~~This letter contains proprietary information.~~
Withhold Enclosure 1 from public disclosure in accordance with 10 CFR 2.390.

Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213
Tel 601-368-5138

Ron Gaston
Director, Nuclear Licensing

10 CFR 50.55a(z)(1)

2CAN102102

October 10, 2021

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

Subject: Relief Request ANO2-R&R-012
Support the Repair of the Reactor Vessel Closure Head Penetration #46

Arkansas Nuclear One, Unit 2
NRC Docket No. 50-368
Renewed Facility Operating License No. NPF-6

On October 4, 2021, Arkansas Nuclear One, Unit 2 (ANO-2) completed the analysis on an indication revealed on Penetration #46. ANO-2 was required to perform ultrasonic examinations of the Reactor Vessel Closure Head partial penetration welds during the current refueling outage (2R28) in compliance with 10 CFR 50.55a and the approved ANO-2's relief request ANO2-ISI-022. A flaw located in the nozzle was determined to be unacceptable based on American Society of Mechanical Engineers (ASME) code requirements. A strategy to perform a local excavation of the weld to remove the indication has been developed in order to affect a repair of this nozzle.

Defect evaluation requirements are specified in IWA-4422.1(a) and (b) of the ASME Section XI Code. One alternative is removal of the defect area and any remaining portion of the defect may be evaluated and the component accepted in accordance with the appropriate flaw evaluation design provisions of the Owner's Requirements and either the Construction Code or Section.

The strategy to remove this indication that Entergy Operations, Inc. (Entergy) elected requires a proposed alternative to the requirements of ASME Section III, N-462.4(d), Figure N-462.4(d) *Attachment of Connections Using Partial Penetration Welds* pursuant to 10 CFR 50.55a(z)(1).

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Withhold Enclosure 1 from public disclosure in accordance with 10 CFR 2.390.

In accordance with 10 CFR 50.55a(z)(1), proposed alternatives may be approved by the NRC, provided an acceptable level of quality and safety are maintained. Entergy requests approval of the proposed alternative in order to support the return of ANO-2 to service from the current refueling outage.

This relief request is required to address an emergent condition at ANO-2. Entergy requests NRC approval as soon as possible but no later than October 12, 2021, at 1800 hours. This schedule is subject to fluctuation. Relief is requested for one operating cycle.

Some information provided in Enclosure 1 (from LTR-SDA-21-074) is considered proprietary to Westinghouse Electric Company and is to be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. The proprietary information is identified by text enclosed within double brackets [[Example]]. The non-proprietary version is provided in Enclosure 2.

This information is supported by an affidavit, signed by Westinghouse Electric Company, the owner of the information. The affidavit sets forth the bases by 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 2.390 of the Commission's regulations. The affidavit is included in Enclosure 3.

There are new regulatory commitments established in this submittal. They are summarized in the attachment to the enclosure.

If there are any questions or if additional information is needed, please contact Riley Keele, Manager, Regulatory Assurance, Arkansas Nuclear One, at 479-858-7826.

Respectfully,

Ronald W. Gaston
Digitally signed by Ronald W. Gaston
Date: 2021.10.10 18:04:53 -05'00'

Ron Gaston

RWG/rwc

Enclosure: 1. Relief Request ANO2-R&R-012 (**PROPRIETARY)**

Attachment to Enclosure 1 Commitment

2. Relief Request ANO2-R&R-012 (**NON-PROPRIETARY)**

3. Affidavit

cc: NRC Region IV Regional Administrator

NRC Senior Resident Inspector – Arkansas Nuclear One

NRC Project Manager – Arkansas Nuclear One

Designated Arkansas State Official

Enclosure 1, Attachment

2CAN102102

Commitments

This table identifies actions discussed in this letter for which Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are **not** commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Entergy will perform a fatigue analysis to address local effects at the excavation due to expansion and contraction of the head for cyclic pressure and thermal transients to support long term operation.	**X**		**Prior to 2R29 (Spring 2023)**
Entergy will submit a revised relief request based on the revised fatigue analysis.	**X**		**To support ANO's return to service following 2R29.**
After the final PT of the excavation, emery cloth buffing will be performed to the ground surface to remove possible cold working. After emery cloth buffing an ultrasonic examination of the excavated area is required to demonstrate the flaw indication has been removed. If not, Entergy will continue to excavate until the limits described above are reached or a successful PT is achieved prior to reaching the limits.	**X**		**October 14, 2021**

