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April 27, 1988

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station, Unit 2
Docket No. 50-370
ASME Code Section XI Requirements
Relief Request No. 88-02

Gentlemen:

Pursuant to 10CFR 50.55a(g)(5)(iii), find attached the subject request for relief from ASME Code Section XI Requirements pertaining to McGuire Nuclear Station's Nuclear Service Water system. Included in the attachment is the request, applicable drawings, and material specifications. The request is being submitted prior to planned maintenance that will occur during the 1988 Unit 2 Refueling Outage; therefore, it is requested that NRC review and approve this request prior to May 27, 1988.

Pursuant to 10CFR 170.3(y), 170.12(c), and 170.21 find enclosed an application fee of $150.00.

Should there be any questions concerning this matter, please contact Steve LeRoy of Duke Nuclear Production Licensing at (704)373-6233.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

SEL/235/jgc

Attachment

xc: Dr. J. Nelson Grace
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
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Mr. W.T. Orders
NRC Resident Inspector
McGuire Nuclear Station

Mr. Darl Hood
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

A001 1/1 Add: NRR/BEST/MEB 4 encl 1 1 w/check $150 #19475967

DUKE POWER COMPANY

McGUIRE NUCLEAR STATION RELIEF REQUEST NO. 88-02

REQUEST FOR RELIEF FROM ASME CODE SECTION XI
REQUIREMENT DETERMINED TO BE IMPRACTICAL

1. Component for Which Relief is Requested:

   A. Name and Number:

      1. The welds associated with valve 2RN134, weld numbers RN2F128 and RN2F127, size 18 inches with a weld joint thickness of 0.375 inches, ASME SA-516 Grade 55 and ASME SA-285 Grade B materials. Both of these materials are P1 Group 1 materials referenced by QW-422 of ASME Section XI.

      2. The welds associated with valve 2RN235, weld numbers RN2F160 and RN2F159, size 19 inches with a weld joint thickness of 0.375 inches, ASME SA-516 Grade 55 and ASME SA-285 Grade B materials.

      These welds are associated with Unit 2 Nuclear Service Water (RN) system valves that require removal and replacement to perform maintenance.

   B. Function:

      The Nuclear Service Water (RN) system is a Nuclear Safety Related, open cooling system that provides cooling water from Lake Norman or the Standby Nuclear Service Water Pond (SNOWS) to various station heat exchangers during all modes of operation. In addition, the system acts as an assured source of makeup water for various requirements and is the normal supply of water for the Containment Ventilation Cooling Water (RV) system.

   C. ASME III Code Class:

      Equivalent Class 3

   D. Materials and Welds

      Welds RN2F127, RN2F128, RN2F159, and RN2F160 are groove welds with a joint thickness of 0.375 inches. All piping material is SA-106 Grade B and pipe size for all welds is 18 inches. The valve size for both valves is 18 inches and all valve material is ASME SA-516 Grade 55 and ASME SA-285 Grade B materials.

2. ASME Code Section XI Requirement That Has Been Determined to be Impractical:

   ASME B and PB Code Section XI, 1980 Edition through Winter 1980 Addenda, Article IWA-4400, IWA-5000

3. Basis for Requesting Relief:
   Hydrostatic testing of welds referenced in Section A of this request would be impractical based on the following reason:

A. The valves used for isolation of the Nuclear Service Water (RN) system are a butterfly type design and range in size from 18 inches up to 36 inches in size. Historically, these valves have not held design hydro pressure without significant leakage. These valves are welded into the system and cannot be easily removed without causing the same hydro problems that presently exist. The use of flanges in the RN system is limited, thereby limiting the use of blanks or blank flanges to enhance hydro capabilities. Additional hydro pump capacity is not available nor is it considered usable in this situation because hydro pump leakage, past the butterfly valve seats, could potentially over pressurize other vital equipment such as heat exchangers and critical instrumentation. System pressures range from 135 PSIG to 35 PSIG. The required design changes to install isolation values and/or the installation of blanks into the system to achieve hydro capability would place an additional burden of time, manpower, and planning on Duke without a commensurate increase in operational quality of the system. The RN system is a low temperature, low pressure system. Hydro pressure on the system would be 110% of design pressure or approximately 150 PSIG. Duke feels that the additional MT or PT examination requirement compensates for the difference in hydro pressure and inservice inspection pressure.

