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June 29, 2009

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

Subject: Duke Energy Carolinas, LLC (Duke)
McGuire Nuclear Station, Unit 1
Docket No. 50-369
Relief Request Serial #09-MN-003

Pursuant to 10 CFR 50.55a(a)(3)(i), Duke hereby submits the enclosed alternative to the reactor vessel inservice inspection (ISI) interval requirements of the ASME Code, Section XI, IWB-2412.

As indicated in PWR Owners Group Letter OG-06-356 dated October 31, 2006, the next proposed McGuire Unit 1 reactor vessel ISI date is 2011 (plus or minus one outage). Duke requests extension of this ISI date to 2020 (plus or minus one outage). In exchange for moving the McGuire Unit 1 ISI date to 2020 (plus or minus one outage), the next proposed Oconee Unit 3 reactor vessel ISI date is 2014 (plus or minus one outage), as opposed to 2024 (plus or minus one outage) as previously indicated in the OG letter.

In the safety evaluation (SE) dated May 8, 2008 for Topical Report WCAP-16168-NP, Revision 2 "Risk-Informed Extension of Reactor Vessel In-Service Inspection Interval," the NRC required licensees to amend their facility operating license to provide the NRC with the information and analyses requested in Section (e) of the final rule for paragraph 10 CFR 50.61(a) or the proposed rule published in the Federal Register on October 3, 2007 (72 FR 56275) within one year following completion of each ASME Code, Section XI, Category B-A and B-D weld inspection. Duke understands this requirement is no longer necessary because the NRC will grant ISI interval extensions on an interval-by-interval basis only and not through the end of the facility's operating license. Based on this NRC position, the NRC granted in 74 FR 29247 a request by Waterford 3 to withdraw its license amendment request required by this SE.

The proposed alternative provides for an acceptable level of quality and safety, consistent with 10 CFR 50.55a(a)(3)(i).

To support outage planning, approval is requested by November 30, 2009.

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NRR

The attachment to this letter contains the relief request. If you have any questions or require additional information, please contact P.T. Vu at (704) 875-4302.

Sincerely,

Bruce Hamilton

Bruce H. Hamilton

Attachment

xc:

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ATTACHMENT

Relief Request 09-MN-003

McGuire Unit 1

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(i)
-Alternative Provides Acceptable Level of Quality and Safety-

1. ASME Code Component(s) Affected

The affected component is the McGuire Unit 1 Reactor Vessel, specifically the following American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code Section XI (Reference 1) examination categories and item numbers covering examinations of the reactor vessel (RV). These examination categories and item numbers are from IWB-2500 and Table IWB-2500-1 of the ASME BPV, Code Section XI.

Examination Category	Item No.	Description
B-A	B1.11	Circumferential Shell Welds
B-A	B1.12	Longitudinal Shell Welds
B-A	B1.21	Circumferential Head Welds
B-A	B1.22	Meridional Head Welds
B-A	B1.30	Shell-to-Flange Weld
B-D	B3.90	Nozzle-to-Vessel Welds
B-D	B3.100	Nozzle Inside Radius Section

(Throughout this request the above examination categories are referred to as "the subject examinations" and the ASME BPV Code, Section XI, is referred to as "the Code.")

2. Applicable Code Edition and Addenda

ASME Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1998 Edition with the 2000 Addenda.

3. Applicable Code Requirement

IWB-2412, Inspection Program B, requires volumetric examination of essentially 100% of reactor vessel pressure retaining welds identified in Table IWB-2500-1 once each ten year interval. The McGuire Unit 1 third 10-year inservice inspection interval is scheduled to end November 30, 2011.

4. Reason for Request

An alternative is requested from the requirement of IWB-2412, Inspection Program B, that volumetric examination of essentially 100% of reactor vessel pressure retaining welds, Examination Categories B-A and B-D welds, be performed once each ten-year interval. Extension of the inspection interval for Examination Category B-A and B-D welds from 10 years to up to 20 years will result in a reduction in man-rem exposure and a potential reduction in the frequency for which the RV lower internals need to be removed thereby reducing the possibility for human error and damage to the lower internals.

