

# CATEGORY 1

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SUBJECT: Requests use of alternative to ASME Boiler & Pressure Vessel Code, Section XI, Subsection IWE, 1992 Edition w/1992 Addenda for Oconee Units 1, 2 & 3, McGuire Units 1 & 2 & Catawba, Units 1 & 2 re augmented exam requirements for surface areas.

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April 6, 1998

U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Duke Energy Corporation

Oconee Nuclear Station - Units 1, 2, & 3  
Docket Nos. 50-269, 50-270, and 50-287

McGuire Nuclear Station - Units 1 & 2  
Docket Nos. 50-369 and 50-370

Catawba Nuclear Station - Units 1 & 2  
Docket Nos. 50-413 and 50-414

Request to use an Alternative to the ASME Boiler  
and Pressure Vessel Code, Section XI in Accordance  
With 10 CFR 50.55a(a)(3)(i)  
Duke Energy Corporation Serial Number 98-GO-003

Pursuant to 10 CFR 50.55a(a)(3)(i), Duke Energy Corporation requests the use of an alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWE, 1992 Edition with the 1992 Addenda for Oconee Units 1, 2 and 3, McGuire Units 1 and 2, and Catawba Units 1 and 2.

This request is to allow the use of an alternative to the augmented examination requirements for surface areas of metal containments and liners of concrete containment (Class MC components), as specified in the ASME Boiler and Pressure Vessel Code, Section XI, 1992 Edition with the 1992 Addenda, IWE-2500(c) and Table IWE-2500-1, Examination Category E-C, Containment Surfaces Requiring Augmented Examination.

Duke Energy Corporation finds that compliance with some of the specified requirements of IWE-2500(c) and Table IWE-2500-1, Examination Category E-C, would result in hardship or unusual difficulty without a compensating increase in the

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U. S. Nuclear Regulatory Commission  
April 6, 1998  
Page 2

level of quality and safety for certain cases. The proposed alternative will provide an equivalent level of quality and safety in lieu of these requirements for all containment surfaces subject to augmented examination.

A detailed description of this proposed alternative, including a background discussion and justification is included as an enclosure to this letter. Duke Energy Corporation requests timely NRC review and approval of this relief request so that Containment Inservice Inspection Plans, which are under development, can be completed to support the implementation of Containment Inservice Inspections during plant refueling outages starting in September, 1998. A NRC response is requested by July 1, 1998 in order to allow sufficient time to amend the Duke plans that will implement this request. Questions regarding this request should be directed to J. S. Warren at (704) 382-4986.

Very truly yours,



M. S. Tuckman

MST/JSW

Attachment:

Duke Energy Corporation  
Request for Relief  
Serial Number 98-GO-003, Pages 1 through 10.

U. S. Nuclear Regulatory Commission  
April 6, 1998  
Page 3

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U. S. Nuclear Regulatory Commission  
April 6, 1998  
Page 3

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## DUKE ENERGY CORPORATION

Oconee Nuclear Station Units 1, 2 and 3  
McGuire Nuclear Station Units 1 and 2  
Catawba Nuclear Station Units 1 and 2

Request for Alternative to the Requirements of the ASME  
Boiler and Pressure Vessel Code, Section XI

**Background:**

Pursuant to 10 CFR 50.55a (a) (3) (i), Duke Energy Corporation requests the use of an alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWE, 1992 Edition with the 1992 Addenda for Oconee Units 1, 2 and 3, McGuire Units 1 and 2, and Catawba Units 1 and 2.

Duke Energy has concluded that some containment surface areas identified in accordance with IWE-1241 will require augmented examination in accordance with IWE-2500(c). The following information describes the difficulties expected when complying with augmented examination requirements of IWE-2500(c).

IWE-2500(c)(1) requires that surfaces areas accessible from both sides be visually examined using a VT-1 method. This requirement implies that both sides of the component require examination. However, if only one side of the component is subject to conditions which warrant augmented examination, there is no justification for requiring the accessible surface on the opposite side to be examined. VT-1 visual examinations should be required on both sides of a component only when both sides are subject to conditions which warrant augmented examination. The requirement of IWE-3200 is sufficient to ensure that supplemental examinations are performed on augmented examination areas when visual examinations of surfaces subject to augmented examination detect surface flaws or areas that are suspect.

IWE-2500(c)(2) requires that surfaces areas accessible from one side only be examined for wall thinning using an ultrasonic thickness measurement method. When only one side of a component is accessible for visual examination, and when only this side is subject to conditions which warrant augmented examination, a VT-1 visual examination on the accessible side is sufficient. Ultrasonic thickness measurements should be required only when the augmented

examination area exists on the opposite side of the component and when that augmented examination surface is not accessible for visual examination. The requirement of IWE-3200 is sufficient to ensure that supplemental examinations are performed when visual examinations of the accessible surfaces of augmented examination areas detect surface flaws or areas that are suspect.