4. Alternative Testing:

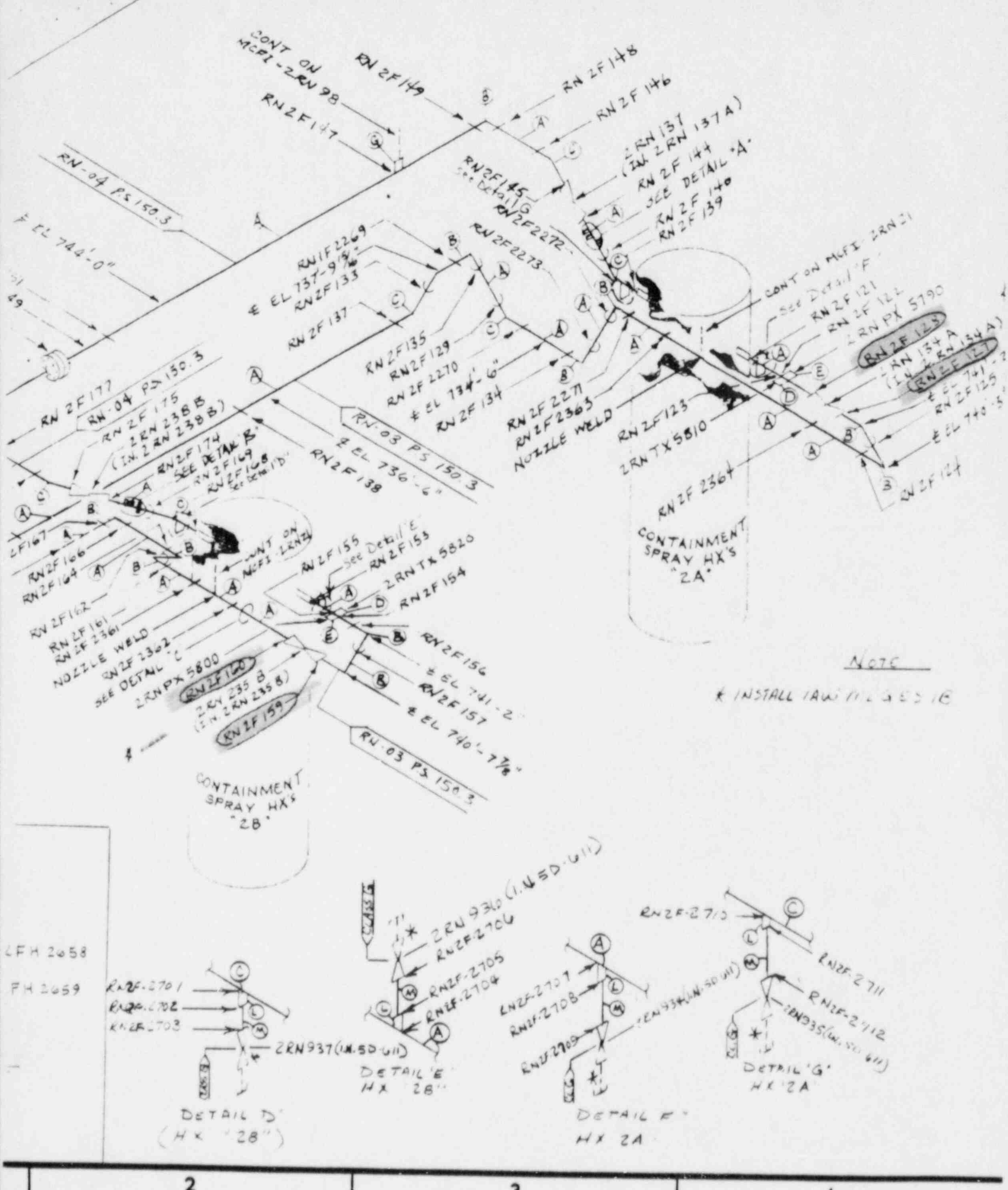
All welding shall be subject to a dye penetrant or magnetic particle examination on root pass and also final welding pass. An inservice leak test at system pressure and temperature shall also be performed on all welds.

