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10 CFR 50.55a

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Duke Energy Carolinas, LLC (Duke)
McGuire Nuclear Station Units 1 and 2
Docket Nos. 50-369 and 50-370
Proposed Alternative Request No. 09-MN-005
Alternative Leakage Testing for Various ASME Code Class 1 Piping and Components

Pursuant to 10 CFR 50.55a(a)(3)(ii), Duke hereby requests NRC approval of proposed alternative testing for the remainder of the Third Ten-Year Inservice Inspection Interval at McGuire Nuclear Station. The third intervals are currently scheduled to expire on December 01, 2011 for Unit 1 and July 14, 2014 for Unit 2. This submittal pertains to system leakage testing for various ASME Code Class 1 piping and components connected to the Reactor Coolant System. The details of the request are included in the enclosure. Duke requests approval of this request within one calendar year of the submittal date.

This submittal contains no regulatory commitments.

If there are any questions or if additional information is needed, please contact M. K. Leisure at (980) 875-5171.

Sincerely,

Bruce Hamilton

Bruce H. Hamilton

Enclosure

A047
NRR

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ENCLOSURE

REQUEST NO. 09-MN-005

Duke Energy Corporation

Request Number 09-MN-005

Proposed Alternative in Accordance With 10CFR50.55a(a)(3)(ii)

--Hardship or Unusual Difficulty
Without Compensating Increase in Level of Quality or Safety--

Station: McGuire Nuclear Station **Unit(s):** 1 & 2 Third 10 Year Interval

Systems Designation Legend:
NC – Reactor Coolant System (or RCS)
NV – Chemical Volume and Control System
ND – Residual Heat Removal System (or RHR)
NI – Safety Injection System

I. ASME Code Components Affected:

ASME Code Class 1 piping and components connected to the RCS that are isolated from direct RCS pressure (2235 psig) during normal operation by their location, either upstream of a check valve, between two check valves or between two closed valves that must remain closed during the unit's operation in Modes 1, 2 or 3 **The specific portions of piping for which relief is requested are described below.**

Notes: *a.) Valve/component numbers listed in this request correspond to both units 1 and 2 piping and components unless otherwise specified.*
b.) RCS double isolation valves in this request are described as inboard or outboard valves relative to their location from the RCS loop(s).
c.) Marked drawings that show the affected portions of piping are included in Attachment 2 to this request.
d.) *Piping segment lengths are given in approximate total run of piping components (excluding valve bodies) as installed for each individual pipe size.*

Portion 1:
2 inch Class 1 Auxiliary Pressurizer Spray piping and components upstream of inboard check valve NV-22 out to and including outboard RCS isolation valves NV-21A (globe valve) and NV-841 (check valve).

Portion 1 piping is shown on Attachment 2 drawings MCFD-1554-01.02 and MCFD-2554-01.02, while the piping materials and segment lengths, listed by nominal pipe size (NPS) are listed in Attachment 1.

Portion 2:
14 inch Class 1 RHR suction piping and components between the RCS series isolation gate valves ND-1B and ND-2AC, along with the ¾ inch branch line out to globe valve ND-54.

Portion 2 piping is shown on Attachment 2 drawings MCFD-1561-01.00 and MCFD-2561-01.00 while the piping materials and segment lengths, listed by NPS are listed in Attachment 1.

Portion 3:
1½ inch Class 1 piping and components between each cold leg supply series double isolation check valve pair (including the outboard check valve):

- NI-15 and NI-354 for cold leg loop 1,
- NI-17 and NI-347 for cold leg loop 2,
- NI-19 and NI-348 for cold leg loop 3,
- NI-21 and NI-349 for cold leg loop 4.

Portion 3 piping is shown on Attachment 2 drawings MCFD-1562-01.00 and MCFD-2562-01.00 while the piping materials and segment lengths, listed by NPS are listed in Attachment 1.

