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February 1, 2010

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-002
Response to Request for Additional Information

On May 4, 2009, Duke submitted Relief Request 09-MN-002 pursuant to 10 CFR 50.55a(a)(3)(i) requesting NRC approval for an alternative to the weld repair requirements of the ASME Code, Section XI, IWA-4400.

On December 16, 2009, the NRC Staff electronically requested additional information regarding this relief request. This additional information, along with the Duke response, is attached.

If you have any questions or require additional information, please contact P.T. Vu at (980) 875-4302.

Sincerely,

Regis T. Repko

Attachment

A047
NRR

xc:

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ATTACHMENT

Relief Request 09-MN-002

Response to NRC Request for Additional Information

Response to NRC Request for Additional Information (Relief Request #09-MN-002)

1. *Discuss whether the buried piping under consideration expected to carry water that has an elevated tritium content.*

   Response: The proposed alternative will not be used on buried piping that is expected to carry water with elevated tritium levels. The water being carried is directly from Lake Norman or the Standby Nuclear Service Water Pond and tritium levels are at background levels.

2. *Please specify the diameter, wall thickness, service pressure, and material specification of the buried piping.*

   Response: Nuclear Service Water (RN) System buried piping has the following range of properties:

Diameter:	36 to 42 inches
Nominal Wall Thickness:	0.5 inches
Design Pressure:	25 to 35 psig
Design Temperature:	95 to 150 degrees, F
Material Specification:	Carbon Steel, A-134 Gr 283C, SA-155 Gr C55, SA 285 Gr C, SA-155 Class 1 Gr KC70

   Diesel Fuel Oil (FD) System buried piping has the following range of properties:

Diameter:	2 to 3 inches
Nominal Wall Thickness:	ANSI Schedule 10 and Schedule 40
Design Pressure:	0 to 30 psig
Design Temperature:	90 degrees, F
Material Specification:	Stainless Steel, SA-312 TP304, SA-403 TP304

   Please note that Duke plans to excavate portions of the above RN System piping for inspections during 2010. However, Duke plans to use this alternative, if necessary, for other Class 3 components that are not buried as noted in 4.2 of the original request.

3. *Discuss whether mechanical clamping devices will be used to replace the piping pressure boundary covered under this relief request and provide a description of their application and inspection.*

   Response: Mechanical clamping devices will not be used at locations where the provisions of this Relief Request are to be used.

4. *Reexamination and NDE was described in paragraph 3b of "Proposed Alternative and Basis for Use." Discuss how the modification will be designed to allow for reexamination of the defective area.*

   Response: One design configuration that would allow for reexamination would be to install a branch piping connection fitted with a blind flange that could be removed for future examinations. Please note that Duke does not plan to use this type of configuration for buried piping applications. See additional information in Duke's response to question 6a below.

5. *Discuss whether and how the repair modification will be examined during the next refueling outage after the repair to confirm the rate of defect propagation and structural integrity of the modification. Please provide justification if the repair modification will not be examined during the next refueling outage.*

   Response: See Duke's response to question 6a below.

6. *The repair examination frequency is to be determined by the projected rate of corrosion.*

   a. *If there is already through-wall leakage, since the time at which corrosion started and the time at which the defect became through-wall are not known, discuss how the projected rate of corrosion can be determined.*

   Response: Duke agrees that it is difficult to determine an accurate corrosion rate for locations where through-wall leakage is detected because the time at which corrosion started and the time at which the defect became through-wall are not known. Because of this, Duke intends to use the alternative detailed in 5.1 and 5.3.c of our request for nearly all locations where a welded encapsulation will be used in accordance with this request. For those locations where the alternative detailed in 5.1, 5.3.a, and 5.3.b of our request will be used, Duke proposes to perform a reexamination of the repair area within 5 years of completing the repair, or sooner if required by the engineering evaluation. The frequency of subsequent reexaminations shall be based on the corrosion rate determined from consecutive examinations, not to exceed 10 years.

   Where the alternative detailed in 5.1 and 5.3.c of our request is used, a reexamination of the repair area is not required for the reasons described below.

   A code compliant repair can be accomplished by welding a coupling or pipe cap to the exterior surface of the component, provided the defective portion of the component wall has been removed and is not relied on for pressure boundary integrity. For this type of repair, a relief request is not required. Figure 1 shows an example of a code compliant repair of this nature.