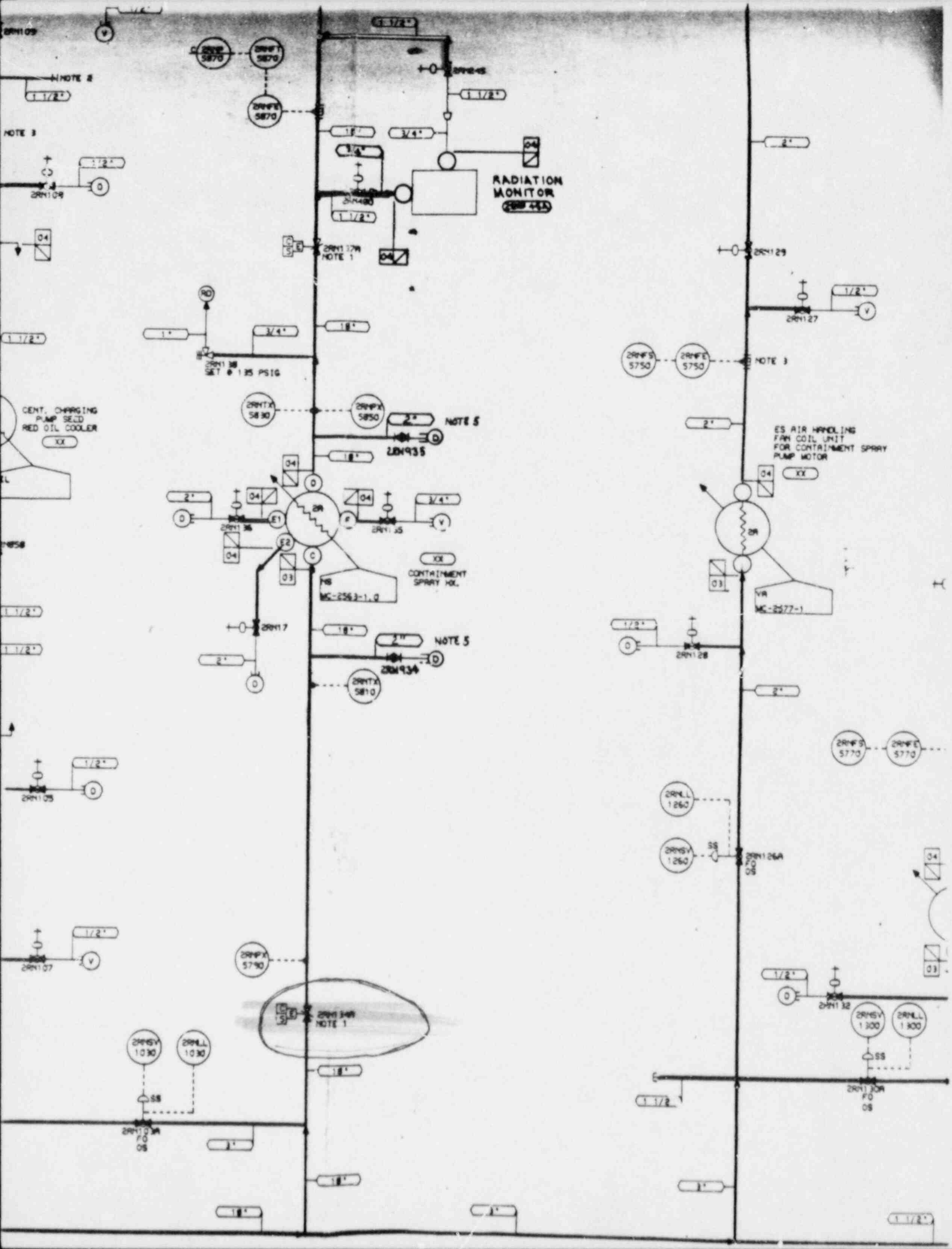
5. Why the Alternate Proposed Testing Will Provide an Acceptable Level of Quality and Safety:

A. The ASME Code requires only a Dye Penetrant (PT) inspection or Magnetic Particle (MT) inspection on the finished weld surface for greater than 4 inches NPS. We impose an additional PT or MT examination on the root pass weld which would detect any defects in the root weld. An inservice leak test at system pressure and temperature would detect any leaks or defects in welds while the system is filled with liquid and under operating pressure. The section of the RN system in question operates at a low design pressure and temperature of 135 PSIG and 95 degrees-F respectively. Duke Power considers the alternate and additional examinations more than adequate to ensure safe and consistent operational reliability of the system. The basis for the alternate testing in that the examinations will detect any defects that would have otherwise been exposed by the pressure differential between the operating pressure and hydrostatic testing pressure. Thus, the probability of detecting any additional weld defects by hydrostatic testing is extremely low.