Enclosure 2

2CAN102102

Relief Request
ANO2-R&R-012

NON-PROPRIETARY

RELIEF REQUEST

ANO2-R&R-012

1. ASME Code Component Affected:

Component:	Reactor Vessel Closure Head (RVCH) Penetration #46
Code Class:	1
Exam. Cat.:	ASME Code Case N-729-6
Item No.:	B4.10 and B4.20
Unit:	Arkansas Nuclear One, Unit 2 (ANO-2)
Interval:	Fifth (5^{th})

2. **Application Code Edition and Addenda:**

ASME Section III, 1968 Edition with Addenda through Summer 1970

ASME Section III 1992 Edition

ASME Section XI, 2007 Edition with the 2008 Addenda

3. Applicable Code Requirement:

Defect evaluation requirements are specified in IWA-4422.1(a) and (b) of the ASME Section XI Code which states:

(c) A defect is considered removed when it has been reduced to an acceptable size. If the resulting section thickness is less than the minimum required thickness, the component shall be corrected by repair/replacement activities.

(d) Alternatively, the defect removal area and any remaining portion of the defect may be evaluated and the component accepted in accordance with the appropriate flaw evaluation provisions of Section XI, or the design provisions of the Owner's Requirements and either the Construction Code or Section III.

Design requirements for partial penetration groove welds are specified in Section N-462.4(d)(1) of the ASME Section III code.

> Partial penetrations attachments used to connect nozzles necks as permitted in N-457(c) shall be groove welds having a minimum depth equal to 1 1/4 times the nominal thickness nozzle neck. These welds shall be inspected progressively at the lesser of one-third of the thickness of the weld joint or each ½ in. of thickness by a magnetic particle method in accordance with N-626 or by a liquid penetrant method in accordance with N-627. Acceptable types are shown in Fig. N-462.4(d).

Based on Figure N-462.4(d)(3) of the Reference 1, the total weld throat shall be $1.5t_n$ while the throat dimension of the partial penetration weld shall be $0.75t_n$.

4. Reason for Request:

ANO-2 is currently in a refueling outage. As part of the examination of the Reactor Vessel Closure Head (RVCH) required by ASME Code Case N-729-6, the inside diameter of Penetration #46 was examined with ultrasonic testing (UT) and eddy current testing (ET) as approved by relief request ANO2-ISI-022. The results from the current examination were compared to the previous examination results. An UT indication was identified on the outside diameter of the nozzle that exhibited growth from the previous examination.

An outside diameter surface ET was performed to confirm the presence of a surface indication. An outside diameter surface dye penetrant test (PT) in the area of the UT indication confirmed a surface breaking indication. The indication was shown to extend into the J-groove weld fillet cap on the outside surface of the nozzle.

Figures 1 and 2 are pictures of the PT indication.

A strategy to perform a local excavation of the weld to remove the indication has been developed in order to affect a repair of this nozzle.

The UT report is the basis for the determination of the allowable excavation area. Figure 3 summarizes the UT key data and critical dimensions based on ASME Code J-groove weld requirements listed in ASME Section III, N-462.4(d). The figure characterizes the dimensions and location of the indication relative to the dimensions and location of the J-groove weld. The following points are demonstrated by Figure 7:

1. The total measured weld length derived by the difference of L_3 and L_4 is 1.04 inch, which is only 0.041 inch larger than the minimum weld depth of 0.999 inch based on the $1.5t_n$ requirements of Reference 1 where t_n is the nominal nozzle thickness of 0.666 inch (Reference 2).

2. The top of the indication, as shown by L_2 in Figure 7, is above the bottom of the weld, indicated by L_3, whereby the indication extends into the weld by the difference of L_2 and L_3, or 0.28 inch.