IWE-2500(c)(3) provides requirements for ultrasonic thickness measurements when these examinations are to be performed. Duke Energy interprets the Code to require examination of 100% of surfaces subject to conditions which warrant augmented examination. For this reason, the requirements of IWE-2500(c)(3) are excessive for potentially large surface areas subject to ultrasonic thickness measurement.

IWE-2500(c)(4) requires that the minimum wall thickness be marked within each grid, as required by Table IWE-2500-1, Examination Category E-C, Item E4.12. Because Duke Energy interprets the Code to require 100% examination of each grid square during each Inspection Period, in accordance with footnote (2) of this Table, the requirement of IWE-2500(c)(4) is excessive for potentially large surface areas subject to ultrasonic thickness measurement. Our preliminary assessment has revealed several areas in at least 2 containments where ultrasonic thickness measurements will be required on areas which may exceed 300 square feet.

In lieu of the requirements of IWE-2500(c) and Table IWE-2500-1, Examination Category E-C, the alternative proposed in this request will provide an equivalent level of quality and safety.

**I. Systems/Components for Which Alternative is Requested:**

Class MC pressure retaining components and metallic shell and penetration liners of Class CC pressure retaining components.

**II. Code Requirement(s):**

The requirements of The ASME Boiler and Pressure Vessel Code, Section XI, Division 1, 1992 Edition with the 1992 Addenda, Paragraph IWE-2500(c) are provided below:

(c) Examination methods for surface areas for augmented examination in IWE-1242 shall comply with the following criteria.

(1) Surface areas accessible from both sides shall be visually examined using a VT-1 visual examination method.

(2) Surface areas accessible from one side only shall be examined for wall thinning using an ultrasonic thickness measurement method in accordance with Section V, T-544.

(3) When ultrasonic thickness measurements are performed, one foot square grids shall be used. The number and location of the grids shall be determined by the Owner.

(4) Ultrasonic measurements shall be used to determine the minimum wall thickness within each grid. The location of the minimum wall thickness shall be marked such that periodic reexamination of that location can be performed in accordance with the requirements of Table IWE-2500- 1, Examination Category E-C.

Table IWE-2500-1, Examination Category E-C, Item E4.12 requires ultrasonic thickness measurement of 100% of minimum wall thickness locations during each Inspection Period, established in accordance with IWE-2500(c)(3) and IWE-2500(c)(4). The extent of examination shall be 100% for each inspection period until the areas remain essentially unchanged for three consecutive inspection periods. Such areas no longer require augmented examination in accordance with IWE-2420(c).

### **III. Requirement from Which Alternative is Requested:**

An alternative is requested to the Visual, VT-1 examination requirements and the ultrasonic thickness measurement requirements of IWE-2500(c)(1), IWE-2500(c)(2), IWE-2500(c)(3), IWE-2500(c)(4), and Table IWE-2500-1, Examination Category E-C, Containment Surfaces Requiring Augmented Examination.

### **IV. Basis for Requesting Alternative:**

Compliance with IWE-2500(c)(1) will require a VT-1 visual examination on some surfaces that do not warrant augmented examination. These examinations will result in a hardship without a compensating increase in quality or safety. For a component which is accessible from both sides, it is unnecessary to require a VT-1 visual examination on both sides when only one side of the component is subject to conditions which warrant augmented examination. VT-1 visual examination of the

side subject to augmented examination is sufficient to comply with the intent of IWE-2500(c)(1). Please note that both sides of accessible components receive general visual examination and VT-3 visual examination in accordance with IWE-2500(a) and Table IWE-2500-1, Examination Category E-A, Containment Surfaces.

Compliance with IWE-2500(c)(2) will require ultrasonic thickness measurements to be performed on some surfaces that do not warrant volumetric examination. These examinations will result in a hardship without a compensating increase in quality or safety. For a component which is accessible from one side only, it is unnecessary to require an ultrasonic thickness measurement if only the accessible side of the component is subject to conditions which warrant augmented examination. Such surfaces can be effectively examined using a visual, VT-1 examination method.