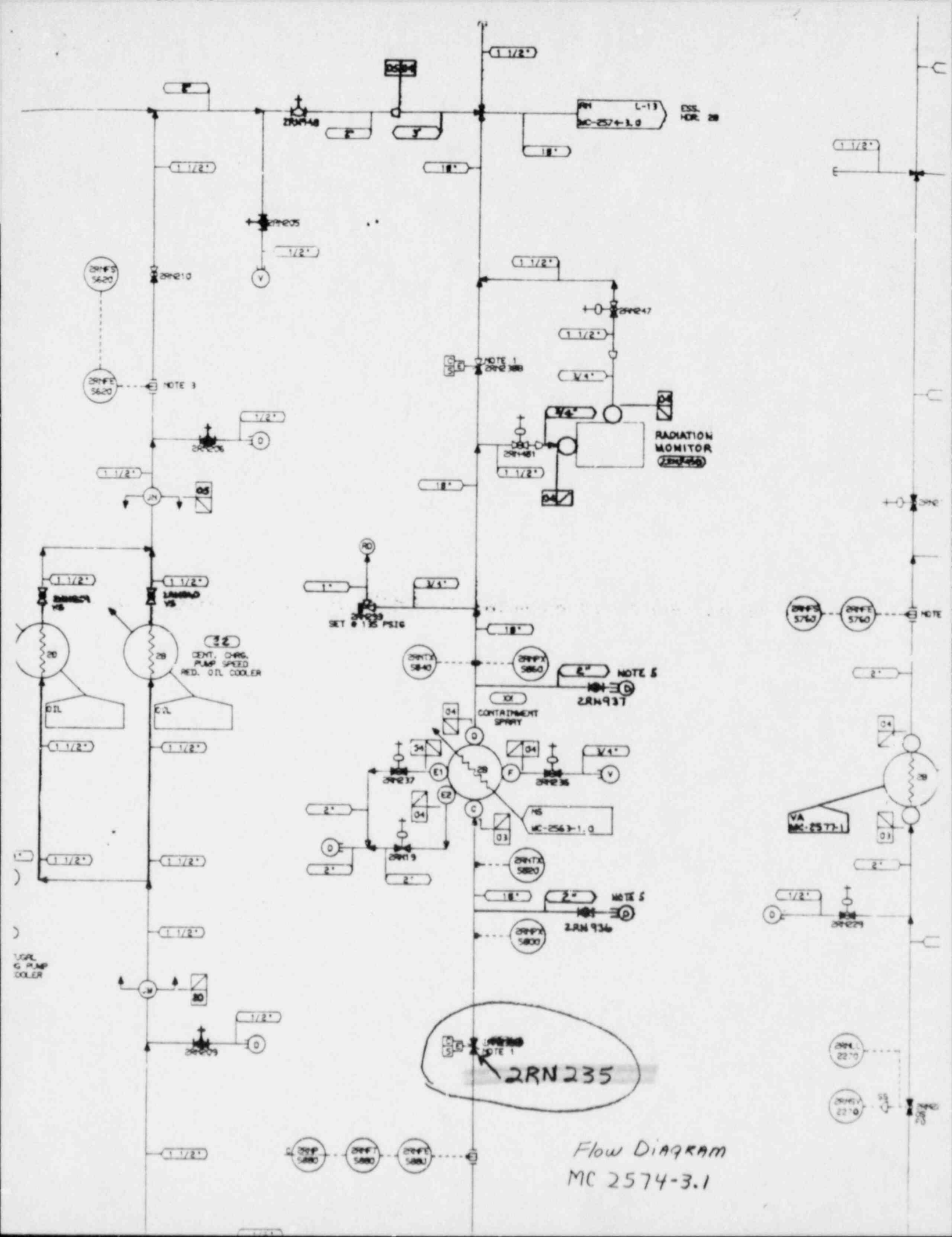
6. Implementation:

The previously mentioned maintenance will occur during the Unit 2 1988 Refueling Outage scheduled to begin on May 27, 1988.