5. Proposed Alternative and Basis for Use

Duke Energy proposes to defer the ASME Code required volumetric examination of the McGuire Unit 1 reactor vessel full penetration pressure retaining Category B-A and B-D welds for the third inservice inspection interval until 2020 (plus or minus one outage).

In accordance with 10 CFR 50.55a(a)(3)(i), an alternate inspection interval is requested on the basis that the current inspection interval can be extended based on a negligible change in risk by satisfying the risk criteria specified in Regulatory Guide 1.174 (Reference 3).

The methodology used to demonstrate the acceptability of extending the inspection intervals for Category B-A and B-D welds based on a negligible change in risk is contained in WCAP-16168-NP-A, Revision 2 (Reference 4). This methodology was used to develop a pilot plant analysis for Westinghouse, Combustion Engineering, and Babcock and Wilcox reactor vessel designs and is an extension of the work that was performed as part of the NRC PTS Risk Re-Evaluation (Reference 5). The critical parameters for demonstrating that this pilot plant analysis is applicable on a plant specific basis, as identified in WCAP-16168-NP-A, Revision 2, are identified in Table 1. By demonstrating that each plant specific parameter is bounded by the corresponding pilot plant parameter, the application of the methodology to the McGuire Unit 1 reactor vessel is acceptable as shown in Table 1 below.

Table 1 Critical Parameters for Application of Bounding Analysis

Parameter	Pilot Plant Basis	Plant Specific Basis	Additional Evaluation Required?
Dominant Pressurized Thermal Shock (PTS) Transients in the NRC PTS Risk Study are applicable	NRC PTS Risk Study (Reference 5)	PTS Generalization Study (Reference 6)	No
Through Wall Cracking Frequency	1.76E-08 Events per year (Reference 4)	6.60E-09 Events per year (Calculated per Reference 4)	No
Frequency and Severity of Design Basis Transients	7 heatup/cooldowns per year (Reference 4)	Bounded by 7 heatup/cooldowns per year	No
Cladding Layers (Single/Multiple)	Single Layer (Reference 4)	Single Layer	No

Additional information relative to the McGuire Unit 1 reactor vessel inspection is provided in Table 2. This information confirms that satisfactory examinations have been performed on the McGuire Unit 1 reactor vessel.

Table 2 Additional Information Pertaining to Reactor Vessel Inspection

Inspection methodology:	The most recent inservice inspection of the Category B-A was performed to ASME Section XI Appendix VIII requirements. Inspection of the Category B-D welds from the vessel ID was performed to Section XI Appendix VIII requirements while the inspections from the nozzle bore and inspections of the nozzle inner radius were performed to Regulatory Guide 1.150 requirements.
Number of past inspections:	Two 10-Year inservice inspections have been performed.
Number of indications found:	64 indications were identified in the beltline region and they were acceptable during the most recent inservice inspection. 35 of these 64 indications were within the inner 3/8th of the vessel thickness and they were further assessed and acceptable per Table IWB-3510-1 of Section XI of the ASME Code. Six of these 35 indications were within the inner 1/10th or 1" of the reactor vessel thickness and also further assessed. Five of these six indications were in the weld material. A summary of these indications is provided in the table below. The column to the right indicates the number allowed per the proposed PTS rule, 10 CFR 50.61a in SECY-07-0104 (Reference 8). This number is based on the length of weld inspected in the beltline region.

No. of Indications	Range of Through-Wall Extent (TWE, inch)	No. Allowable
1 axial, 1 circ.	$0.075 \leq TWE \leq 0.125$	162
1 axial	$0.125 \leq TWE \leq 0.175$	89
2 axial	$0.225 \leq TWE \leq 0.275$	9

One circumferential indication, in plate material B5012-1, with a through-wall extent of 0.43", does not meet the requirements in SECY-07-0104. Additional information regarding the acceptability of this indication is provided in Section 6.

The location of the six flaws relative to the beltline materials is illustrated in Figure 1. The circled numbers in Figure 1 correspond to the regions in Table 3.

Proposed inspection schedule:	The third inservice inspection is due to be performed by 2011 and is currently scheduled for 2010. This inspection will be performed in 2020 (plus or minus one outage).

Table 3 provides additional information relative to the calculation of the TWCF for McGuire Unit 1.

