by the +Point coil prior to the test piece magnetization dissipating. This magnetic saturation decreases permeability variations within the sleeve/parent tube which in turn improves eddy current flow through the test piece, ultimately providing improved detection capability for the +Point coil. The +POINT response did not change from 2R21 to 2R22 as shown in Figure 2 and Figure 3 when both inspections used the combination Ghent Version 2 probe.

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Ghent coil inspections of the lower sleeve joint were performed in 2R21 and 2R22 and showed a circumferential response in both inspections. There was no change in the circumferential responses from 2R21 to 2R22 as shown in Figure 4 and Figure 5.

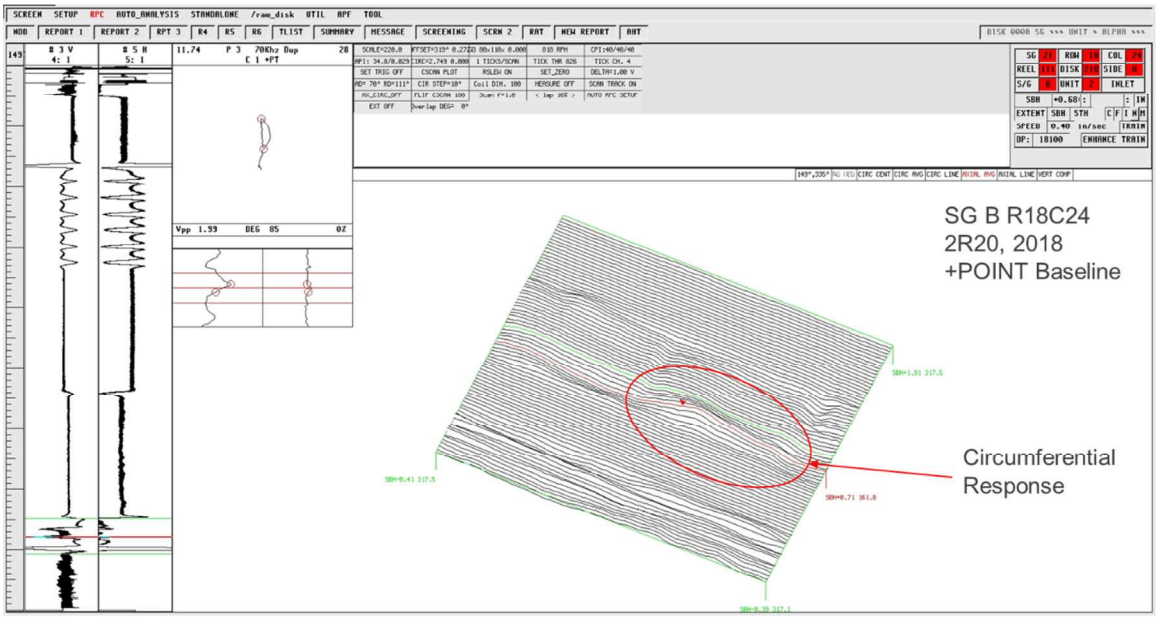

Figure 1: 2R20 Baseline +POINT Probe Examination of SG B R18C24 Lower Sleeve Joint