CONT ON MCFI-2RN 98
RN 2F 149
RN 2F 148
RN 2F 146
RN 2F 147
RN-04 P.S 150.3
2RN 137 (IN 2RN 137 A)
RN 2F 144 SEE DETAIL "A"
RN 2F 140
RN 2F 139
RN2F145 See Detail G
RN2F2272
RN2F2273
RN1F2269
RN2F133
RN 2F 137
CONT ON MCFI-2RN 21
See Detail "F"
RN 2F 121
RN 2F 122
2RN PX 5790
RN 2F 123
2RN 134 A (IN 2RN 134 A)
RN 2F 127
RN2F135
RN2F129
RN 2F 2270
RN 2F 134
RN 2F 2271
RN 2F 2363
NOZZLE WELD
RN 2F 123
2RNTX5810
RN 2F 125
RN 2F 124
RN 2F 2364
RN 2F 177
RN-04 P.S 150.3
RN 2F 175
2RN 238 B (IN 2RN 238 B)
RN2F174 SEE DETAIL "B"
RN2F169
RN2F168 See Detail "D"
RN-03 P.S 150.3
RN 2F 138
CONTAINMENT SPRAY HX'S "2A"
2F167
RN2F166
RN2F164
RN 2F162
RN 2F161
RN 2F 2361
NOZZLE WELD
RN2F 2362
SEE DETAIL "C"
2RNPX5800
RN 2F 120
2RN 235 B (IN 2RN 235 B)
RN 2F 159
RN2F155 See Detail "E"
RN2F153
2RNTX5820
RN2F154
RN2F156
RN2F157
RN-03 P.S 150.3
CONTAINMENT SPRAY HX'S "2B"
NOTE
* INSTALL IAW ...
FH 2658
FH 2659
RN2F-2701
RN2F-2702
RN2F-2703
2RN937 (IN.50-611)
DETAIL "D" (HX "2B")
2RN 9310 (IN 50-611)
RN2F-2706
RN2F-2705
RN2F-2704
DETAIL "E" HX "2B"
RN2F-2707
RN2F-2708
RN2F-2709
2RN934 (IN.50-611)
DETAIL "F" HX 2A
RN2F-2710
RN2F-2711
RN2F-2712
2RN935 (IN.50-611)
DETAIL "G" HX "2A"
2
3
4



RADIATION MONITOR
NOTE 1
NOTE 2
NOTE 3
NOTE 5
2RN109
2RN108
2RN117A
2RN118
SET @ 135 PSIG
2RNTX 5830
2RNPX 5850
2RN935
CENT. CHARGING PUMP SEZD RED OIL COOLER
2RN136
2RN135
2RN117
2RN934
2RNTX 5810
CONTAINMENT SPRAY HX.
MC-2563-1.0
2RN105
2RN107
2RNPX 5790
2RNSV 1030
2RNLL 1030
2RN129
2RN127
2RNFS 5750
2RNFE 5750
ES AIR HANDLING FAN COIL UNIT FOR CONTAINMENT SPRAY PUMP MOTOR
MC-2577-1
2RN128
2RNFS 5770
2RNFE 5770
2RNLL 1260
2RNSV 1260
2RN126A
FO
OS
2RN132
2RNSV 1300
2RNLL 1300
2RN130A


RADIATION MONITOR
CONTAINMENT SPRAY
2RN235
Flow DIAGRAM
MC 2574-3.1

QW-422
P-NUMBERS
Grouping of Base Metals for Qualification

P-No.	Group No.	Spec. No.	Grade	Minimum Specified Tensile, ksi [Note (1)]	Type of Base Metal: Nominal Composition	Type of Base Metal: Product Form
				Steel and Steel Alloys		
1	1	SA-31	A	45	(C)	Rivets
			B	58		
		SA-36	. . .	58	(C-Mn-Si)	Plate
		SA-53	Type S, Gr. A	48	(C)	Smls. Pipe
			Type S, Gr. B	60	(C-Mn)	Smls. Pipe
			Type E, Gr. A	48	(C)	Resistance Welded Pipe
			Type E, Gr. B	60	(C-Mn)	Resistance Welded Pipe
			Type F	45	(C)	Furnace Welded Pipe
		SA-106	A	48	(C-Si)	Smls. Pipe
			B	60		
		SA-134	. . .	. . .		Of SA-283 and SA-285
		SA-178	A	47[2]	(C)	Electric-Resistance Welded (ERW) Tube
			C	60		
		SA-179	. . .	. . .	(C)	Smls. Tube
		SA-181	Cl. 60	60	(C-Si)	Pipe Flange
		SA-192	. . .	47[2]	(C-Si)	Smls. Tube
		SA-210	A-1	60	(C-Si)	Smls. Tube
		SA-214	. . .	. . .	(C)	ERW Tube
		SA-216	WCA	60	(C-Si)	Casting
		SA-226	. . .	47[2]	(C-Si)	ERW Tube
		SA-234	Marking WPB	60	(C-Mn-Si)	Piping Fitting
		SA-266	Cl. 1	60	(C-Si)	Forging
		SA-283	A	45		
			B	50	(C)	Plate
			C	55		
			D	60		
		SA-285	A	45		
			B	50	(C)	Plate
			C	55		
		SA-333	1	55	(C-Mn)	Smls. and Welded Pipe
			6	60	(C-Mn-Si)	Smls. and Welded Pipe
		SA-334	1	55	(C-Mn)	Welded Tube
			6	60	(C-Mn-Si)	Welded Tube