   If the defective portion of the component wall has not been removed prior to welding a coupling or pipe cap over the defective area, Duke believes that the requirement of IWA-4400 has not been met and that the repair/replacement activity is not considered to be in compliance with the requirements of the ASME Code, Section XI. Figure 2 shows an example of this type of repair/replacement activity that complies with the proposed alternative in 5.1 and 5.3.c of our request. For the proposed alternative shown in Figure 2, there is actually more material remaining in the component wall within the welded encapsulation than is provided by the code compliant repair shown in Figure 1. Please note that Duke plans to install protective coatings material into the encapsulation following completion of the repair/replacement activity, system leakage test and VT-2 visual examination, provided the wooden plug (or other temporary seal) continues to seal the defective area sufficiently to allow for installation of the protective coatings material. Installation of protective coatings will eliminate concern that the interior surfaces of the encapsulation and its attachment weld will be subject to conditions that could cause continued corrosion. For these reasons, Duke believes that the proposed alternative provides an acceptable level of quality and safety as that afforded by the code compliant repair/replacement activity shown in Figure 1.

b. *Discuss how the projected rate of corrosion of the encapsulation and pipe will be determined when the environment to which they are exposed may be different than that for the buried piping itself, e.g., stagnant water between the encapsulation and the pipe wall could result in an enhanced corrosion rate of both the pipe as well as the encapsulation.*

Response: Duke agrees that the rate of corrosion within the encapsulation could be different than that within the pipe for those locations where degradation has resulted in a through-wall defect. However, if protective coatings are installed in the encapsulation, Duke believes that the environmental conditions within the encapsulation will not be conducive to corrosion.

For the alternative detailed in 5.1, 5.3.a and 5.3.b of our request, the re-examination shall be performed within 5 years of completing the repair (or sooner if required by the engineering evaluation) to ensure that any accelerated corrosion within the encapsulation has not resulted in an unacceptable rate of wall thickness loss.

For the alternative detailed in 5.1 and 5.3.c of our request, a re-examination of the repair area is not proposed. Because the design of the encapsulation does not rely on any of the component wall material within the interior diameter of the encapsulation for pressure retaining function, accelerated corrosion of this material is not a concern. Accelerated corrosion of the encapsulation and its attachment welds could occur and could result in a future through-wall leak in the encapsulation. For RN System applications where protective coatings have not been installed within the encapsulation, Duke proposes to address this concern by performing a VT-2 visual examination of ground surfaces in the vicinity of these repair areas during each inspection period to confirm the absence of such leakage. Duke's Corrective Action Program would address correction of any leakage detected during these examinations.

7. *When the defect is not through-wall, discuss how the welded encapsulation will be locally pressure tested.*

Response: Because the welded encapsulation could become the new pressure boundary, a valid pressure test shall be performed to confirm that the encapsulation and its attachment welds to the component pressure boundary are leak-tight.

For welded encapsulations that use a threaded coupling (or pipe cap with a drilled and tapped hole), a local pressure test shall be performed using an external pressurization source. For welded encapsulations that use a branch piping connection and blind flange, the blind flange shall be supplied with a fitting that shall be used to perform the local pressure test.

Upon completion of the pressure test and VT-2 visual examination, protective coatings material shall be installed into the encapsulation, and the welded encapsulation will be fitted with a threaded plug that will be seal-welded to the exterior surface of the encapsulation. As indicated in our request, protective coatings shall be corrected on external surfaces of the pipe and the encapsulation upon completing the repair/replacement activity.

8. *For the following hypothetical scenarios, please briefly describe the anticipated repair design, structural integrity analysis, the repair procedure, the NDE of the modification and the pressure test. Please include sketches if appropriate.*

   a. *Pitting over a 10 square inch area without through-wall leakage.*

   Response: A defective area of 10 square inches that results from pitting would be encapsulated in accordance with our proposal. The design of the encapsulation shall be in accordance with all applicable requirements of the component construction code. The encapsulation would be attached to the component using a full-penetration weld to the outside surface of the component and would conform to the requirements of the construction code. Applicable non-destructive examination required by the construction code would be performed on the full penetration weld. Pressure testing would be performed as described in our response to question 7.