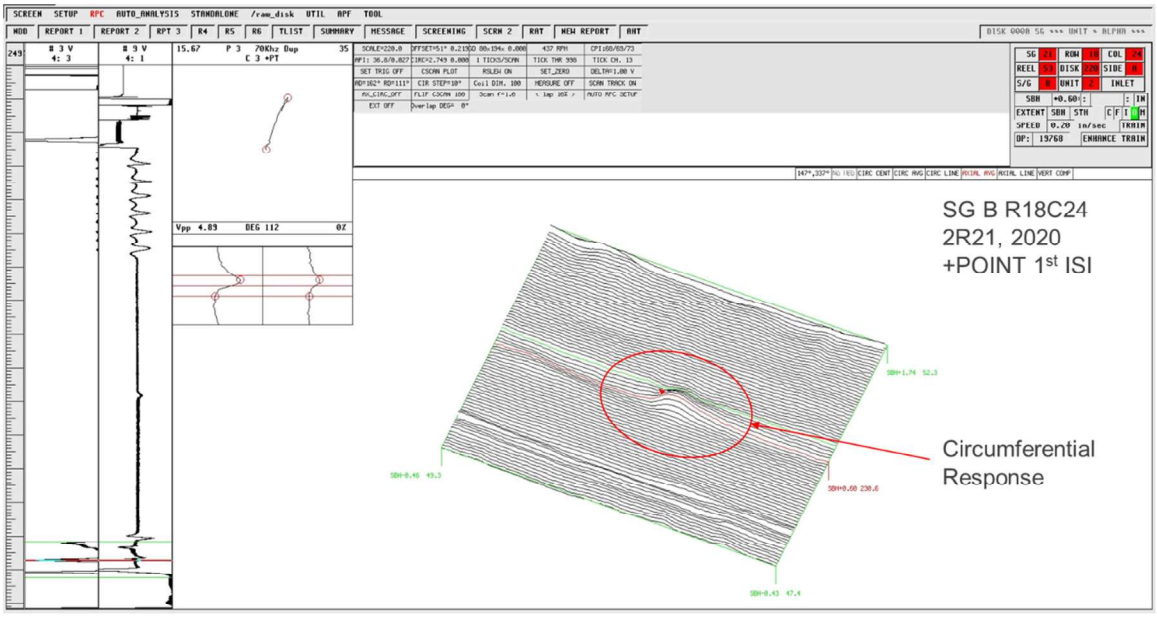

Figure 2: 2R21 +POINT Probe 1st ISI Examination of SG B R18C24 Lower Sleeve Joint

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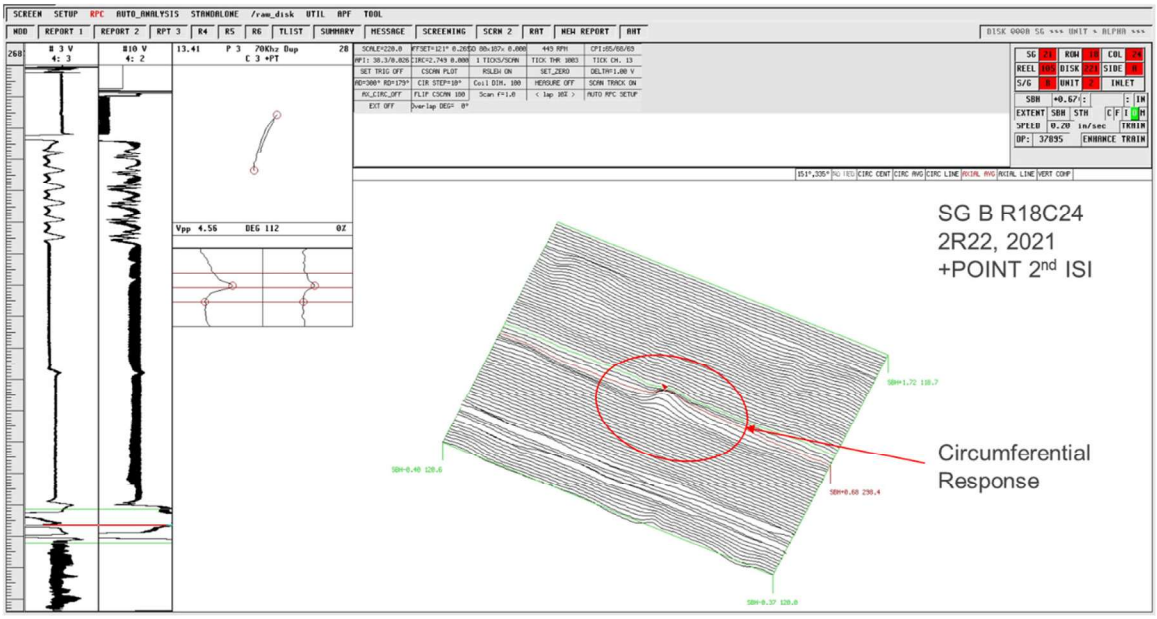

Figure 3: 2R22 +POINT Probe 2nd ISI Examination of SG B R18C24 Lower Sleeve Joint