Portion 4:
10 inch, 6 inch, 2 inch, 1 inch and ¾ inch Class 1 Safety Injection piping and components within the boundaries listed below, including the outboard Pressure Isolation Valve (PIV) check valves NI-59, NI-70, NI-81 and NI-93:

- Cold Leg Accumulator (CLA) isolation (gate) valves NI-54A, NI-65B, NI-76A, NI-88B
- Safety Injection pump and RHR pump outboard PIVs:
  - check valves NI-171 and NI-175 for loop 1
  - check valves NI-169 and NI-176 for loop 2
  - check valves NI-167 and NI-180 for loop 3
  - check valves NI-165 and NI-181 for loop 4
- To inlet side of CLA, Safety Injection inboard PIV check valves NI-60, NI-71, NI-82, NI-94
- Globe valves NI-362, NI-364 and NI-366 for Unit 1, and the inline flow restrictor (d=0.375 inch) for Unit 2, installed in each of five 1 inch branch off lines as Class 1 to Class 2 breaks.
- Inline flow restrictor (d = 0.375 inch) installed on each of two 3/4 inch branch connections off the injection header for each loop.

Portion 4 piping is shown on Attachment 2 drawings MCFD-1562-02.00, -02.01, -03.01 and MCFD-2562-02.00, -02.01 and -03.01 while the piping materials and segment lengths, listed by NPS are listed in Attachment 1.

Portion 5:
8 inch, 6 inch, 2 inch 1 inch and ¾ inch Class 1 Safety Injection piping and components within the following boundaries:

- between each of the following hot leg supply series check valves (including the upstream check valve) listed below:
  - loop 1 PIVs NI-156 and NI-157
  - loop 2 PIVs NI-128 and NI-134, including NI-129 from the RHR Pump
  - loop 3 PIVs NI-124 and NI-126, including NI-125 from the RHR Pump
  - loop 4 PIVs NI-159 and NI-160.
- Globe valves NI-423, NI-370 and NI-368 for Unit 1, and the inline flow restrictors (d = 0.375 inch) for Unit 2, installed in each of three 1 inch branch off lines as Class 1 to Class 2 breaks.
- Inline flow restrictor (d = 0.375 inch) installed on one 3/4 inch branch connection off the injection header for each loop.

Portion 5 piping is shown on Attachment 2 drawings MCFD-1562-03.00 and MCFD-2562-03.00 while the piping materials and segment lengths, listed by NPS are listed in Attachment 1.

Portion 6:
1 inch Class 1 piping and components between and including the double isolation vent valve pairs as described below:

- NI-362 and NI-363, on CLA injection header 1A (Unit 1 only)
- NI-364 and NI-365 on CLA injection header 1B (Unit 1 only)
- NI-366 and NI-367 on CLA injection header 1B (Unit 1 only)
- NI-423 and NI-418 on hot leg injection loop 1A (Unit 1 only)
- NI-370 and NI-371 on hot leg injection loop 1B (Unit 1 only)
- NI-368 and NI-369 on hot leg injection loop 1C (Unit 1 only)
- NC-226 and NC-227 on cold leg 1C (Unit 1 only)
- NC-228 & NC-229 on cold leg 1D (Unit 1 only)

Also the 2 inch and 1 inch Class 1 piping and components within the RCS Cross-over Drain boundaries described below:

- NC-4, NC-5 and NC-224 for Loop 1,
- NC-94, NC-95 and NC-113 for Loop 2,
- NC-13, NC-106 and NC-115 for Loop 3,
- NC-19, NC-253 and NC-111 (including NC-20) for Loop 4.

Portion 6 piping is shown on Attachment 2 drawings MCFD-1553-01.00, MCFD-1562-02.00, -03.00 and MCFD-2553-01.00 while the piping materials and segment lengths, listed by NPS are listed in Attachment 1.

Portion 7:

1 inch Class 1 piping and components associated with the Reactor Vessel Head Vent path between and including the following vent valve pairs:

- NC-272AC and NC-273AC (remote solenoid operated Reactor Head vent valves)
- NC-274B and NC-275B, (remote solenoid operated Reactor Head vent valves)
- NC-238 and NC-22 (manually operated Reactor Head vent valves).

Portion 7 piping is shown on Attachment 2 drawings MCFD-1553-01.00, -02.01, MCFD-2553-01.00 and -02.01 while the piping materials and segment lengths, listed by NPS are listed in Attachment 1.

II. Applicable Code Edition and Addenda:

The 1998 Edition with 2000 Addenda of the ASME Boiler and Pressure Vessel (B&PV) Code, Section XI.

