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10 CFR 50.55(a)

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

OCONEE NUCLEAR STATION, UNITS NO. 1 AND 2
DOCKET NO. 50-269 AND 270 / RENEWED LICENSE NO. DPR-38 AND DPR-47

SUBJECT: Response to Request for Additional Information for Proposed Alternative to Repair/Replacement Activities on Low Pressure Service Water (LPSW) Piping

REFERENCES:

1. Duke Energy Letter RA-20-0036, *Request for Alternative to Defect Removal Prior to Performing Repair/Replacement Activities on Low Pressure Service Water (LPSW) System Piping,* dated March 02, 2020 (ADAMS Accession No. ML20062G131).
2. NRC Email from Michael Mahoney to Chet Sigmon, *Request for Additional Information - Oconee Nuclear Station - LPSW Relief Request RA-20-0036 (L-2020-LLR-0036)*, dated May 19, 2020 (ADAMS Accession No. ML20140B003).

Ladies and Gentlemen:

By letter dated March 02, 2020 (Reference 1), Duke Energy Carolinas, LLC (Duke Energy) submitted Relief Request RA-20-0036, “Request for Alternative to Defect Removal Prior to Performing Repair/Replacement Activities on Low Pressure Service Water (LPSW) System Piping” to the NRC. Duke Energy requested an alternative to performing a repair/replace activity in accordance with Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Specifically, relief was requested from ASME Code Requirement IWA-4421.

By email dated May 19, 2020, (Reference 2), the NRC requested additional information required to complete its review. The Enclosure to this letter provides Duke Energy’s response to the request. Attachment 1 provides a data map showing the as found thickness values associated with the through-wall leak. Attachment 2 provides a data map showing as found thickness values for proposed encapsulation attachment of the 6-inch pipe to 12-inch header, and Attachment 3 provides a data map showing the as found thickness values with an illustration of the proposed encapsulation attachment to line stop.

This document contains no new Regulatory Commitments.

Should you have any questions concerning this letter, or require additional information, please contact Art Zaremba, Director – Nuclear Fleet Licensing, at 980-373-2062.

Sincerely,

J. Ed Burchfield, Jr.
Vice President
Oconee Nuclear Station

Enclosure:
Duke Energy Response to Request for Additional Information

Attachments
1. Data Map Showing As Found Thickness Values Associated with the Through-Wall Leak
2. Data Map Showing As Found Thickness Values for Proposed Encapsulation Attachment of 6-inch Pipe to 12-inch Header
3. Data Map Showing As Found Thickness Values with Illustration of Proposed Encapsulation Attachment to Line Stop

cc : L. Dudes, Regional Administrator USNRC Region II
J. Nadel, USNRC Senior Resident Inspector – ONS
S. Williams, NRR Project Manager – ONS

Enclosure

Duke Energy Carolinas, LLC

Oconee Nuclear Station Units 1 and 2

Duke Energy Response to Request for Additional Information

By letter RA-20-0036, dated March 2, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20062G131), Duke Power Carolinas, LLC (Duke, the licensee), submitted Relief Request (RR) RA-20-0036 which proposes an alternative to the requirements in Subarticle IWA-4421 of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2007 Edition through 2008 Addenda, regarding removal of defects in accordance with IWA-4411, IWA-4461, or IWA-4462 on the subject Low Pressure Service Water (LPSW) piping identified in the request, prior to performing repair/replacement activities at Oconee Nuclear Station, Unit Nos. 1 and 2. The licensee is proposing to install a modification/repair of a welded encapsulation, over the defect in the subject LPSW piping.

The NRC staff has reviewed the application and, based upon this review, determined that additional information is needed to complete our review. Please provide a response on the docket within 30 days of this correspondence.

Request for Additional Information (RAI-01)

The letter dated March 2, 2020, does not discuss the nature of the degradation mechanism which resulted in the through-wall leak discovered on September 26, 2019.

a. Please provide a discussion of the degradation mechanism which caused the through-wall leak.

Duke Energy Response to RAI-01a:

The degradation mechanism causing the through-wall leak was determined to be localized general corrosion and pitting. This is based on monthly ultrasonic testing results obtained since leak discovery which show the measured thickness in the vicinity of the flaw to be 25-30% thinner than the surrounding area within the same pipe. The area where the leak exists is a stub of carbon steel piping that remains after removal of previously identified thin piping downstream. A review of historical ultrasonic testing data taken from programmatic monitoring of the downstream 3-inch piping prior to its removal and subsequent placement of line stop fitting, revealed the same corrosion mechanism characteristics observed at the through-wall leak location.