These findings indicate that any excavation of the weld to remove the indication will locally reduce the weld height below the $1.5t_n$ requirement of Reference 1. As a result, the repair excavation will not comply with Fig. N-462.4(d)(3) of the ASME Section III Code.

5. Proposed Alternative and Basis for Use:

Entergy intends to repair Penetration #46 by removing the identified defect using a mechanical metal removal process (e.g., machining) in accordance with IWA-4422.1 and IWA-4462. In performing this repair, the resultant excavation in the partial penetration J-groove weld will encroach upon the $1.5t_n$ throat dimension of Fig. N-462.4(d)(3) of Reference 1. Pursuant to 10 CFR 50.55a(z)(1), Entergy proposes to perform an engineering evaluation to demonstrate the acceptability of the J-groove weld in lieu of implementing the design evaluation provisions of IWA-4422.1.

Basis for Use:

The ANO-2 RVCH was built to ASME Section III requirements.

The first qualified RVCH CEDM nozzle tube UT examination was performed in 2R20

Entergy proposes to remove the identified defect in Penetration #46 by performing “defect removal without welding” in accordance with IWA-4422.2.1. However, as explained above, the excavation following defect removal will encroach into the weld region of the J-groove weld by at least 0.28 inch. This results in a reduction of the throat thickness in a small portion of the J-groove weld to less than the $1.5t_n$ dimension of Fig. N-462.4(d)(3) of Reference 1. Entergy has determined that this loss of throat thickness in a localized region of the J-groove weld will not have any adverse impact on the structural integrity of the J-groove weld as demonstrated below.

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Part 3: Other Considerations

The defect in Penetration #46 will be removed in accordance with IWA-4422.2.1. As part of this repair process, the defect removal cavity will be examined by the liquid penetrant (PT) examination method in accordance with NB-5000 of the 1992 Edition of ASME Section III.

After the final PT of the excavation, emery cloth buffing will be performed to the ground surface to aid in the removal of possible cold working. After emery cloth buffing, an ultrasonic examination of the excavated area is required to demonstrate the flaw indication has been removed.

Finally, pre-service examination of the repair in Penetration #46 will comply with ASME Code Case N-729-6 and any NRC approved alternatives to these conditions. Pre-service examinations will include both UT and PT examinations.

Conclusions

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The vendor has applied a similar strategy that has been successfully used in the following applications:

- 2003 / 2004 timeframe – removal of an indication via grinding at the tube to j-weld interface on an ICI penetration at San Onofre Nuclear Generating Station.
- 2005 / 2006 timeframe - removal of an indication via grinding at the tube to j-weld interface on an ICI penetration at ANO-2.
- 2016 – removal of an indication via grinding at the tube to j-weld interface on a control rod drive mechanism penetration 50 at Indian Point Energy Center, Unit 2.
- 2018 – removal of an indication via grinding at the tube to j-weld interface on control element drive mechanism penetration 49 at ANO-2.

None of the applications required a relief request to implement.

After the final PT of the excavation, emery cloth buffing will be performed to the ground surface to aid in the removal of possible cold working. After emery cloth buffing an ultrasonic examination of the excavated area is required to demonstrate the flaw indication has been removed. If not, Entergy will continue to excavate until the limits described above are reached or a successful PT is achieved prior to reaching the limits.

Entergy will continue to inspect the ANO-2 RVCH next refueling outage in accordance with 10 CFR 50.55a requirements.

6. Duration of Proposed Alternative

This proposed alternative is requested for one operating cycle.

7. Conclusion

From 10 CFR 50.55a:

> (z) Alternatives to codes and standards requirements. Alternatives to the requirements of paragraphs (b) through (h) of this section or portions thereof may be used when authorized by the Director, Office of Nuclear Reactor Regulation, or Director, Office of

New Reactors, as appropriate. A proposed alternative must be submitted and authorized prior to implementation. The applicant or licensee must demonstrate that:

(1) *Acceptable level of quality and safety*. The proposed alternative would provide an acceptable level of quality and safety;

Entergy believes the proposed alternative provides an acceptable level of quality and safety by utilizing a technique, inspections and analysis of the ANO-2 Penetration #46 described in this request. Therefore, Entergy requests authorization to perform the proposed alternative pursuant to 10 CFR 50.55a(z)(1).

