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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

Pursuant to 10 CFR 50.55a(a)(3)(i), Duke hereby submits the enclosed alternative to the weld repair requirements of the ASME Code, Section XI, IWA-4400.

The enclosed alternative is needed to allow for potential repairs that may be necessary when portions of the Class 3 Nuclear Service Water (RN) System buried piping are excavated and inspected in 2010, and will eliminate the need for submitting an expedited relief request should areas requiring repair be detected during these inspections. The proposed alternative will reduce the risk to system operation, should Duke need to make repairs on buried portions of this system, and will allow similar repair methods to be used in other Class 3 applications. The proposed alternative provides for an acceptable level of quality and safety, consistent with 10 CFR 50.55a(a)(3)(i).

To support schedules for planning the excavation and inspection of the RN System piping as documented in this request, approval is requested by December 15, 2009.

The enclosure 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

Enclosure

xc:

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Enclosure

Duke Energy Corporation
McGuire Nuclear Station, Unit 1
Relief Request Serial #09-MN-002

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(i)

## 1. ASME Code Component(s) Affected

ASME Class 3 components.

## 2. Applicable Code Edition and Addenda

ASME Code, Section XI, 1998 Edition with the 2000 Addenda.

Use of this Code edition and addenda was approved by the NRC, as documented in the Safety Evaluation Report for Duke Relief Request #RR-03-001, Rev. 1, dated November 17, 2004.

## 3. Applicable Requirement

IWA-4410 requires that welding, brazing, defect removal, and installation activities be performed in accordance with IWA-4420.

IWA-4422 specifies requirements for defect removal and examination.

Relief is requested from the requirement of IWA-4400 that defective portions of components be removed prior to performing a repair/replacement activity by welding.

## 4. Reason for Request

The alternative documented in this request will allow limited use of repair/replacement methods that will not require the removal of defective areas on Class 3 components. Duke believes that the proposed alternative will provide an acceptable level of quality and safety, and will minimize complications associated with performing repairs in accordance with IWA-4000 for reasons described below.

1. McGuire plans to excavate and inspect portions of buried Class 3 Nuclear Service Water (RN) Low Level Intake supply piping for external visual and ultrasonic examination during 2010 in accordance with requirements of the McGuire Buried Piping Integrity Program. This program was developed for the purpose of maintaining the safe and reliable operation of all buried piping systems within its scope, including portions of the RN System, and was developed in direct response to INPO SER 7-06 and WANO SER 2006-2, "Degradation of Essential Service Water Piping". Although there is no regulatory commitment associated with excavating and examining portions of buried RN supply piping, Duke Energy believes that these examinations will help to confirm the structural and leak-tight integrity of these components, providing additional assurance that this system can continue to perform its intended safety function.

If excessive wall thinning or through-wall leakage resulting from corrosion is detected in buried piping, the defective areas would require repair in accordance with the ASME Code, Section XI, 1998 Edition with the 2000 Addenda, IWA-4000. Prior to performing repair/replacement activities by welding, the defective portions of the component must be removed.

For repair of excessive wall thinning caused by corrosion initiated on the O.D. of the component (without through-wall leakage), weld overlay on the exterior of the pipe could jeopardize the integrity of the pressure boundary during welding, resulting in leakage. For the RN system, the Low Level Intake Supply Piping is a single header that is shared between Units 1 and 2, and it cannot be isolated, depressurized, and drained to permit other types of repairs.

For repair of defective areas where through-wall leakage is detected, the defective area must be removed. The defective area can then be replaced using weld material, installation of a new pressure retaining part, or by the installation of a branch connection that is designed in accordance with the requirements of the Construction Code. The Low Level Intake Supply Piping is a single header that is shared between Units 1 and 2, and cannot be isolated, depressurized, and drained to permit weld repair or the replacement of a new pressure retaining part. As such, the only practical repair method is the installation of a branch connection using a hot-tap machine that can make this repair during system operation (which can also be used to repair excessive wall thinning caused by corrosion). This repair method is not desirable for the following reasons:

- Hot-tapping the RN pipe could result in a portion of the pipe wall dislodging, entering the system, and becoming debris that could hinder system operation and make it difficult to retrieve the loose material.
- Typically, this type of branch connection installation results in a mechanical joint being installed on the new branch connection after the hot-tap is completed. Installation of a mechanical joint in a buried application is not desirable because it introduces a new path for potential system leakage.
- This method is considerably more complicated than encapsulating the defective area. In addition, the removal of material from the pipe wall could increase the risk that unacceptable leakage could occur in the event that the hot-tapping activity encounters a problem.