Table 3 Details of TWCF Calculation – Performed for 60 Effective Full Power Years (EFPY)

Inputs								
Reactor Coolant System Temperature, T_{RCS}[°F]:			N/A			T_{wall} [inches]:		8.84
#	Region/Component Description	Material / Flux Type	Cu [wt%]	Ni [wt%]	C.F. [°F]	R.G. 1.99 pos.	Un-Irradiated RT_{NDT} [°F]	Fluence [10^{19} Neutron/cm^2, E > 1.0 MeV]
1	Int. Plate B5012-1	A 533B	0.110	0.610	2.1	62.5	34.0	3.80
2	Int. Plate B5012-2	A 533B	0.140	0.610	1.1	100.3	0.0	3.80
3	Int. Plate B-5012-3	A 533B	0.110	0.660	1.1	74.9	-13.0	3.80
4	Low. Plate B5013-1	A 533B	0.140	0.580	1.1	99.1	0.0	3.63
5	Low. Plate B5013-2	A 533B	0.100	0.510	1.1	65.0	30.0	3.63
6	Low. Plate 5013-3	A 533B	0.100	0.550	1.1	65.0	15.0	3.63
7	Int. Ax. Weld 2-442A	Linde 1092	0.199	0.846	2.1	156.5	-50.0	2.16
8	Int. Ax. Weld 2-442B	Linde 1092	0.199	0.846	2.1	156.5	-50.0	3.09
9	Int. Ax. Weld 2-442C	Linde 1092	0.199	0.846	2.1	156.5	-50.0	3.09
10	Int. Ax. Weld 3-442A	Linde 1092	0.213	0.867	2.1	194.4	-50.0	2.96
11	Int. Ax. Weld 3-442B	Linde 1092	0.213	0.867	2.1	194.4	-50.0	2.06
12	Int. Ax. Weld 3-442C	Linde 1092	0.213	0.867	2.1	194.4	-50.0	2.96
13	Circ. Weld 9-442	Linde 1091	0.051	0.096	1.1	37.5	-70.0	3.59

Outputs						
Methodology Used to Calculate ΔT_{30}:		Regulatory Guide 1.99, Revision 2				
	Controlling Material Region # (From Above)	RT_{MAX-XX} [R]	Fluence [10^{19} Neutron/cm^2, E > 1.0 MeV]	FF (Fluence Factor)	ΔT_{30} [°F]	$TWCF_{95-XX}$
Axial Weld – AW	12	659.91	2.96	1.287	250.22	2.88E-09
Circumferential Weld - CW	2	593.32	3.59	1.332	133.63	5.52E-29
Plate – PL	2	594.59	3.80	1.345	134.90	1.23E-12
$TWCF_{95-TOTAL}$ ($\alpha_{AW}TWCF_{95-AW} + \alpha_{PL}TWCF_{95-PL} + \alpha_{CW}TWCF_{95-CW}$):						6.60E-09