RAI-01

b. Please provide a map of the as found pipe wall thickness readings this should also identify the locations where the encapsulation is proposed to be attached to the existing piping.

Duke Energy Response to RAI-01b:

Please see map and sketch showing the as found data at the leak location (Attachment 1, Data Map Showing As Found Thickness Values Associated with the Through-Wall Leak).

Please see map showing the as found data for the proposed encapsulation attachment to the 12-inch header (Attachment 2, Data Map Showing As Found Thickness Values for Proposed Encapsulation Attachment of 6-inch Pipe to 12-inch Header).

Please see map showing the as found data for the proposed encapsulation attachment to the line stop fitting (Attachment 3, Data Map Showing As Found Thickness Values with Illustration of Proposed Encapsulation Attachment to Line Stop).

RAI-02

Section 5.1.6 of the letter dated March 2, 2020, discusses ultrasonic thickness measurements being performed prior to installation of the encapsulation to confirm that that the material thickness has remained adequate for the encapsulation design.

Please define what the material thickness needs to be, to be adequate for the encapsulation design.

Duke Energy Response to RAI-02:

The minimum average circumferential pipe wall thickness for the 12-inch header can be as low as 0.287" and be adequate for the encapsulation design. In addition, the minimum average circumferential pipe wall thickness for the line stop fitting can be as low as 0.328" and be adequate for the encapsulation design. These minimum values are based on the mill tolerance values (-12.5%) of the analyzed pipe wall thicknesses.

RAI-03

Sections 5.1.1 and 5.1.2 of the letter dated March 2, 2020, discuss that the design, replacement pressure-retaining materials, and welding of the encapsulation will comply with the Construction Code (American Society of Mechanical Engineers (ASME), Section B31.1) and Owner's requirements.

a. Please clarify how the outer pipe is analyzed to satisfy the allowable stresses in ASME B31.1.

Duke Energy Response to RAI-03a:

This 6-inch outer pipe was analyzed by the piping analysis computer program Superpipe, which includes a B31.1 (1967) design check comparing the computed stresses with the allowable stress values. The encapsulation design uses a longitudinal weld; therefore, B31.1 Code Section 102.4.3 requires a longitudinal weld joint efficiency factor. A weld joint efficiency factor of 0.80 was incorporated into the stress allowable for the 6-inch encapsulation. A Stress Intensification Factor (SIF) for a full size unreinforced fabricated tee was conservatively considered.

RAI-03

b. Please provide a discussion on how the applied loads (i.e., forces and moments) on the outer pipe are calculated or obtained.

Duke Energy Response to RAI-03b:

As discussed above, this cantilever pipe section was analyzed for gravity and seismic loads, including pressure stress due to the design pressure of 100 psig, using Superpipe (no thermal analysis was performed since the design temperature is low; 100°F) and the various pipe/ component weights/geometry of both the branch and header were included in this analysis including the weight of the encapsulated 3-inch pipe. Note: The inside 3-inch pipe was not credited for structural strength.

RAI-04

Please provide a discussion on the rate of degradation used in the design of the encapsulation to ensure that propagation of the defect into the material credited for structural integrity in the modification does not occur in the design life of the modification. This discussion should include a comparison of the rate of degradation used in the design to the actual measured rate of degradation.

Duke Energy Response to RAI-04:

The estimated maximum rate of corrosion in the area of the defect, based on nominal wall thickness and current ultrasonic testing data results, is 0.002 inches/year. This value is associated with the leak location on the stub of 3-inch piping that branches from the 12-inch header and is consistent with the estimated maximum corrosion rate derived from historical ultrasonic measurements taken from the downstream section of 3-inch piping prior to its removal.

The radial distance from the flaw to the inner wall of the proposed encapsulation is 1.28 inches. Using this distance and 4 times the estimated maximum corrosion rate, yields an expected time of 160 years for the flaw to propagate from the 3-inch pipe into the portion of the 12-inch header where the proposed encapsulation device will attach.

Similarly, the distance from the flaw to the existing weld at the line stop fitting is 1.5 inches (this value is conservative since proposed encapsulation will attach beyond that weld onto the fitting itself). Using 4 times the estimated maximum corrosion rate and a distance of 1.0 inch (discounting entire 0.5-inch grid width where leak is located) predicts the time for the flaw to propagate into the line stop fitting to be 125 years.

RAI-05

Please provide a description of the wall thickness examinations in the vicinity of the modification and relevant pipe base metal which will be performed after the installation of the encapsulation to ensure propagation of the defect into the material credited for structural integrity does not occur during the design life of the modification.