8. References

1. ASME Boiler and Pressure Vessel Code, Section III, Nuclear Vessels, 1968 Edition with Addenda through Summer 1970.

2. Combustion Engineering Drawing, E-234-760, Rev. 2, “Closure Head Nozzle Details Arkansas Nuclear 157” I.D. P.W.R. Equipment No. 2R1.”

3. Design Reports:

   a. Combustion Engineering Analytical Report, CENC-1222, Rev. 000, “Analytical Report for Arkansas Nuclear One – Unit 2 Reactor Vessel,” August 1974.

   b. ABB Combustion Engineering Design Report, A-MECH-DR-007, Rev. 00, “Addendum to the Reactor Vessel Analytical Report for Entergy Operations, Inc., Arkansas Nuclear One-Unit 2,” June 9, 1993.

4. Combustion Engineering Drawing, E-234-761, Rev. 3, “Closure Head Penetrations Arkansas Nuclear 157” I.D. P.W.R. Equipment No. 2R1.”

5. Westinghouse Letter, LTR-SDA-18-096, Rev. 0, “ANO2 Reactor Vessel Head CEDM Penetration 49 Disposition of Grinding Option,” October 10, 2018.

Figure 1

Initial PT Indication Upon Application of the Developer

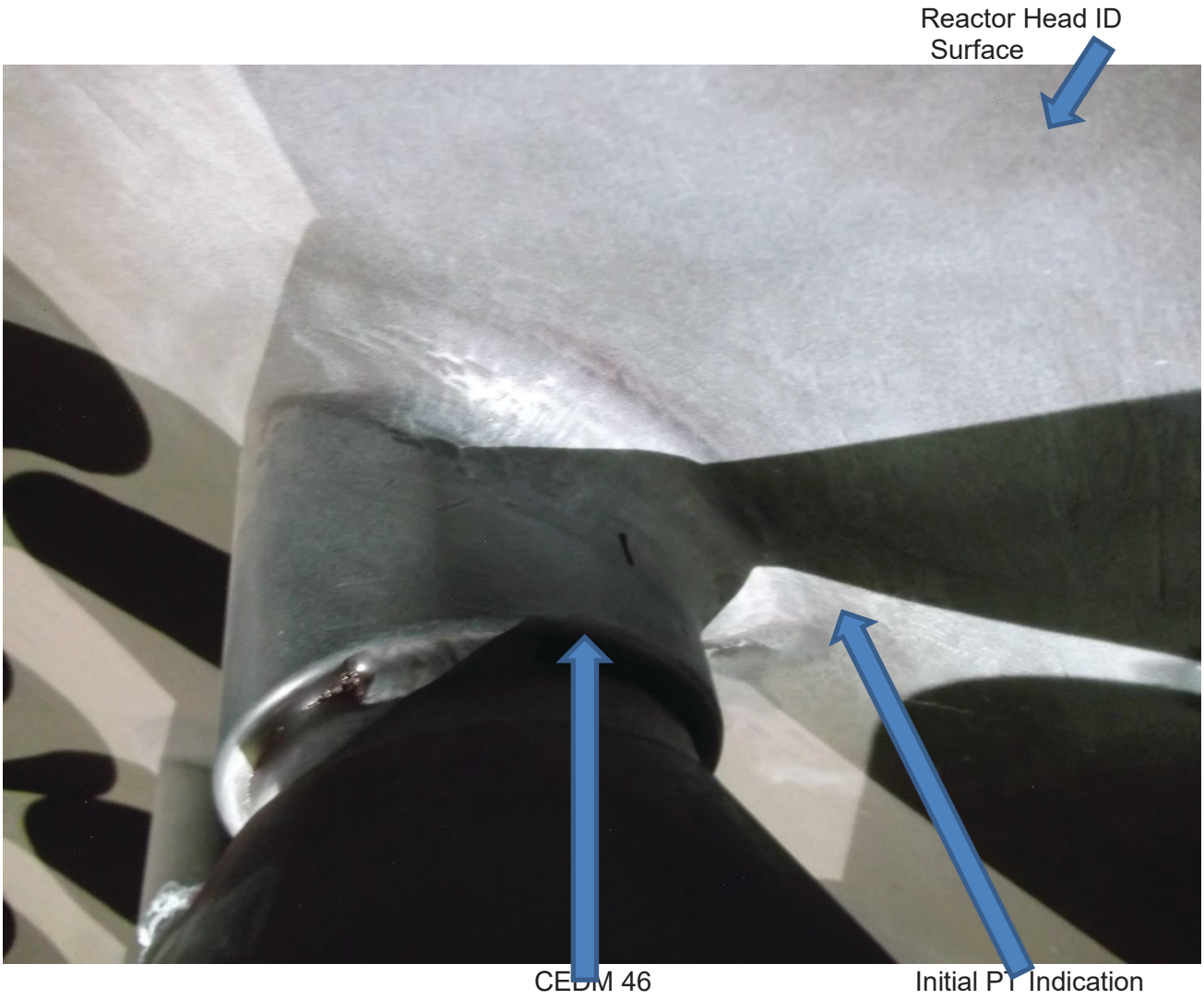

Figure 2

Final PT Indication After Final Development

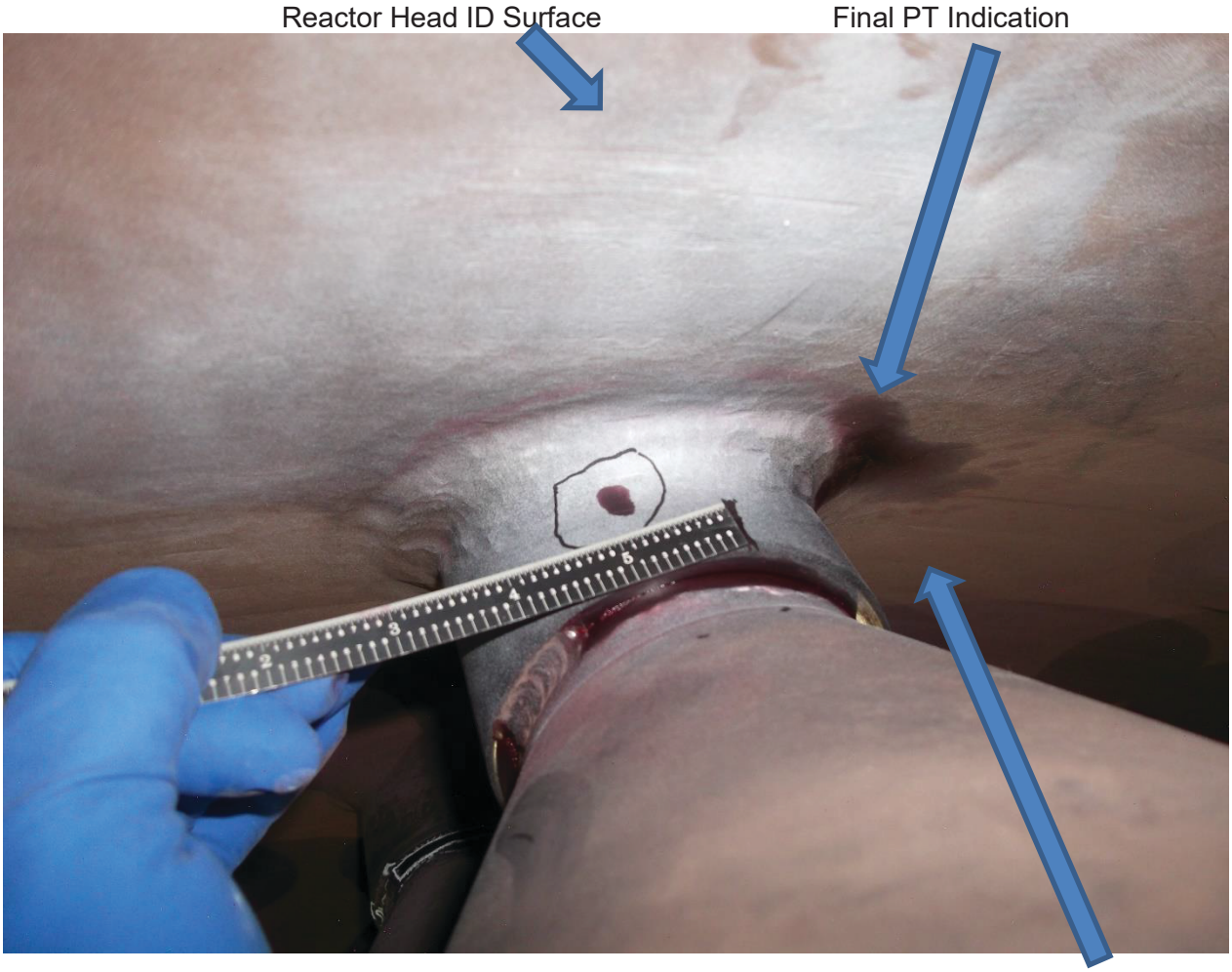

Figure 3

Design vs. WESDYNE Critical Dimensions

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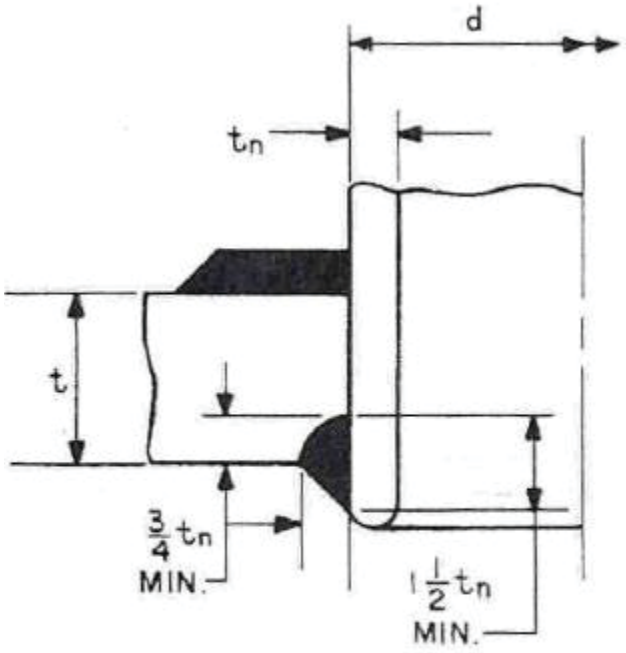
Figure 4

ASME Section III Design By Rule Weld Sizing



(3)

Figure 5

Section View of Proposed Excavation

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Figure 6

Isometric View of Proposed Excavation

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Figure 7

Design vs. WESDYNE Critical Dimensions

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Enclosure 3

2CAN102102

Affidavit

COMMONWEALTH OF PENNSYLVANIA:
COUNTY OF BUTLER:

(1) I, Camille T. Zozula, 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 LTR-SDA-21-074 Rev. 0 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

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 submittal contains proprietary information throughout, for the reasons set forth in Sections 5(a) through (f) of this Affidavit. Accordingly, a redacted version would be of no value to the public.

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: 08 Oct 2021

Camille T. Zozula, Manager
Regulatory Compliance & Corporate
Licensing

Utility Customer Instructions

Include the following information in the TRANSMITTAL LETTER to NRC. This is not part of the affidavit.

Enclosed is:

CAW-21-5232

The enclosure contains information proprietary to Westinghouse Electric Company LLC ("Westinghouse"), 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 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 respectfully requested that the information which 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-21-5232 and should be addressed to Camille T. Zozula, Manager, Regulatory Compliance & Corporate Licensing, Westinghouse Electric Company, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.