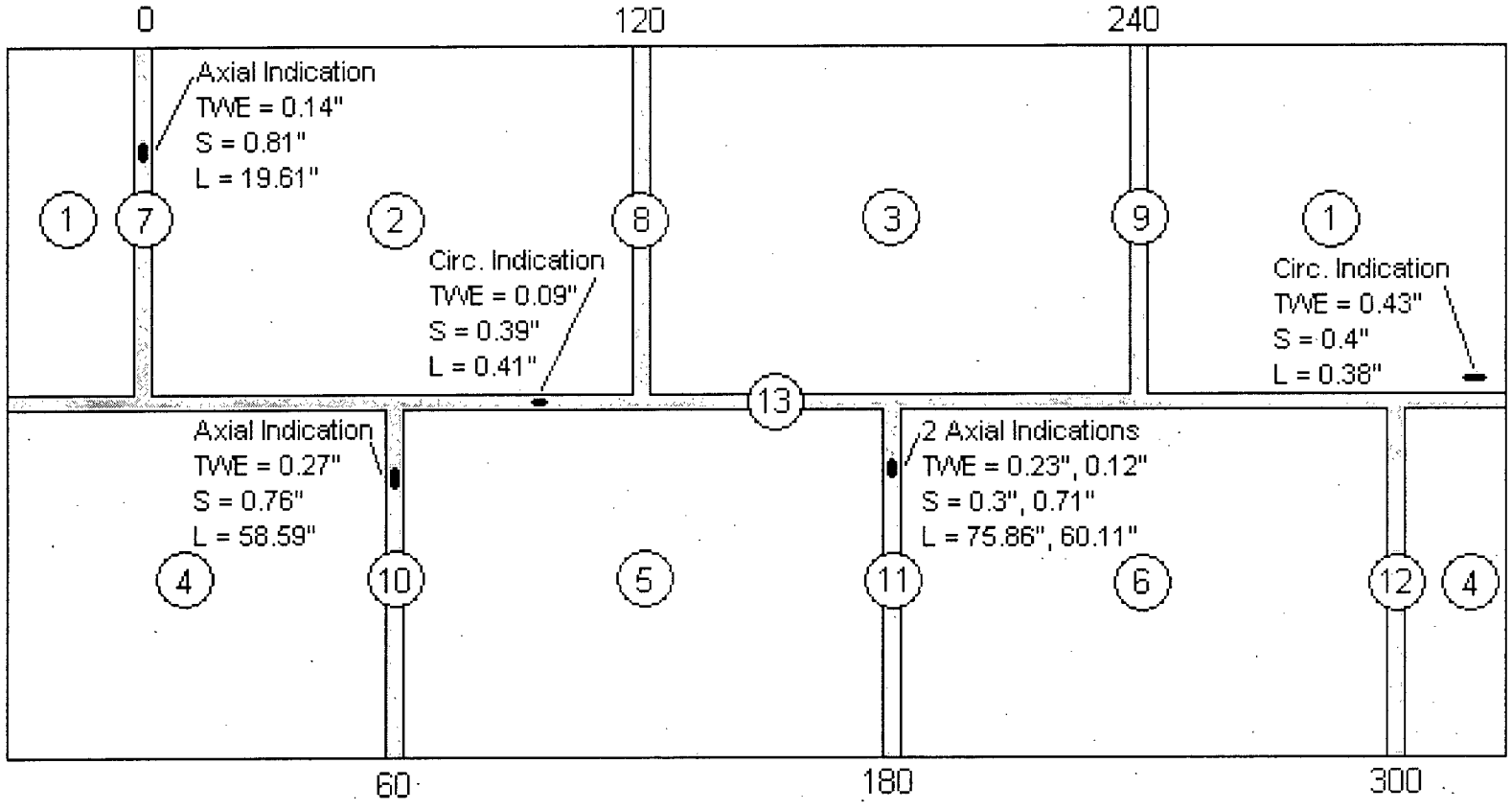

Figure 1 – McGuire Unit 1 Beltline Indication Map

(Figure is not to scale. Indication location is approximate.)

6. Deviation and Justification

The inspection dates identified in Section 5 and Table 2 differ from those provided to the Staff in PWR Owners Group letter OG-06-356 (Reference 2). To account for the change in distribution of inspections as a result of moving the McGuire Unit 1 inspection from 2011 as indicated in OG-06-356 to 2020, Duke proposes to inspect the Oconee Unit 3 reactor vessel in 2014 as opposed to 2024 as stated in the OG letter. This "swap" in implementation dates of the 20-year inspection interval between McGuire Unit 1 and Oconee Unit 3 should reduce the impact on the distribution of inspections per year provided by the schedule in OG-06-356. Furthermore, it should be noted that the change in inspection dates has no effect on the risk-informed technical basis for the acceptability of the extension in inspection interval for McGuire Unit 1.