Duke Energy Response to RAI-05:

Wall thickness measurements will be performed on the 12-inch header pipe in the area surrounding the proposed encapsulation. Additionally, wall thickness measurements of the area immediately adjacent to the proposed encapsulation attachment at the line stop fitting will be taken to ensure propagation of the defect into the material credited for structural integrity does not occur during the design life of the modification. These measurements will be taken at least once per operating cycle and thickness data will be gathered in accordance with the ONS Service Water Piping Corrosion Program.

Attachment 1

Data Map Showing As Found Thickness Values Associated with the Through-Wall Leak

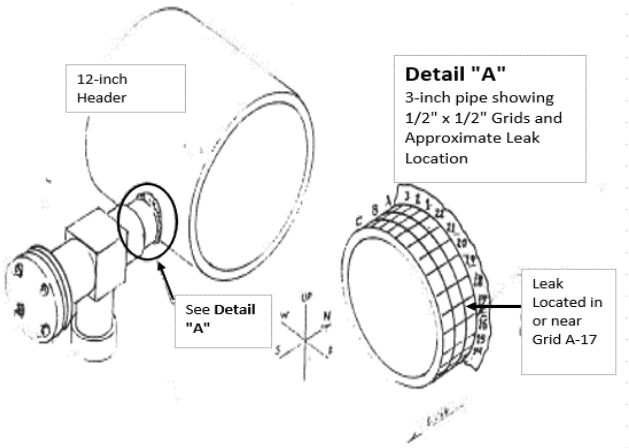
Attachment 1

Data Map Showing As Found Thickness Values Associated with the Through-Wall Leak

	C	B	A
1	0.179	0.157	0.191
2	0.196	0.199	0.208
3	0.180	0.172	0.206
4	0.195	0.206	0.193
5	0.186	0.202	0.127
6	0.179	0.193	0.206
7	0.177	0.203	0.200
8	0.180	0.182	0.192
9	0.171	0.192	0.188
10	0.195	0.190	0.200
11	0.174	0.175	0.183
12	0.139	0.160	0.159
13	0.192	0.195	0.143
14	0.175	0.146	0.154
15	0.195	0.125	0.133
16	0.157	0.165	0.159
17	0.190	0.163	0.122
18	0.197	0.163	0.164
19	0.201	0.163	0.174
20	0.164	0.170	0.163
21	0.162	0.178	0.183
22	0.157	0.175	0.163

(Column Order Shown to Match Sketch Orientation)

COMPONENT SKETCH:



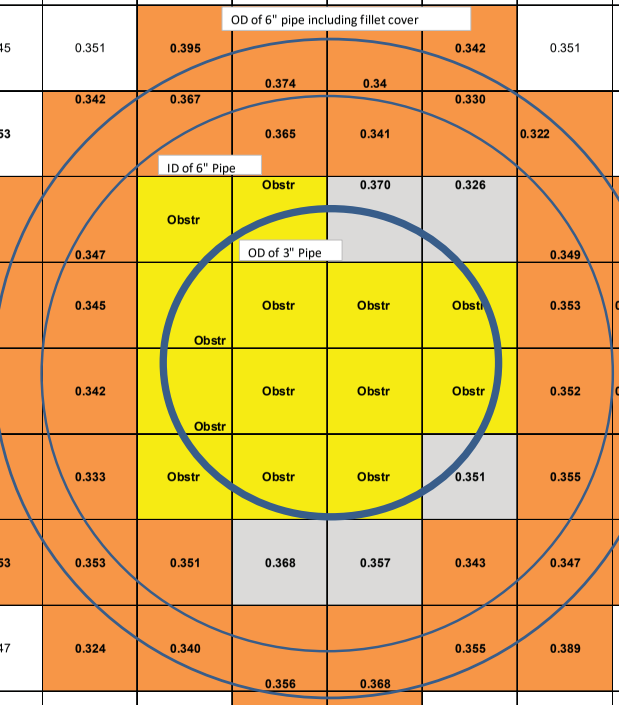
Attachment 2

Data Map Showing As Found Thickness Values for Proposed Encapsulation Attachment of 6-inch Pipe to 12-inch Header

Attachment 2

Data Map Showing As Found Thickness Values for Proposed Encapsulation Attachment of 6-inch Pipe to 12-inch Header