Because IWE-1241 does not indicate whether an Owner can select a sample for examination from within an area subject to ultrasonic thickness measurement, Duke Energy has interpreted the Code to require that 100% of such areas be examined. Furthermore, IWE-1241 is applicable to areas that not only have experienced accelerated degradation and aging, but also to areas that could potentially experience such degradation and aging. It can be interpreted that all areas with conditions similar to those where degradation is found shall require augmented examination. As a result, it is possible that large areas of containment surfaces shall be subject to ultrasonic thickness measurement in accordance with the augmented examination requirements of IWE-2500(c)(2). The requirement to perform examinations on 100% of these areas is excessive and may expose personnel to increased radiological exposure, with no compensating increase in quality or safety. 100% Examination is unwarranted if an appropriate examination plan is established that provides an equivalent level of assurance that potential degradation can be detected.

An alternative sampling plan for selecting areas to be examined using an ultrasonic thickness measurement method is provided in Table 1 of this request.

Table 1 permits the use of a sampling plan that complies with the Normal Sampling Plan specified in Table 2-1 of EPRI NP-7218, "Guideline for the Utilization of Sampling

Plans for Commercial-Grade Item Acceptance (NCIG-19)", Project Q101-07, Final Report, June 1992. The use of the Normal Sampling Plan as detailed in this alternative is justified for the following reasons:

1. Lot homogeneity.

Table 1 requires that the lot size be limited to areas which are subject to similar service conditions. This helps to ensure lot homogeneity within the areas subject to augmented examination.

2. Lot attributes.

The critical characteristic of the lot (wall thickness) can be easily verified using the required examination method. Another critical characteristic of the lot (leak-tightness) is verified through periodic leak-testing in accordance with 10 CFR 50, Appendix J.

3. Component safety significance.

The Reactor containment provides an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment. Although the containment serves an important safety function, its function is less critical than that of safety class 1 systems such as reactor coolant systems which are subject to examination under ASME Code, Section XI, Subsection IWB.

4. Performance history.

Although licensees have identified degradation to containment pressure boundary materials, there have been no documented cases where the leak-tight integrity of the containment pressure boundary has resulted from wall thickness loss. As a result, it is unlikely that ultrasonic thickness measurements will reveal areas where degradation is unacceptable, even if 100% examination is performed.

5. Designation of areas subject to ultrasonic thickness measurement.

IWE-1241 requires that areas likely to experience accelerated aging and degradation require augmented examination. However, IWE does not specifically address areas where the risk of potential degradation is low or where expected service

conditions have an undetermined effect on containment surface areas. An advantage to allowing an appropriate sampling plan is that areas with marginal degradation risk can now be examined in accordance with IWE without excessive hardship or unusual difficulty. IWE does not contain risk-based provisions which would allow an Owner the flexibility to establish appropriate examination requirements, commensurate with the anticipated risk of degradation.

6. Additional verifications of containment integrity.

10 CFR 50, Appendix J Type A leakage tests provide assurance of containment leak-tight integrity. Option B to Appendix J was approved in 1996 primarily because the performance history of these tests justified reducing the required test frequency.

Also, 10 CFR 50.55a (b) (2) (x) (A) requires that a licensee evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of or result in degradation to such inaccessible areas. When such degradation is detected by visual examination, the inaccessible surface areas would be evaluated. If these areas can be examined using an ultrasonic thickness measurement method, such areas would be subject to augmented examination in accordance with IWE-2420(b). This provision will help to ensure that the sampling plan would be modified to include these additional areas.

The proposed alternative will provide an equivalent level of quality and safety in lieu of the augmented examination requirements of IWE-2500(c) and Table IWE-2500-1, Examination Category E-C for all containment surfaces subject to augmented examination and will minimize personnel radiological exposure associated with performing these examinations.

**V. Alternative Examination(s):**

The alternative below provides more appropriate examination requirements for areas subject to augmented examination in accordance with IWE-1240.

In lieu of the requirements of IWE-2500(c)(1) and IWE-2500(c)(2), the following alternative is proposed:

(1) Surface areas accessible for visual examination shall be visually examined using a VT-1 visual examination method.

(2) Surface areas accessible only from the opposite side shall be examined for wall thinning using an ultrasonic thickness measurement method in accordance with Section V, T-544.

Please note that both sides of a component part need not be subject to augmented examination if conditions which warrant the augmented examination occur on one side only. The "surface areas" listed above are those subject to augmented examination.

In lieu of the requirements of IWE-2500(c)(3) and IWE-2500(c)(4), the following alternative is proposed:

(3) When ultrasonic thickness measurements are performed, grids not exceeding one foot square shall be used. The size and location of examination areas shall be determined by the Owner.

(4) Ultrasonic thickness measurements shall be used to determine the minimum wall thickness within each grid. The location of the minimum wall thickness shall be recorded or marked so that periodic reexamination of that location can be performed in accordance with Table 1, Examination Category E-C.

