

# Enclosure 1

Duke Energy Carolinas, LLC  
McGuire Nuclear Station, Unit 1

## Relief Request Serial #16-MN-003

Relief Requested in Accordance with 10 CFR 50.55a(z)(2) to use an Alternative to Defect Removal Prior to Performing Repair/Replacement Activities on Nuclear Service Water System Piping

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## 1 ASME Code Component(s) Affected

Nuclear Service Water (RN) System ASME Class 3 components listed below:

- 1.1 The 3 inch drain piping between valve 1RN-883 and its associated 8" diameter header as shown on MCFD-1574-03.00. This piping is a low point system drain on the supply side of the '1B' Diesel Generator Cooling Water Heat Exchanger. The associated 8" header ties into the 36" diameter '1B' Essential Supply Header. See Attachment 1 for the 3" pipe drain configuration at valves 1RN-883 and 1RN-884.
- 1.2 The 3 inch drain piping between valve 1RN-884 and its associated 8" diameter header as shown on MCFD-1574-03.00. This piping is a low point system drain on the discharge side of the '1B' Diesel Generator Cooling Water Heat Exchanger. The associated 8" header ties into the 36" diameter '1B' Essential Discharge Header.
- 1.3 Design data applicable to the above piping is provided below from Duke Energy Specification MCS-1206.00-02-0002 and McGuire Flow Diagram MCFD-1574-03.00:
- 1.4 Design data applicable to the above piping is as follows:
  - Nominal Wall Thickness: 0.216 inches
  - Design Pressure: 135 psig
  - Design Temperature: 150 degrees, F
  - Material of Construction: Carbon Steel
  - Internal Coatings: None

## 2 Applicable Code Edition and Addenda

ASME Code, Section XI, 2007 Edition with the 2008 Addenda.

## 3 Applicable Requirements

- 3.1 IWA-4400 specifies requirements for welding, brazing, metal removal, fabrication, and installation.
- 3.2 IWA-4420 specifies requirements for defect removal, evaluation, 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

- 4.1 Relief is requested from the requirement of ASME Code, Section XI, 2007 Edition with the 2008 Addenda, IWA-4400 to remove defects on the piping identified in this request, prior to performing repair/replacement activities by welding.
- 4.2 This request is submitted to allow the installation of pressure retaining parts that will be used to encapsulate locally thinned areas of the 3 inch RN piping between: 1) valve 1RN-883 and the 8" supply header to the '1B' Diesel Generator Heat Exchanger, and 2) valve 1RN-884

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and the 8" discharge header from the '1B' Diesel Generator Heat Exchanger. The pipe wall thickness loss that challenges structural integrity is limited to the area of piping directly adjacent to the interface between the weld between the valve body and the carbon steel pipe.

- 4.3 Duke Energy believes that requiring removal of defective portions of this piping prior to performing repair/replacement activities represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety for reasons identified in this request.

## 5 Proposed Alternative and Basis for Use

- 5.1 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:

- 5.1.1 The defective area shall be encapsulated with a section of split section of pipe. The lengthwise cut shall be symmetrical along the long axis to provide two pieces for clam-shell type installation. Attachment 2 illustrates an example of an acceptable encapsulation configuration
- 5.1.2 The encapsulation pipe shall be A-106 carbon steel material suitable for installation on Duke Class C piping.
- 5.1.3 The encapsulation shall be secured by appropriately sized fillet welds circumferentially at the ends while the lengthwise welds shall be partial penetration on both sides. Each piece shall be beveled upon the long axis to create the necessary configuration for partial penetration welds. The ends shall be cut at 90 degrees to the long axis to provide the appropriate fillet weld geometry.
- 5.1.4 The internal diameter of the encapsulation shall be sized such that it is a tight fit to the pipe subject to being repaired.
- 5.1.5 Appropriate gasket material or sealant may be used between sleeve and base piping to eliminate water / welding concerns if necessary.
- 5.1.6 The modification shall be designed such that the piping system no longer relies on the encapsulated parts for structural integrity or leak tightness.
- 5.1.7 Prior to installation of replacement pressure retaining parts, an ultrasonic examination shall be performed to characterize the defective and locally thinned area(s) and to confirm the absence of cracks or crack-like indications.
- 5.1.8 Encapsulation of the defective or locally thinned area(s) at this location shall be performed only once.
- 5.1.9 Weld inspections will be completed upon

- 5.2 The basis for the proposed alternative is as follows:

- 5.2.1 Isolation of an RN Essential Header removes a complete train of safety related equipment and its associated emergency diesel generator from service resulting in a high probabilistic risk configuration affecting multiple accident scenarios. Compensatory measures required for the mitigation of all of the possible impacted scenarios would be a significant burden.
- 5.2.2 Removal of defective portions of this piping would require that the '1B' RN Essential Header be isolated and depressurized.