2. For Class 3 components that are not buried and cannot be isolated by means of valves during system operation, or cannot otherwise be removed from service during plant operation, repair techniques identical to those listed above for buried piping repairs would be required. For reasons identical to those detailed above, these types of repairs create unnecessary risks to system operation.

   Use of the alternative proposed in this request will eliminate the potential risks to system operation, as described above.

## 5. Proposed Alternative and Basis for Use

In lieu of the requirement of IWA-4400 to remove the defective portion of the component prior to performing repair/replacement activities by welding, the following alternative is proposed:

For Class 3 components where unacceptable wall thickness loss or through-wall leakage has been caused by general or pitting corrosion, the defective portion of the component need not be removed prior to performing repair/replacement activities by welding, provided the following conditions are met:

1. The defective area shall be encapsulated on the O.D. of the component using pressure retaining parts that comply with the Construction Code and Owner's requirements.
2. For corrosion initiated on the component O.D. that is not through-wall, the corrosion shall be arrested by encapsulating the affected area to eliminate continued exposure to the applicable degradation mechanism. In addition, protective coatings shall be repaired on component surfaces in the vicinity of the repair area, upon completion of the repair/replacement activity.
3. For corrosion initiated on the component I.D., corrosion initiated on the component O.D. resulting in through-wall leakage, or corrosion initiated from both the component I.D. and O.D., the repair/replacement activity shall comply with the following:
    a. An engineering evaluation shall be performed to determine the projected rate of corrosion. Successive examinations shall be scheduled using a conservative assumption that the actual corrosion rate is twice the projected rate, and shall be completed prior to the date on which the defective area is projected to propagate beyond the I.D. of the encapsulation.
    b. The repair/replacement activity shall be designed to allow for reexamination of the defective area to confirm that the unacceptable wall thickness loss has not propagated beyond the I.D. of the modification. Successive examinations shall be performed at the prescribed frequency (not to exceed 10 years) and shall continue to be performed until such time that the condition of the defective area is confirmed by reexamination to be essentially unchanged from that previously recorded, or the defect is removed. The nondestructive examination method used to detect the initial condition shall be used during successive examinations, except that alternative nondestructive examination methods may be used, provided the requirements of IWA-2240 are met.
    c. In lieu of performing an engineering evaluation and successive examinations as prescribed above, the following alternative may be used

for components where it is not feasible to design the repair/replacement activity to allow for reexamination of the defective area:

The repair/replacement activity shall be designed such that the I.D. of the encapsulation is greater than the maximum diameter of the defective area plus twice the nominal thickness of the component. In addition, the nominal thickness of the pressure retaining part and connecting weld attached to the component pressure boundary shall be equal to, or greater than, the nominal wall thickness of the component to which it is welded. This option may be used when the defective area is located on a component where examination of the defective area from the component O.D. could be accomplished only by installing a mechanical connection that could be disassembled to allow for reexamination, or on other Class 3 components where the component geometry (or system operational limitations) precludes performing direct or remote examinations from the component I.D.

4. The modification shall be pressure tested in accordance with IWA-4540 upon completion of the repair/replacement activity to confirm the leak-tight integrity of the modification and its connecting welds to the component pressure boundary. The modification shall be tested locally if it cannot be confirmed that the modification has been exposed to system pressure during the system leakage test.
5. Encapsulation of a defective area on a component shall be used only once at each discrete location requiring correction by repair/replacement activity.

The basis for the proposed alternative is as follows:

The proposed alternative for Class 3 components is acceptable because it eliminates risks associated with weld overlay repairs and branch connection installations using a hot-tapping machine, and because it includes appropriate requirements to address the following issues:

1. Pressure testing the modification
2. Flaw growth evaluation
3. The maximum number of times an encapsulation may be used to repair a defective area without removing the defective area.
4. Successive examinations required to confirm that any continued corrosion will not cause the defective area to propagate beyond the limits of the encapsulation.
5. Alternative design requirements that will preclude the need for performing successive examinations on the defective area. The alternative design requirements are acceptable because the material provided in the encapsulation and its connecting welds provides a corrosion allowance that is equivalent to, or greater than, that available in an uncorroded section of the component wall.

For the reasons stated above, the proposed alternative provides an acceptable level of quality and safety.

## 6. Duration of Proposed Alternative

The proposed alternative is requested for the remainder of the McGuire Unit 1 3rd Inservice Inspection Interval, currently scheduled to end on December 1, 2011.

## 7. References

a. Letter dated November 17, 2004, providing NRC Safety Evaluation Report for Duke Energy Corporation Relief Request #RR-03-001, Revision 1.