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

Subject: Duke Energy Carolinas, LLC (Duke Energy)
McGuire Nuclear Station, Unit 1
Docket No. 50-369
Relief Request Serial #09-MN-002, Revision 1, Response to Request for Additional Information

By letter dated May 4, 2009, Duke Energy submitted Relief Request #09-MN-002 for the use of an alternative to the requirements of the American Society of Mechanical Engineer Boiler and Pressure Vessel Code, Section XI, IWA-4400 for McGuire Nuclear Station, Unit 1. By letters dated February 1, 2010 and September 28, 2010, Duke Energy provided responses to additional information requested by the NRC staff. As part of the response dated September 28, 2010, Duke Energy also provided Revision 1 of RR 09-MN-002.

On November 10, 2010, the NRC staff electronically requested additional information regarding Revision 1 of this request. Enclosure 1 to this letter provides specific responses to this request for additional information. In addition, Duke Energy would like to clarify that all responses to NRC questions documented in the submittals listed above remain valid, except as noted or clarified below.

1. February 1, 2010 Submittal, Response 6.a

   Revision 1 of this request no longer includes an alternative as previously described in 5.3.a and 5.3.b of Revision 0 of this request. All repairs made in accordance with Revision 1 will be encapsulation type repairs as initially described in 5.3.c [Revision 0]. As such, an engineering evaluation and the reexaminations specified in the February 1, 2010 Submittal, Response 6.a are no longer proposed and are not included in the scope of Revision 1 of this request. These provisions were applicable only to the alternatives detailed in 5.3.a and 5.3.b of Revision 0 of this request.

2. February 1, 2010 Submittal, response 6.b

   Revision 1 of this request no longer includes an alternative as described in 5.3.a and 5.3.b of Revision 0 of this request.

   Revision 1 of this request also requires the installation of sealant within the encapsulation to protect internal surfaces of the encapsulation (and external surfaces of the pipe wall within the encapsulation) from corrosion. In addition, a visual examination of above ground surfaces in the vicinity of each encapsulation is now proposed to be performed at least once during each Unit 1 operating cycle to confirm the absence of leakage from the modified portion of the buried piping.

   Therefore, paragraphs 2 and 3 of the response provided in 6.b are no longer applicable.

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3. February 1, 2010 Submittal, Figure 2

   The inside diameter of the encapsulation (as shown in Figure 2) may need to be increased to ensure an acceptable service life, in accordance with provisions documented in Enclosure 1 of this response. However, the minimum inside diameter of the encapsulation shall be determined in accordance with dimensions shown in Figure 2.

Duke Energy requests NRC approval of this request by January 17, 2011 to support schedules for excavating and inspecting portions of the RN System buried piping in 2011.

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

Sincerely,

HD Brewer for

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Enclosure

xc:

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Enclosure 1

McGuire Nuclear Station, Unit 1

Relief Request #09-MN-001, Revision 1

Response to Request For Additional Information

1. The inside diameter of the Nuclear Service Water (RN) piping at McGuire 1 likely experiences nearly the same corrosion conditions over its entire length. If unacceptable loss of wall is found in the area examined, what examination sample expansion will be performed to ensure that adequate examination coverage?

   Response: 1.a. *When the proposed alternative is used to repair a defective area resulting from external corrosion, all external surfaces of the piping within 5 feet on each side of the repair area shall be visually examined to confirm the absence of similar conditions requiring repair.*

   1.b. *When the proposed alternative is used to repair a defective area resulting from internal corrosion, all external surfaces of the piping within 5 feet on each side of the repair area shall be examined ultrasonically using 6" grids. These examinations provide reasonable assurance that the structural integrity of the piping has not been challenged.*

   1.c. *To monitor the condition of buried piping in other locations that are not exposed as a result of excavation, periodic visual examinations of ground surfaces in the vicinity of buried RN piping, as specified in Relief Request #09-GO-001*[1] *shall be performed. Revision 1 of this relief request also includes a requirement to perform visual examinations of ground surfaces during each refueling cycle at locations where the proposed alternative has been used. These visual examinations provide reasonable assurance that any through-wall leakage would be detected. Upon detection of leakage during these visual examinations, the condition would be entered into Duke Energy's corrective action program and appropriate corrective actions taken to address the condition.*

2. Continued internal corrosion should not challenge the structural integrity of the encapsulation. The NRC staff finds that the proposed corrosion rate value used, 4 mils per year, is not conservative since this rate of corrosion would not result in through wall leakage at the current piping age.

   a. Justify not using a value of the corrosion rate that is the greater of the through-wall corrosion rate (wall thickness divided by current time in service) or the defect lateral expansion corrosion rate (maximum diameter of the defective area divided by current time in service) to determine the life of the repair.