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1. Duke Energy believes that it would be a challenge to isolate the '1B' Essential Header, complete the required repairs, and return the affected train to service within the limits of Technical Specification 3.7.7, Condition A Allowed Outage Time of 72 hours.
  2. Installation of a mechanical line stop in the 3 inch piping is not possible since there is only approximately 3 inches of pipe length between 8" and the valves both drain valves.
  3. Installation of a mechanical line stop in the 8 inch piping is not possible since the configuration of both of the 8" pipes to their respective 36" headers is such as to make mechanical line stops impractical.
  4. Installation of mechanical line stops in the 36 inch piping might be possible. However, this is not desirable because this activity could result in metal shavings or the removed 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.
  5. Use of a freeze seal to isolate the 3 inch pipe is not possible due to the short length of drain piping.
  6. Use of a freeze seal to isolate the 8 and 36 inch pipe is not practical due to the pipe location where significant quantities of gas storage cylinders would be required to be maintained.
- 5.2.3 Duke Energy believes that the proposed alternative to IWA-4400 will provide reasonable assurance of continued structural integrity of the component until permanent repairs are made in compliance with the Construction Code and Owner's requirements during the next refueling outage.
- 5.2.4 For the reasons stated above, Duke Energy believes that complying with IWA-4400 requirements to remove defective portions of this piping prior to performing a repair/replacement activity represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

## 6 Duration of Proposed Alternative

The proposed alternative is requested until the next Unit 1 refueling outage in Fall 2017, (designated as 1EOC25).

## 7 References

- 7.1 Letter dated March 28, 2011, transmitting the NRC Safety Evaluation for McGuire Nuclear Station Unit 1 Relief Request Serial #09-MN-002, Revision 1 (ML110800426)
- 7.2 ASME PCC-2-2015, "Repair of Pressure Equipment and Piping"

## 8 Attachments

- 8.1 Attachment 1, "Details of Pipe Layout for valves 1RN-883 and 1RN-884", MC-1418-14.41-02, Revision 51
- 8.2 Attachment 2, "Temporary Encapsulation Repair for 1RN883 and 1RN884"

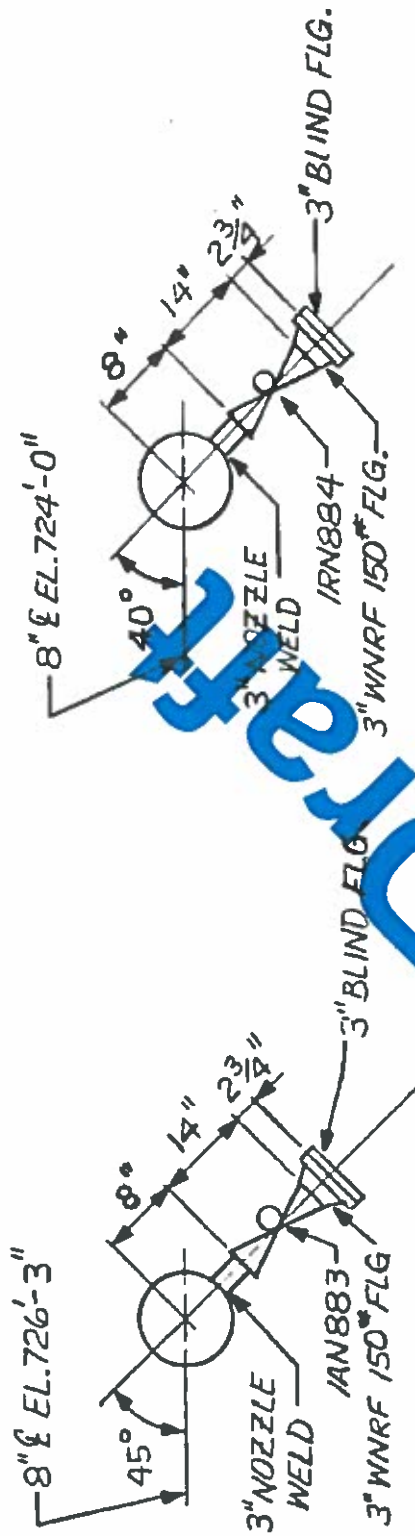
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# Attachment 1