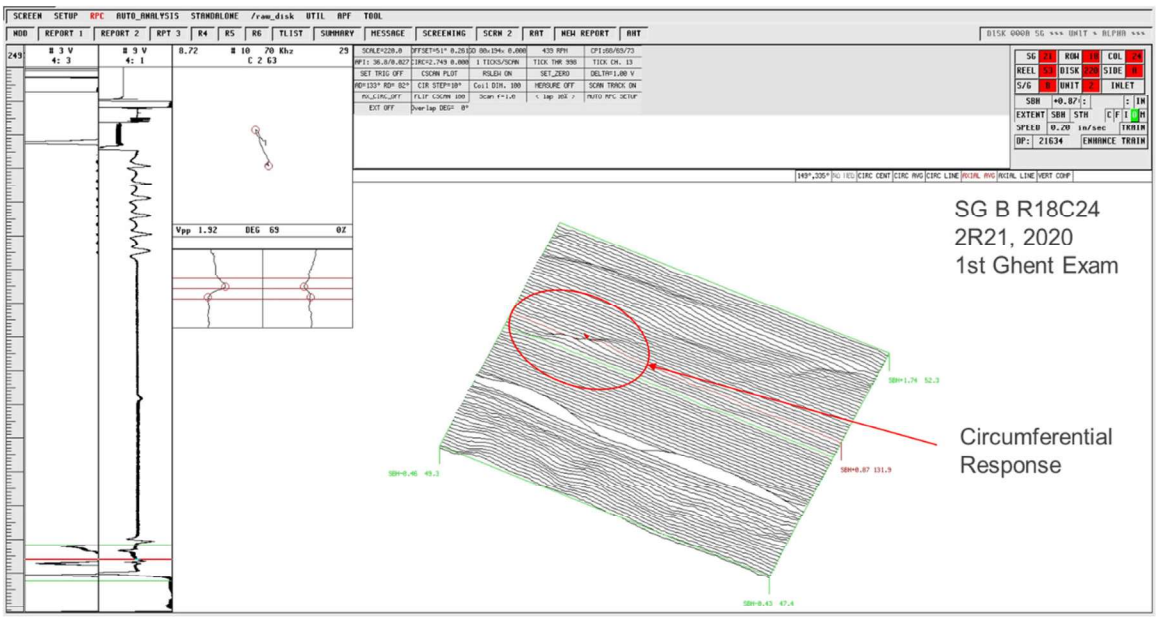

Figure 4: 2R21 Ghent Probe 1st Examination of SG B R18C24 Lower Sleeve Joint

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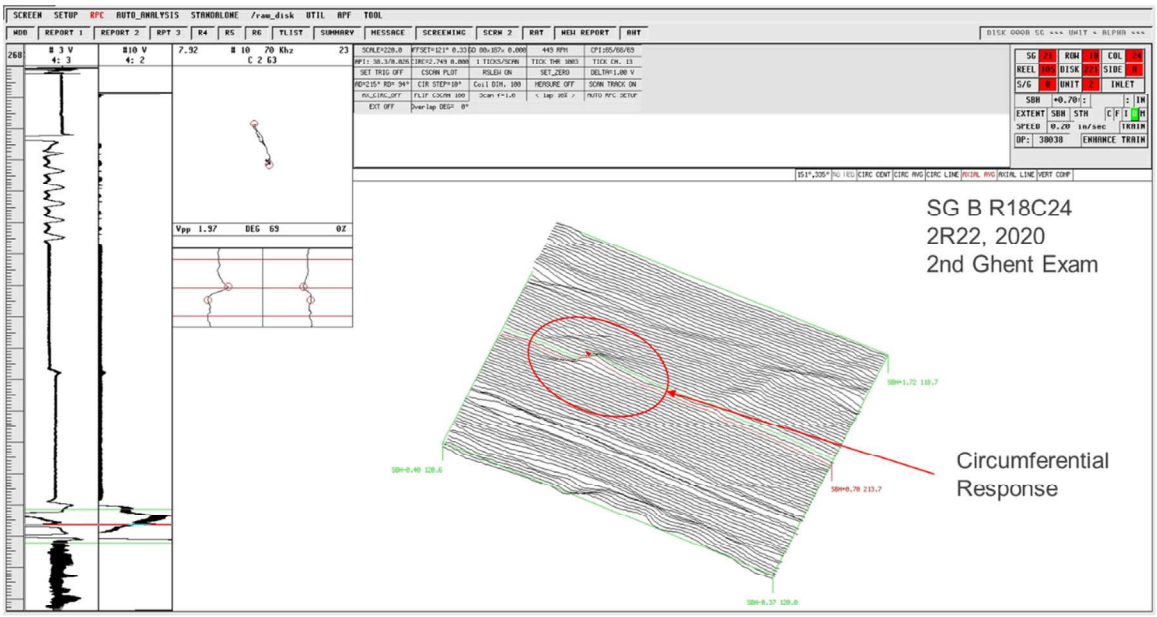