12-in Header Coordinates from As Found Data	H	I	J	K	L	M	N	O	P	Q	R	S
25	0.364	0.279	0.358	0.346	0.362	0.379	0.377	0.345	0.362	0.359	0.352	0.357
26	0.345	0.367	0.412	0.342	0.350	0.361	0.367	0.353	0.359	0.356	0.360	0.365
27	0.350	0.347	0.345	0.351	**0.395**	**0.374**	**0.34**	**0.342**	0.351	0.356	0.341	0.364
28	0.336	0.339	**0.353**	**0.342**	**0.367**	**0.365**	**0.341**	**0.330**	**0.322**	0.319	0.400	0.356
29	0.333	0.336	**0.330**	**0.347**	**Obstr**	**Obstr**	**0.370**	**0.326**	**0.349**	**0.344**	0.353	0.353
30	0.332	0.328	**0.309**	**0.345**	**Obstr**	**Obstr**	**Obstr**	**Obstr**	**0.353**	**0.349**	0.358	0.345
31	0.339	0.340	**0.332**	**0.342**	**Obstr**	**Obstr**	**Obstr**	**Obstr**	**0.352**	**0.334**	0.367	0.350
32	0.346	0.344	**0.337**	**0.333**	**Obstr**	**Obstr**	**Obstr**	**0.351**	**0.355**	**0.340**	0.342	0.347
33	0.333	0.341	**0.353**	**0.353**	**0.351**	**0.368**	**0.357**	**0.343**	**0.347**	**0.391**	0.366	0.356
34	0.343	0.340	0.347	**0.324**	**0.340**	**0.356**	**0.368**	**0.355**	**0.389**	0.359	0.345	0.376
35	0.345	0.356	0.355	0.346	0.37	**0.351**	**0.37**	0.353	0.373	0.342	0.361	0.358
36	0.346	0.344	0.354	0.358	0.363	0.364	0.356	0.36	0.362	0.349	0.353	0.362



Legend

Note: All Values given are for Minimum Pipe Wall Thickness (inches) within Each of the 1"x1" Grids shown for the 12-in header

	Thickness Values for Grids in Areas Where Proposed Encapsulation Pipe or Fillet Weld Will Make Contact with 12- in Header .
	Thickness Values for Grids Inside Proposed Encapsulaton Not in Contact with Encapsulation
	Grids Where Thickness Measurements Could Not Be Taken Due to Obstructions from 3-in Pipe

Attachment 3

Data Map Showing As Found Thickness Values with Illustration of Proposed Encapsulation Attachment to Line Stop

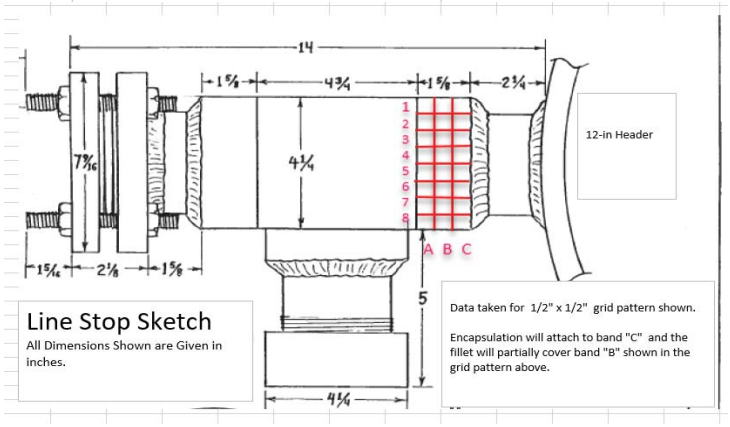
Attachment 3

Data Map Showing As Found Thickness Values with Illustration of Proposed Encapsulation Attachment to Line Stop

Thickness Values (inches) Taken From Proposed Encapsulation Attachment Location

	A	B	C
1	0.379	0.376	0.374
2	0.383	0.377	0.374
3	0.380	0.378	0.373
4	0.380	0.378	0.372
5	0.382	0.384	0.381
6	OBSTR.	OBSTR.	OBSTR.
7	0.381	0.381	0.380
8	0.379	0.384	0.374
9	0.384	0.375	0.379
10	0.375	0.373	0.381
11	0.376	0.375	0.378
12	0.382	0.377	0.384
13	0.386	0.383	0.375
14	0.381	0.381	0.374
15	0.378	0.380	0.374
16	0.382	0.373	0.385
17	0.382	0.378	0.398
18	0.376	0.379	0.375
19	0.380	0.379	0.373
20	0.377	0.378	0.374
21	0.377	0.379	0.373
22	0.377	0.380	0.379
Average	***0.380***	***0.378***	***0.378*** (inches)

Location of Proposed Encapsulation Attachment to Line Stop (Grid Area)



Minimum Thickness (inches)	**0.372**
Minimum Average Thickness (inches)	**0.378**