      Response: *Duke Energy agrees that a repair that encapsulates a defect has a defined service life that is dependent on the lateral growth of the defective area not exceeding the inside diameter of the encapsulation. The service life of this type of repair is also dependent on the growth of through-wall corrosion at the periphery of the encapsulation. The following information describes how Duke Energy will determine the service life of this type of repair. The service life of an encapsulation (as indicated below) may be extended, provided the repair area is reexamined prior to the end of the*

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[1] *Safety Evaluation Dated February 18, 2010, ADAMS Accession No ML100470359*

projected service life of the repair. The calculated corrosion rates, based on these reexaminations, may be used to determine the remaining life of the repair.

a.1. *For external corrosion that does not result in through-wall leakage, Duke Energy believes that the encapsulation, corrective coatings restoration, and installation of sealant within the encapsulation should be sufficient to arrest the cause of the degradation. However, to ensure that any future internal corrosion subsequent to the repair would not challenge the encapsulation before the end of the service life of the pipe, the design of the encapsulation for this condition shall be based on corrosion rates listed in a.2 below. The lateral corrosion rate listed in a.2.1 below shall be used after internal corrosion is projected to result in a through-wall defect in the pipe wall.*

a.2. *For external corrosion that results in through-wall leakage, the encapsulation, corrective coatings restoration, and installation of sealant within the encapsulation should be sufficient to arrest the cause of the degradation. However, general corrosion from the interior of the pipe is still possible. Therefore, Duke Energy proposes to determine the service life of the encapsulation for this condition as follows:*

1. *The lateral corrosion rate (in any single direction) of the defective area shall be not less than 8 mils/year, which is approximately 4 times the average general corrosion rate and 2 times the average pitting corrosion rate of surfaces on the interior of the RN pipe, based on data collected during the service life of the RN piping. Use of internal corrosion rates to determine the lateral growth of the defective area is considered appropriate because corrosion will be arrested on the exterior of the pipe.*
2. *The through-wall corrosion rate shall be calculated using the measured wall thickness loss (based on nominal wall thickness or actual thickness documented in the construction records) at the periphery of the encapsulation divided by the length of time the component has been in service, multiplied by a factor of 2 (for conservatism). Duke Energy believes that the corrosion rate proposed for this determination provides reasonable assurance that the service life of the encapsulation can be conservatively calculated.*

a.3. *For internal corrosion, the service life of the encapsulation shall be determined as follows:*

1. *The lateral corrosion rate (in any single direction) of the defective area shall be calculated using ½ the diameter of the*

defective area divided by the length of time the component has been in service, multiplied by a factor of 2 (for conservatism).

2. *The through-wall corrosion rate shall be calculated using the measured wall thickness loss (based on nominal wall thickness or actual thickness documented in the construction records) at the periphery of the encapsulation divided by the length of time the component has been in service, multiplied by a factor of 2 (for conservatism).*

b. If continued corrosion of the pipe wall resulted in structural failure of the pipe supporting the encapsulation and a hole that is the maximum encapsulation diameter were to form, would there be a reasonable expectation that the system could still perform its function?

Response: *Duke Energy believes that because of the low system operating pressure (≤ 35 psig), it is unlikely that a catastrophic structural integrity failure of the type suggested would occur before through-wall leakage would be detected. The RN System is designed to perform its safety function assuming a single failure. Therefore, a single failure of the type described would not prevent the RN System from performing its safety function.*

3. Since the repair procedure requires welding on water-backed P-No. 1 base material:

a. Will temper bead technique similar to that described in IWA-4650 be used?

Response: *The intent of the temper bead technique is to temper the Heat Affected Zone (HAZ) when a hard microstructure is produced as an effect of welding. Duke Energy Welding and Metallurgical engineers reviewed the materials and their associated specification grades for MNS 1 and determined they have low hardenability. Duke Energy plans to use stringer beads to deposit the weld in the branch connection groove and reinforcing fillet. Because the stringer bead technique is expected to produce tempering in the HAZ, the temper bead technique was considered but determined to be unnecessary to achieve an acceptable microstructure.*

b. Will there be a 48-hour wait after completion of welding to perform the surface examination?

Response: *Yes.*