Figure 5: 2R22 Ghent Probe 2nd Examination of SG B R18C24 Lower Sleeve Joint

b. Why the preliminary assessment suggested ODSCC on the outer surface of the parent tube.

Response:

During 2R22, all alloy 800 nickel banded mechanical tubesheet sleeves were inspected with the Ghent Version 2 probe. This probe contains both +POINT and Ghent coils. The Ghent portion of the probe contains strong magnets adjacent to the Ghent coils to minimize the response of the nickel band material. An eddy current Independent Qualified Data Analyst (IQDA) determined that four signals found with the +Point coil, just below the bottom of the nickel band, were flaw-like. The four were reported as single circumferential indications (SCI's), with the tubes being proactively plugged.

To assess where in the sleeve/parent tube joint these occurred, the IQDA performed a comparison of the phase and voltage amplitude between these four signals and known flaws from the calibration standard. Three calibration standard electrical discharge machining (EDM) notches were used and were located on the outer diameter (OD) of the sleeve, inner diameter (ID) of the parent tube, and OD of the parent tube. The phase and voltage amplitude results of the comparison are provided in Table 1 below. Responses from all test frequencies were used in the comparison, but only the results from the qualified reporting frequency of 70kHz are provided.

It was observed that the phase response of the four signals reported in 2R22 are similar to the response of an OD circumferential EDM notch on the parent tube. This comparison of phase responses led the IQDA to initially report the signals appear to be initiated on the outer surface of the parent tube during the inspection.

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Table 1:
Ghent Probe Response Comparison of Calibration Standard and 2R22 Signals

Sample/Tube	Phase, degrees	Voltage, Amplitude, Vpp
Calibration Standard Ghent Probe Responses		
Parent Tube 71% Through Wall (TW) OD Circ. EDM Notch	113	1.63
Parent Tube 66%TW ID Circ. EDM Notch	96	1.72
Sleeve 43%TW OD Circ. EDM Notch	50	2.84
2R22 Sleeve Signal Ghent Probe Responses		
SGB R18 C24	112	4.56
SGB R18 C14	115	6.77
SGB R12 C59	105	2.44
SGA R13 C56	112	3.01

c. Any insights on why the circumferential signals in the three tubes installed during 2R20 (2018) were not observed during the inspections performed during 2R21 (2020). The staff notes that the Ghent Version 2 probe was also used during 2R21 and that two sleeved tubes were plugged due to axial scratches located in the lower tubesheet sleeve joint (ML20287A373).

Response:

The Ghent Version 2 probe eddy current signals for the 4 circumferential signals reported are similar in their appearance, voltage amplitude and phase between 2R21 and 2R22. The eddy current data analysis guidelines and ETSS were the same for both inspections. While not reported in 2R21, the IQDA in 2R22 took a conservative approach to report these signals as single circumferential indications as opposed to reporting as sleeve anomalies.

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d. It is the staff's understanding that the use of a high-speed buffing tool for mechanically conditioning the tube prior to sleeving may have been eliminated prior to 2R20 (2018) (ML18348B206). If so, could the lack of tube buffing prior to sleeve installation in these tubes be related to the eddy current indications? In addition, are any changes to the sleeve installation process being considered?