III. Applicable Code Requirement:

IWB-5221(a) The system leakage test shall be conducted at a test pressure not less than the pressure corresponding to 100% rated reactor power.

IWB-5222(b) The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all class 1 pressure retaining components within the system boundary.

Application of the above ASME Code requirements to all Class 1 piping and components would require performance of a system leakage test at or near the end of each 10 year ISI Interval that would extend a test pressure equal to the nominal operating pressure associated with 100% rated reactor power (i.e. 2235 psig) to all Class 1 pressure retaining piping and components connected to the Reactor Coolant System. This would include the portions of Class 1 piping and components that are normally isolated from receiving (or can not be verified to receive) 2235 psig due to their location either upstream of a check valve, between two check valves or between two closed valves that must remain closed during the unit's operation in Modes 1, 2 or 3

IV. Reasons for Request:

In accordance with 10 CFR 50.55a(a)(3)(ii), the following discussion provides the basis of how complying to the above Code requirements would result in a hardship or unusual difficulty to the station without a compensating increase in the level of quality and safety. The hardship conditions are described below as they pertain to specific portions (as described in Section I) of the Class 1 piping.

Portions 1, 3, 4 and 5 have check valves as the inboard RCS Class 1 isolation valve, which would require their pressure test be performed with the unit at **full RCS operating pressure** to meet the Code requirements. Use of an alternate test pressure rig (hydro pump) to attain RCS pressure under such conditions would pose a potential personnel safety hazard associated with operating such a temporary rig on a system at RCS pressure (2235 psig). This would require that personnel be stationed near open vent or drain valves, exposing them to unnecessary personal safety hazards in the event of a leak from the non-class test pressure rig connections. A break at any connection in the rig under such conditions (temporary non-code connections under RCS test pressure) would pose a substantial personnel safety hazard.

Additionally, pressurization of any such piping segment in this manner would likely unseat the series Class 1 check valves, creating the potential for a Loss of Coolant Accident (LOCA) through the non-class test pressure rig connections. Such an event involving Portions 4 and 5 piping would require those segments to undergo re-testing of the PIVs in accordance with Technical Specification LCO 3.4.14 for unit start-up.

For the remaining Portions 2, 6 and 7, use of such a test rig to test those isolated portions of piping to **full RCS operating pressure** would still have to include application of a compatible pressurized medium. This would result in personnel stationed near open vent or drain valves, exposing them to unnecessary personal safety hazards in the event of a leak from the non-class test pressure rig connections. A break at any connection of the rig under such conditions (temporary non-code connections under RCS test pressure) would pose a substantial personnel safety hazard.

Additional reasons stemming from hardships (as they apply to specific Portions of piping) are given below.

Reasons for Request Specific to Portion 1:

Performing a pressure test on the Portion 1 piping to the Code requirement (at full RCS pressure) by initiating auxiliary pressurizer spray flow at full RCS pressure would create (constitute) a severe thermal design transient ("*Inadvertent Auxiliary Spray*") due to the captive piping fluid volume at ambient containment temperature (~110°F). This design transient has a limited number of allowed cycles (10 total for the life of the plant) per the McGuire Updated Final Safety Analysis Report (UFSAR) Section 5.2.1.5 & UFSAR Table 5-2. The transient would also violate the maximum allowed differential temperature limit specified by Selected Licensee Commitment (SLC) 16.5.8.c, which limits the differential temperature between spray water and pressurizer steam space to 320°F. If this limit is exceeded, then an engineering evaluation must be performed to determine the effects of the cold water on the structural integrity of the pressurizer.

Reasons for Request Specific to Portion 2:

This piping is part of the RHR suction supply header from the 1C/2C RCS hot leg. Normal operational practice prohibits alignment of the inboard Class 1 RHR suction isolation valve (ND-1B) at full RCS operating pressure and temperature. Technical Specification Limiting Condition for Operation (LCO) 3.4.14 imposes allowable leakage limits for PIVs (as referenced in UFSAR Table 5-50), that prohibit opening ND-1B during Modes 1 through 3.