"AS-BUILT" PIPING LAYOUT FOR 1RN883 AND 1RN884  
MC-1418-14.41-02, Revision 51

FOR DIMENSIONAL AND CONFIGURATION REFERENCE ONLY.  
NOT TO SCALE

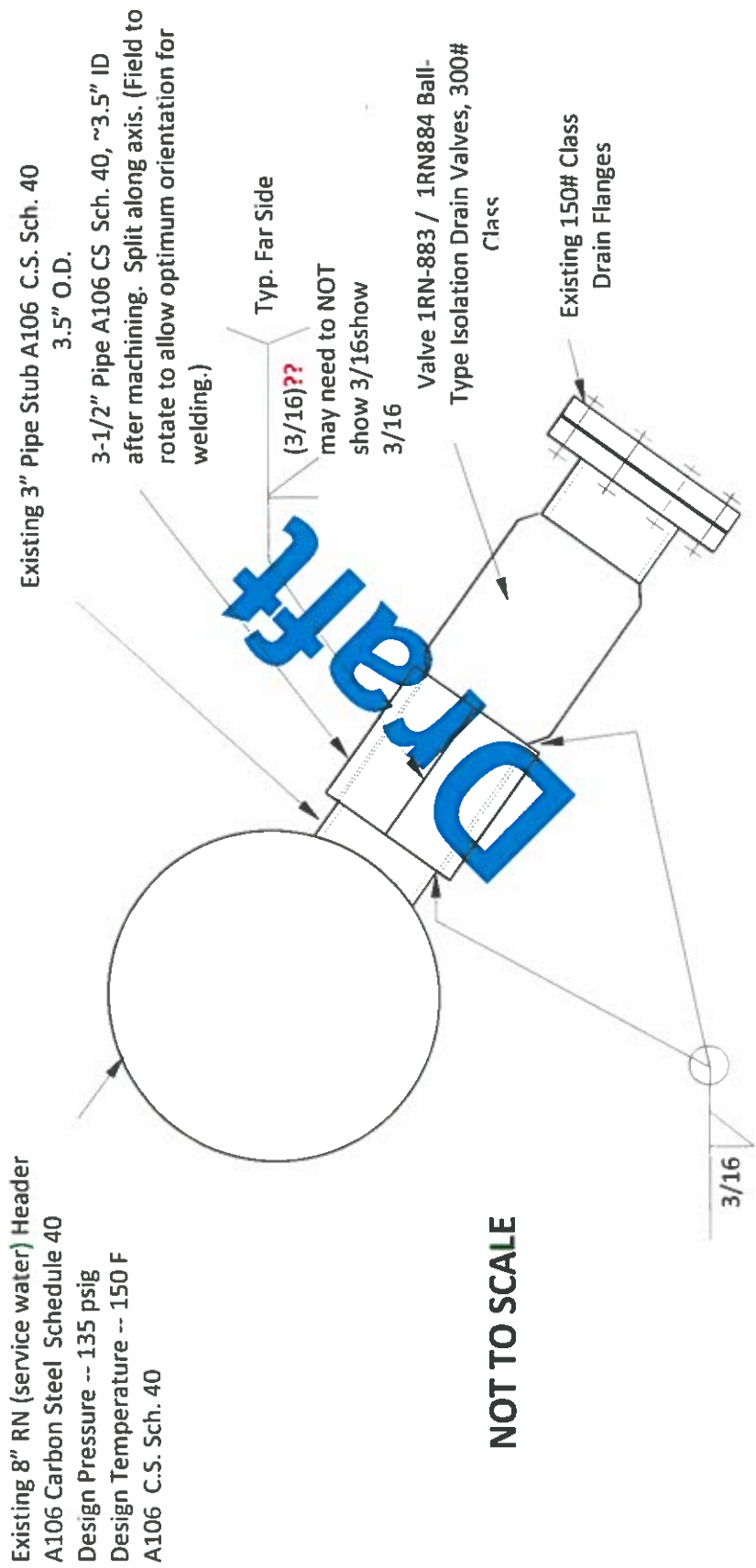


DETAIL B  
LOOKING EAST  
SCALE 1/2" = 1'-0"

DETAIL D  
LOOKING EAST  
SCALE 1/2" = 1'-0"

# Attachment 2

## TEMPORARY ENCAPSULATION REPAIR FOR 1RN883 AND 1RN884



**NOT TO SCALE**

**NOTE:** Appropriate gasket material or sealant may be used between sleeve and base piping to eliminate water / welding concerns if necessary.