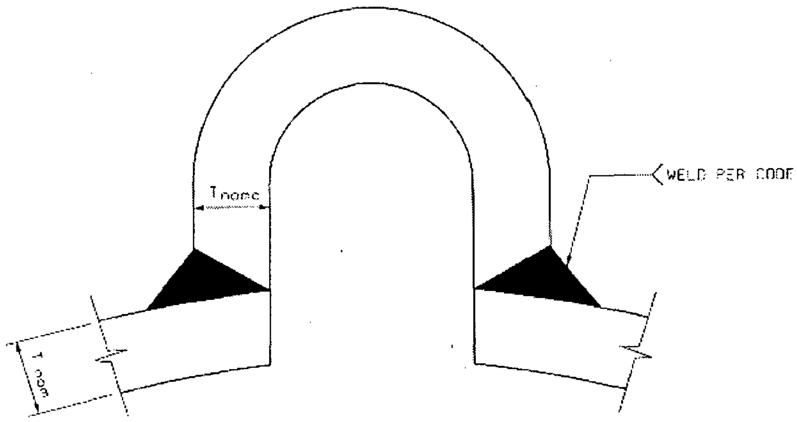
   b. *Pitting over a 1 square foot area with significant (>1 gallon per minute) through-wall leakage.*

   Response: A defective area of 1 square foot that results from pitting would be encapsulated, examined, and tested as indicated in our response to question 8.a, provided the leakage can be arrested sufficiently to allow the encapsulation to be installed.

   c. *Generalized corrosion and wall thinning over a 10 square foot area without through-wall leakage*

   Response: Recognizing that the proposed scenarios are hypothetical, Duke does not expect to find an area as large as 10 square feet that would require repair, based on geotechnical testing for soil resistivity and experience with other comparable uncovered piping.

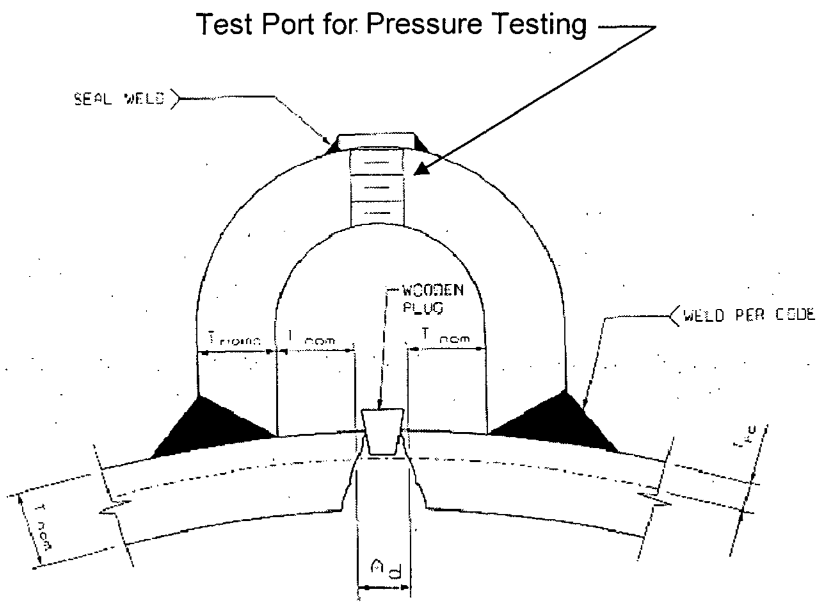
   Additionally, Duke plans to utilize the proposed repair alternative where the effects of pitting are localized. An example of such a localized degradation might be the result of a Microbiologically Induced Corrosion (MIC) attack or a small coating holiday where the pitting is significantly exceeding wall thinning caused by general corrosion.



T_{nom} - NOMINAL WALL THICKNESS

T_{nomc} - NOMINAL PIPE CAP WALL THICKNESS

Figure 1 (Example of Code-Compliant Repair)



T_{nom} - NOMINAL WALL THICKNESS

T_{nomc} - NOMINAL PIPE CAP WALL THICKNESS

T_{rc} - MINIMUM WALL THICKNESS REQUIRED FOR CODE COMPLIANCE

A_d - DEFECTIVE AREA

Figure 2 (Example of Repair/Replacement Conforming to Proposed Alternative)