ND-1B is further equipped with a permissive open interlock which requires RCS pressure to be <~385 psig. The ND-1B interlock is a safety-related function to preclude the potential for an inter-system LOCA. Opening ND-1B at full RCS operating pressure to support testing of Portion 2 piping to the Code requirement would require that the interlock be defeated and would breach the double isolation valve barrier of the RCS boundary from the RHR system. This would create an inability to mitigate a LOCA if a break was to occur in the 14 inch piping between valves ND-1B and ND-2AC, thereby reducing the plant's margin of safety. ND-1B was not designed to assure closure against the resulting differential pressure associated with such a line break.

Additionally, opening valve ND-1B to allow RCS pressure into this piping (including the ¾ inch branch line up against globe valve ND-54) would subject the piping downstream of ND-54 branching to Containment atmospheric vent valve ND-90 and to in-line valve ND-91 routed to the test header, to serve as part of the 10CFR50.55a(c)(2)(ii) required double isolation valve barrier for the RCS. While the ¾ inch piping between valves ND-54, ND-90 and ND-91 is designed for RCS pressure and temperature, any pre-existing minor (pinhole) leakage past valve ND-54 would likely be intensified by direct RCS pressure applied to the valve's seat, and pressurize the short section of non-ASME Code (Duke Piping Class E) ¾ inch piping between the three valves to RCS pressure. This would subject valves ND-90 and ND-91 (and their seats) to RCS pressure, which could result in an intersystem LOCA.

Reasons for Request Specific to Portion 3:

These piping segments are associated with the High-Head Safety Injection supply to the RCS cold-legs. Normal operational practice prohibits establishment of flow through isolation valves NI-9A, NI-10B, or NI-3 with full RCS pressure, except for emergency or transient conditions. Alignment of this flow-path with full RCS pressure conditions during Mode 3 would constitute a safety injection, and further result in a cold leg thermal design transient for the associated piping and valves (design limit is 50 for the life of the plant).

Reasons for Request Specific to Portion 4:

These piping segments are associated with the Low and Medium-Head Safety injection supply to the RCS cold leg on each loop. During normal operation in Mode 3 (with RCS pressure >1000 psig) this piping segment is pressurized to the CLA pressure of ~600 psig. The piping segment can also be pressurized by the RHR or Medium-Head Safety Injection pumps. However, during normal operation with full RCS pressure, flow through these piping segments cannot be established.

During Mode 3 operation with full RCS pressure, use of the Medium-Head Safety Injection pump to pressurize this piping segment (to ~1400 psig) could result in unseating the inboard RCS PIV check valve and create the potential for an inter-system LOCA, as well as breach the double isolation valve barrier of the RCS boundary. Technical Specification LCO 3.4.14 imposes allowable leakage limits for PIVs, whereby the pressure test could result in required entry into the associated LCO action statement if a PIV were to become unseated (Reference UFSAR Table 5-50). Similar station risk could result from the use of an alternate test pressure rig to achieve full RCS operating pressure.

Reasons for Request Specific to Portion 5:

These piping segments are associated with the Medium and Low-Head Safety Injection supply to the RCS hot legs. The piping can be pressurized by alignment of the Medium Head Safety Injection (NI) Pumps through the normally closed hot leg isolation valves (NI-121A, NI-152B). The piping segments which supply hot leg loops 2 & 3 can be pressurized with the Low Head Safety Injection (ND) pumps. However, flow through these piping segments cannot be established during normal operation with full RCS pressure due to pump head limitations.

Normal operational practice prohibits alignment of these flow-paths above Mode 4, except for emergency or transient conditions. Alignment of these flow-paths above Mode 4 would constitute a manual safety injection, and could further result in a thermal design transient for the associated system medium with the hot leg injection nozzle. Alignment of the Medium Head Injection Pump hot leg flow-path would further require entry into the Technical Specification 3.5.2 action statement for an inoperable ECCS train.

Performance of a pressure test at full RCS pressure, or even with reduced Medium Head Injection Pump pressure could result in unseating RCS PIV check valves, and create the potential for an inter-system LOCA, as well as breach the double isolation valve barrier of the RCS boundary. Technical Specification LCO 3.4.14 imposes allowable leakage limits for PIVs, whereby the pressure test could result in required entry into the associated LCO action statement if a PIV were to become unseated. Similar station risk could result from the use of an alternate test pressure rig to achieve full RCS operating pressure.