As indicated in Table 2, there are 6 flaws within the inner 1/10th or 1" of the reactor vessel beltline region. Five of these flaws meet the "Allowable Number of Flaws" criteria in SECY-07-0104 based on an analysis of the McGuire Unit 1 reactor vessel inservice inspection results. However, one plate flaw, with a through wall extent of 0.43 inches exceeds the criteria. The location of all 6 flaws relative to the beltline materials is illustrated in Figure 1. While one flaw is outside the limits in SECY-07-0104 it is not expected that this flaw would increase the McGuire Unit 1 TWCF value above that of the pilot plant for the following reasons:

- This plate which the flaw is located in has a maximum $RT_{NDT} + \Delta T_{30}$ of 118°F and is not the limiting material in the beltline region.
- The total number of flaws detected in the inner $1/10^{th}$ or 1" of the McGuire Unit 1 beltline is far less than those allowed in Tables 2 and 3 of the proposed PTS Rule in SECY-07-0104.
- The flaw is oriented circumferentially with respect to the reactor vessel. Circumferential flaws were shown in the technical basis of the proposed alternate PTS rule (Reference 5) to have a very small contribution to TWCF.
- Conservative analyses performed by the NRC (Reference 9) of a single axially oriented flaw in another PWR showed that the contribution of this flaw to TWCF was on the order of 10^{-17} events per year. Given that the TWE of this flaw was 0.60" instead of 0.43", was axially oriented as opposed to circumferentially oriented, and was in a plate with a higher $RT_{NDT} + \Delta T_{30}$, (142°F vs. 118°F) it can be concluded that the McGuire Unit 1 flaw will have a contribution to TWCF of less than 10^{-17} events per year.

7. Duration of Proposed Alternative

This request is applicable to the McGuire Unit 1 Inservice Inspection Program for the third and fourth 10-Year intervals.

8. Precedents

Calvert Cliffs Nuclear Plant Unit No. 2, Docket No. 50-318, "Revised Request to Extend the Inservice Inspection Interval for Reactor Vessel Weld Examinations – Relief Request

(ISI-020 and ISI-021)" dated October 1, 2008 (ADAMS Accession Number ML082760282).

Donald C. Cook Nuclear Plant Unit No. 2, Docket No. 50-316, "Request for Relief to Extend the Inservice Inspection Interval for the Reactor Vessel Weld Examination and Request for License Amendment for Submittal of ISI Information and Analyses," dated October 9, 2008 (ADAMS Accession Number ML082980354).

Indian Point Nuclear Generating Units Nos. 2 and 3, Docket Nos. 50-247 and 50-286, "Request for Relief to Extend the Unit 2 and Unit 3 Inservice Inspection Interval for the Reactor Vessel Weld Examination and Request for License Amendment for Submittal of ISI Information and Analyses," dated July 8, 2008 (ADAMS Accession Number ML081980058).

9. References

1. *ASME Boiler and Pressure Vessel Code,* Section XI, 1998 Edition with the 2000 Addenda, American Society of Mechanical Engineers, New York.
2. OG-06-356, "Plan for Plant Specific Implementation of Extended Inservice Inspection Interval per WCAP-16168-NP, Revision 1, "Risk-Informed Extension of the Reactor Vessel In-Service Inspection Interval." MUHP 5097-99, Task 2059," October 31, 2006.
3. NRC Regulatory Guide 1.174, Revision 1, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," November 2002.
4. WCAP-16168-NP-A, Revision 2, "Risk-Informed Extension of Reactor Vessel In-Service Inspection Interval," June 2008.
5. NUREG-1874, "Recommended Screening Limits for Pressurized Thermal Shock," March, 2007 (ADAMS Accession Number ML070860156).
6. NRC Letter Report, "Generalization of Plant-Specific Pressurized Thermal Shock (PTS) Risk Results to Additional Plants," December 14, 2004 (ADAMS Accession Number ML042880482).
7. NRC Regulatory Guide 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations," February 1983.
8. SECY-07-0104, "Proposed Rulemaking - Alternate Fracture Toughness Requirements for Protection against Pressurized Thermal Shock," June 25, 2007 (ADAMS Accession Number ML070570141).
9. NRC Memorandum EricksonKirk to Purtscher, "Probabilistic Assessment of Flaw in Support of Calvert Cliffs Unit 2 Relief Request ISI-020," February 6, 2009 (NRC ADAMS Accession Numbers: ML090370140, ML090370653, ML090370666).
10. Westinghouse Calculation Note No. CN-PCAM-08-15, Rev. 0, "Implementation of WCAP-16168-NP-A, Revision 2, for Catawba Units 1 and 2 and McGuire Units 1 and 2"