Response:

Alloy 800 mechanical nickel banded tubesheet sleeves were installed in the BVPS-2 SGs during 2R16 (2012) and during each refueling outage from 2R19 (2017) through 2R22 (2021). High speed buffing (tube conditioning) of the parent tube was not performed prior to sleeve installation in any of the sleeving campaigns at BVPS-2. The mechanical sleeve qualification report (Reference 2) specified that "based on current testing and evaluation this process step may be eliminated in the future when sufficient confidence level is developed. An evaluation of field experience involving visual examination of over 600 conditioned tubes, in four different plants, indicated that process control, in the form of normal in-process instructions and quality assurance surveillance is sufficient to ensure acceptable condition of the tube ID." Therefore, at BVPS-2 there has been no changes related to tube conditioning from when first implemented through the most recent 2R22 outage. Even when tube conditioning has been performed, the operation focuses on the hydraulic expansion regions in the upper sleeve joint as discussed in the mechanical sleeve qualification report (Reference 2). The lower sleeve joint in the nickel band region only received cursory buffing as the buffing tool is being quickly inserted and withdrawn from the upper sleeve joint.

The EPRI SG Examination Guidelines Appendix H qualification (Reference 3) used the Ghent Version 2 combination probe that included Ghent coils and +POINT coils. This is the same designed probe used in the 2R21 inspection and in 2R20 as a prototype probe. The Ghent probe qualification was performed with laboratory samples that replicated the lower tubesheet sleeve joint containing the nickel band and microlok regions. The samples consisted of an Alloy 600 parent tube hard rolled into a carbon steel tubesheet collar simulant and an Alloy 800 tubesheet sleeve hard rolled into the parent tube/collar as described in Reference 3. EDM notches were placed into the parent tubes prior to installation into the test assembly. The qualification testing samples were clean materials that had not been in operation.

During the investigation into the origin of the sleeve signals in the four sleeves from 2R22 (2021), eddy current data from the Ghent Version 2 probe used for the EPRI Appendix H Ghent probe qualification (Reference 3) were reviewed. In this review, it was noted that the same type of signals or responses were present below the nickel band region in some of the laboratory samples that simulated the sleeve to parent tube lower joints. In the Appendix H qualification of the Ghent V2 probe, nine sleeve/parent tube samples were used. Five of these samples had circumferential signals detected by the +POINT coils and were similar to those found in the four sleeves during 2R22. The signals were also detected by the Ghent probe but had smaller voltage amplitudes than the +POINT probe response. Since the qualification testing had signals in clean samples and similar signals found in the field where buffing or tube conditioning were not performed, it is concluded that the signals were not related to the lack of conditioning prior to sleeve installation.

Currently, there are no changes to the sleeving process being considered.

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References:

1. Energy Harbor Nuclear Corporation Letter L-22-100, “Beaver Valley Power Station, Unit No. 2, Docket No. 50-412, License No. NPF-73, 180-Day Steam Generator Tube Inspection Report,” May 5, 2022.

2. Westinghouse Report WCAP-15919-P, Revision 2, “Steam Generator Tube Repair for Westinghouse Designed Plants with 7/8 Inch Inconel 600 Tubes Using Leak Limiting Alloy 800 Sleeves,” January 2006.

3. Westinghouse Report SG-CDMP-19-17-P, Revision 1, “Qualification of an Examination Technique to Inspect Parent Tube Flaws Adjacent to the Nickel Band of an Alloy 800 Sleeve at Beaver Valley Unit 2,” April 2020.

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Enclosure C
L-22-200

Affidavit for Withholding Proprietary Information

(3 pages follow)

COMMONWEALTH OF PENNSYLVANIA:

COUNTY OF BUTLER:

(1) I, Zachary S. Harper, have been specifically delegated and authorized to apply for withholding and execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse).

(2) I am requesting the proprietary portions of DMW-NRCD-RF-LR-000002 P-Attachment, Revision 0, "Beaver Valley Power Station, Unit 2 - Responses to Request for Additional Information - Refueling Outage 22 Steam Generator 180 Day Report," be withheld from public disclosure under 10 CFR 2.390.

(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 10 CFR 2.390, 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 and is not customarily disclosed to the public.

(ii) The information sought to be withheld is being transmitted to the Commission in confidence and, to Westinghouse's knowledge, is not available in public sources.

(iii) Westinghouse notes that a showing of substantial harm is no longer an applicable criterion for analyzing whether a document should be withheld from public disclosure. Nevertheless, 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 technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable

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others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

(5) Westinghouse has policies in place to identify proprietary information. 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.

(6) The attached documents are bracketed and marked to indicate the bases for withholding. The justification for withholding 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

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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 (5)(a) through (f) of this Affidavit.

I declare that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 09/23/2022

Zachary S. Harper, Manager
Licensing Engineering

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