Reasons for Request Specific to Portion 6:

These piping segments are associated with the double isolation vent valve pairs as well as the RCS cross-over piping (between the Steam Generator and Reactor Coolant Pump) drains on each loop. During normal operation all of the valves are maintained in a closed position, thus only the upstream side of the inboard isolation valve is assured to be exposed to full RCS pressure.

Opening the inboard manual RCS isolation valve at full RCS operating pressure to support testing the subject piping segments per the Code requirement would breach the double isolation valve barrier of the RCS boundary, resulting in a "single valve barrier" between the RCS pressure boundary and non-code piping within containment.

Reasons for Request Specific to Portion 7:

These three piping segments are located in the Reactor Vessel Head vent path. Two segments are in parallel and bounded by two solenoid operated valves in series. SLC 16.5.10 prohibits opening either of these inboard reactor head vent solenoid operated valves during normal operation in Modes 1 through 4. The third segment is bounded by two manually operated valves. Opening the inboard manual reactor head vent isolation valve is also prohibited during Modes 1 through 4.

Since no isolation is possible from either the Reactor Vessel or the Pressurizer Relief Tank without significant modification, and no connections exist between the valve pairs for connection, testing of the Reactor Head vent pipe by hydro pump or temporary jumper is not possible.

V. Proposed Alternative and Basis for Use

Alternative Testing for All Portions:

Duke Energy Corporation proposes to use reduced pressure testing as an alternative for the Code required pressure testing (described in Section III above) on the listed portions of piping and components. The basis for the alternative testing is described below. All test pressures shall be greater than or equal to 300 psig. These pressures are sufficient to provide for the detection of any through wall leakage in the tested piping and components. The pressure tests and VT-2 examinations performed at the lower pressures (as an alternative to the pressure requirement in IWB-5221(a)) are determined to provide an acceptable level of assurance of the structural integrity and operational readiness of the tested piping. Actual pressures used in testing of the various portions of piping will exceed 300 psig by as much as the test planning process and/or the station and system conditions at the time of testing will allow.

Through wall leakage that would occur at higher pressures such as RCS pressure would also reveal itself at lower pressures. It may take longer for some leaks to propagate through the piping wall at lower pressures but generally during reduced pressure testing, while the resulting leak rates would be reduced, the leakage would still be visible to VT-2 examination.

Pressure boundary leakage can be modeled as a fixed area orifice whose leakage varies proportional to the square root of the ratio of the differential pressures (reference CRANE Technical Paper #410). Therefore, if a leak L were projected to be present at 2235 psig, that same leak would be present at 300 psig, but with a magnitude of

$$\sqrt{\frac{300}{2235}} \times L = .37L$$

Inspections that reveal no leakage at test pressures $\geq$ 300 psig (where at least **37%** of the leakage produced by 2235 psig pressures would be present for detection during VT-2 examination) therefore give high confidence that no leakage would be present at 2235 psig.

Additionally, each portion of piping listed in this request will be VT-2 examined subsequent to the alternative testing described herein with the RCS at full temperature and pressure and in its normal alignment, as part of the inspection boundary for the 10 Year Interval Class 1 Leakage Test performed at unit start-up in Mode 3.

The proposed alternative testing would be performed in the Third Period of the Third Inservice Inspection Interval for both McGuire Units 1 and 2.

VI. Duration of Proposed Alternative:

Relief is requested for both units 1 & 2 for the remainder of their Third Ten-Year Interval of the ISI operating schedule, which are presently scheduled to expire on 12/01/2011 for Unit 1 and 07/14/2014 for Unit 2. Implementation of alternative testing would begin after receipt of approval of this Request from the NRC.

VII. Precedents:

The Nuclear Regulatory Commission granted similar relief to McGuire Nuclear Stations Units 1 and 2 (Docket Nos. 50-369 and 50-370) via the Commission's Safety Evaluation Report of August 29, 2002 (TAC Nos. MB5281 and MB5282) sent in response to the station's Request for Relief #01-003 dated June 4, 2002.