In lieu of the requirements of Table IWE-2500-1, Examination Category E-C, Containment Surfaces Requiring Augmented Examination, the following table (Table 1) is proposed.

**TABLE 1**

<b>EXAMINATION CATEGORY E-C, CONTAINMENT SURFACES REQUIRING AUGMENTED EXAMINATION</b>							
<b>Item No.</b>	<b>Parts Examined</b>	<b>Examination Requirements/ Fig. No.</b>	<b>Examination Method</b>	<b>Acceptance Standard</b>	<b>Extent and Frequency of Examination (See Notes 1 through 4)</b>		<b>Deferral of Inspection to End of Interval</b>
					<b>1st Inspection Interval</b>	<b>Successive Inspection Intervals</b>	
E4.10	Containment Surface Areas	IWE-2500(c)	Visual, VT-1	IWE-3512.1 IWE-3512.2	100% of Surface Areas Identified by IWE-1242	100% of Surface Areas Identified by IWE-1242	Not Permissible
E4.11	Visible Surfaces						
E4.12	Surface Area Grid, Minimum Wall Thickness Locations	IWE-2500(c)	Ultrasonic Thickness Measurement	IWE-3512.3	100% of Minimum Wall Thickness Locations during each Inspection Period (See Note 5)	100% of Minimum Wall Thickness Locations during each Inspection Period (See Note 5)	Not Permissible

**NOTES:**

- (1) Containment surface areas requiring augmented examination are those identified in IWE-1240.
- (2) Except as permitted in Note 5, the extent of examination shall be 100% for each inspection period until the areas remain essentially unchanged for three inspection periods. Such areas no longer require augmented examination in accordance with IWE-2420(c).

**TABLE 1**

**EXAMINATION CATEGORY E-C, CONTAINMENT SURFACES REQUIRING AUGMENTED EXAMINATION**

- (3) Examinations need not be performed on grids obstructed by structures, components, or permanent plant equipment, except that an alternate grid shall be substituted for any grid selected using the sampling plan below when more than 75% of that grid is obstructed.
- (4) If an examination detects a wall thickness that is less than 95% of the nominal plate thickness (less undertolerance), an evaluation shall be performed to determine the extent of additional examinations required.
- (5) The following sampling plan may be used for surface areas requiring ultrasonic thickness measurement:

(a) Surface areas shall be divided into lots. Each lot shall consist of areas subject to similar service conditions which have, or could cause accelerated degradation and aging. Grids of uniform size not less than 6 inches square, nor larger than one foot square shall be selected at random from within each lot. The lot size shall be equal to the total number of grids within 100% of the lot area.

(b) The sample size shall be defined as the number of grids within each lot to be selected for examination. The sample size shall comply with the following:

<u>Lot Size</u>	<u>Sample Size</u>	<u>Lot Size</u>	<u>Sample Size</u>	<u>Lot Size</u>	<u>Sample Size</u>
1	1	57-62	12	127-132	23
2-4	2	63-69	13	133-138	24
5-6	3	70-76	14	139-144	25
7-11	4	77-83	15	145-150	26
12-20	5	84-90	16	151-162	27
21-24	6	91-96	17	163-174	28
25-28	7	97-102	18	175-186	29
29-32	8	103-108	19	187-198	30
33-41	9	109-114	20	199-210	31
42-50	10	115-120	21	> 210	32
51-56	11	121-126	22		

- (c) If the minimum wall thickness within each selected grid remains essentially unchanged for three consecutive inspection periods, the lot from which the sample was drawn no longer requires augmented examination in accordance with IWE-2420(c).

**VI. Justification for Granting Alternative:**

The purpose of IWE-2500(c) and Table IWE-2500-1, Examination Category E-C is to require either visual or ultrasonic thickness measurement of areas subject to augmented examination to ensure containment leak-tight or structural integrity. The proposed alternative satisfies this requirement, but eliminates examinations that are not necessary to provide this assurance. This alternative also provides a sampling plan for areas subject to ultrasonic thickness measurements that provides an equivalent level of quality and safety without imposing a hardship or unusual difficulty. Augmented examinations performed in accordance with this alternative will also eliminate unnecessary radiological exposure to examination personnel.

**VII. Implementation Schedule**

First Inspection Interval for IWE.

Evaluated By: \_\_\_\_\_

Date: \_\_\_\_\_

*Paul J. Felt*  
3-10-98

Reviewed By: \_\_\_\_\_

Date: \_\_\_\_\_

*D.E. Demet*  
3-11-98