VIII. Attachments

A description of the piping materials installed for each portion of piping as well as the lengths of the piping segments for each NPS for which relief is requested is given in Attachment 1 to this RFR.

The boundaries of the Portions of Class 1 piping and components covered in this Request are indicated on the marked-up drawings (flow diagrams) listed below and included as Attachment 2 to this RFR.

Portion 1	MCFD-1554-01.02
	MCFD-2554-01.02
Portion 2	MCFD-1561-01.00
	MCFD-2561-01.00
Portion 3	MCFD-1562-01.00
	MCFD-2562-01.00
Portion 4	MCFD-1562-02.00
	MCFD-1562-02.01
	MCFD-1562-03.01
	MCFD-2562-02.00
	MCFD-2562-02.01
	MCFD-2562-03.01
Portion 5	MCFD-1562-03.00
	MCFD-2562-03.00
Portion 6	MCFD-1553-01.00
	MCFD-1562-02.00
	MCFD-1562-03.00
	MCFD-2553-01.00
Portion 7	MCFD-1553-01.00
	MCFD-1553-02.01
	MCFD-2553-01.00
	MCFD-2553-02.01

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ATTACHMENT 1

Piping Materials Size and Description

Portion 1 Piping

Description: Auxiliary Pressurizer Spray Piping

Piping Components	*NPS Diameter*	*Piping Material (Specification/Grade and Schedule Rating)*	*Design Pressure*	*Overall Length of Piping (Listed for each NPS)*
(Unit 1)				
Pipe	2"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	36.0 ft
(Unit 2)				
Pipe	2"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	36.0 ft

Portion 2 Piping

Description: RHR Suction Piping.

Piping Components	*NPS Diameter*	*Piping Material (Specification/Grade and Schedule Rating)*	*Design Pressure*	*Overall Length of Piping (Listed for each NPS)*
(Unit 1)				
Pipe	14"	Seamless Austenitic Steel, SA-376/TP-316 Schedule 140	2485 psig	91.0 ft
Pipe	3/4"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	0.5 ft
(Unit 2)				
Pipe	14"	Seamless Austenitic Steel, SA-376/TP-316 Schedule 140	2485 psig	91.0 ft
Pipe	3/4"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	1.0 ft

Portion 3 Piping

Description: High Head Safety Injection to the RCS cold-legs.

Piping Components	*NPS Diameter*	*Piping Material (Specification/Grade and Schedule Rating)*	*Design Pressure*	*Overall Length of Piping (Listed for each NPS)*
(Unit 1)				
Pipe	1 ½"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	1.0 ft
(Unit 2)				
Pipe	1 ½"	Seamless Austenitic Steel, SA-312/TP-304, Schedule 160	2485 psig	1.0 ft

Portion 4 Piping				
Description: Low and Medium-Head Safety Injection to the RCS cold-legs.				
Piping Components	***NPS Diameter***	***Piping Material (Specification/Grade and Schedule Rating)***	***Design Pressure***	***Overall Length of Piping (Listed for each NPS)***
(Unit 1)				
Pipe	10"	Seamless Austenitic Steel, SA-376/TP-316 Schedule 140	2485 psig	38.5 ft (Loop A) 43.5 ft (Loop B) 26.5 ft (Loop C) 28.0 ft (Loop D)
Pipe	6"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	42.5 ft (Loop A) 50.0 ft (Loop B) 38.0 ft (Loop C) 36.0 ft (Loop D)
Pipe	2"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	5.0 ft (Loop A) 0.5 ft (Loop B) 0.5 ft (Loop C) 4.0 ft (Loop D)
Pipe	1"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	2.0 ft (Loop A) 1.0 ft (Loop B) *No 1" pipe in Loops C or D*
Pipe	¾"	Seamless Austenitic Steel, SA-376 / TP-304 or SA-312 / TP-304 SMLS. Schedule 160	2485 psig	7.0 ft (Loop B) *No ¾" pipe in Loops A, C or D.*
(Unit 2)				
Pipe	10"	Seamless Austenitic Steel, SA-376/TP-316, Schedule 140	2485 psig	38.5 ft (Loop A) 43.5 ft (Loop B) 27.0 ft (Loop C) 28.0 ft (Loop D)
Pipe	6"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	43.5 ft (Loop A) 49.5 ft (Loop B) 39.5 ft (Loop C) 37.5 ft (Loop D)
Pipe	2"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	5.0 ft (Loop A) 0.5 ft (Loop B) 0.5 ft (Loop C) 4.0 ft (Loop D)
Pipe	1"	No 1" pipe in Loops A, B, C or D. Restrictors are welded directly to headers.	N/A	N/A
Pipe	¾"	No ¾" pipe in Loops A, B, C or D. Restrictors are welded directly to headers.	N/A	N/A

Portion 5 Piping				
Description: Medium and Low-Head Safgety Injection to the RCS hot-legs.				
Piping Components	***NPS Diameter***	***Piping Material (Specification/Grade and Schedule Rating)***	***Design Pressure***	***Overall Length of Piping (Listed for each NPS)***
(Unit 1)				
Pipe	8"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	50.0 ft (Loop B) 50.5 ft (Loop C) No 8" pipe in Loops A or C.
Pipe	2"	Seamless Austenitic Steel, SA-376 or 312/TP-304, Schedule 160	2485 psig	44.0 ft (Loop A) 2.0 ft (Loop B) 2.0 ft (Loop C) 44.5 ft (Loop D)
Pipe	1"	Seamless Austenitic Steel, SA-376 or 312/TP-304, Schedule 160	2485 psig	1.0 ft (Loop A) 0.5 ft (Loop B) 0.5 ft (Loop C) No 1" pipe on Loop D
Pipe	¾"	No 3/4" pipe installed. Restrictors were welded directly to the headers.	N/A	N/A
(Unit 2)				
Pipe	8"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160	2485 psig	50.0 ft (Loop B) 50.5 ft (Loop C) No 8" pipe in Loops A or D.
Pipe	2"	Seamless Austenitic Steel, SA-376/TP-304, Schedule 160 SMLS	2485 psig	42.0 ft (Loop A) 2.0 ft (Loop B) 2.0 ft (Loop C) 43.0 ft (Loop D)
Pipe	1"	No 1" pipe installed. Restrictors were welded directly to the headers.	N/A	N/A

Portion 6 Piping				
Description: Double isolation valve pairs for RCS vents and RCS crossover loop piping drains.				
Piping Components	***NPS Diameter***	***Piping Material (Specification/Grade and Schedule Rating)***	***Design Pressure***	***Overall Length of Piping (Listed for each NPS)***
(Unit 1)				
Pipe	2"	Seamless Austenitic Steel, SA-312 or 376/TP-304, Schedule 160	2485 psig	1.5 ft (Loop A) 1.5 ft (Loop B) 1.5 ft (Loop C) 12.5 ft (Loop D)
Pipe	1"	Seamless Austenitic Steel, SA-312 or 376/TP-304, Schedule 160	2485 psig	2.0 ft (Loop A) 1.5 ft (Loop B) 1.0 ft (Loop C) 0.5 ft (Loop D)
(Unit 2)				
Pipe	2"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	1.5 ft (Loop A) 6.0 ft (Loop B) 1.5 ft (Loop C) 12.5 ft (Loop D)
Pipe	1"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	1.0 ft (Loop A) 0.5 ft (Loop B) 1.0 ft (Loop D) No 1" pipe in (Loop C)
Pipe	1/2"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	1.0 ft (Loop C) No 1/2" pipe in Loops A, B or D

Portion 7 Piping				
Description: Reactor Vessel Head vent path.				
Piping Components	***NPS Diameter***	***Piping Material (Specification/Grade and Schedule Rating)***	***Design Pressure***	***Overall Length of Piping (Listed for each NPS)***
(Unit 1)				
Pipe	1"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	2.5 ft
(Unit 2)				
Pipe	1"	Seamless Austenitic Steel, SA-376/TP-304 Schedule 160	2485 psig	2.0 ft

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ATTACHMENT 2

McGuire Nuclear Station Flow Diagrams
(18 Drawings Attached)

NOTE: *These drawings are provided for Information Only*

The 18 Drawings specifically referenced in Attachment 2 have been processed into ADAMS.

These drawings can be accessed by within the ADAMS package or by performing a search on the Document/Report Number.