See Notes at end of QW-422.

QW-422
P-NUMBERS (CONT'D)
Grouping of Base Metals for Qualification

P-No.	Group No.	Spec. No.	Grade	Minimum Specified Tensile, ksi [Note (1)]	Type of Base Metal: Nominal Composition	Type of Base Metal: Product Form
			Steel and Steel Alloys (Cont'd)			
1	1	SA-350	LF1	60	(C-Mn-Si)	Forging
		SA-352	LCA	60	(C-Si)	Casting
			LCB	65		
		SA-369	FPA	48	(C-Si)	Forged Pipe
			FPB	60	(C-Mn-Si)	Forged Pipe
		SA-372	Type I	60	(C-Mn-Si)	Forging
		SA-414	A	45		
			B	50	(C)	Sheet
			C	55		
			D	60	(C-Mn)	Sheet
			E	65		
		SA-420	WPL6	60	(C-Mn-Si)	Piping Fitting
		SA-442	55	55	(C-Mn-Si)	Plate
			60	60		
		SA-487	Cl. A and AN	60	(C)	Casting
		SA-515	55	55		
			60	60	(C-Si)	Plate
			65	65		
		SA-516	55	55	(C-Si)	Plate
			60	60	(C-Mn-Si)	Plate
			65	65		
		SA-524	Type I	60	(C-Mn-Si)	Smls. Pipe
			Type II	55		
		SA-556	A2	47	(C)	Smls. Tube
			B2	60	(C-Si)	Smls. Tube
		SA-557	A2	47	(C)	ERW Tube
			B2	60		
		SA-562	. . .	55	(C-Mn-Ti)	Plate
		SA-587	. . .	48	(C)	ERW Pipe
		SA-620		40	(C)	Sheet
		SA-660	WCA	60	(C)	Centrifugal Cast Pipe
		SA-662	A	58	(C-Mn-Si)	Plate
			B	65		

(QW-422 continues on next page)

QW-422
P-NUMBERS
Grouping of Base Metals for Qualification

P-No.	Group No.	Spec. No.	Grade	Minimum Specified Tensile, ksi [Note (1)]	Type of Base Metal: Nominal Composition	Type of Base Metal: Product Form
				Steel and Steel Alloys		
1	1	SA-31	A	45	(C)	Rivets
			B	58		
		SA-36	. . .	58	(C-Mn-Si)	Plate
		SA-53	Type S, Gr. A	48	(C)	Smls. Pipe
			Type S, Gr. B	60	(C-Mn)	Smls. Pipe
			Type E, Gr. A	48	(C)	Resistance Welded Pipe
			Type E, Gr. B	60	(C-Mn)	Resistance Welded Pipe
			Type F	45	(C)	Furnace Welded Pipe
		SA-106	A	48	(C-Si)	Smls. Pipe
			B	60		
		SA-134	. . .	. . .		Of SA-283 and SA-285
		SA-178	A	47[2]	(C)	Electric-Resistance Welded (ERW) Tube
			C	60		
		SA-179	. . .	. . .	(C)	Smls. Tube
		SA-181	Cl. 60	60	(C-Si)	Pipe Flange
		SA-192	. . .	47[2]	(C-Si)	Smls. Tube
		SA-210	A-1	60	(C-Si)	Smls. Tube
		SA-214	. . .	. . .	(C)	ERW Tube
		SA-216	WCA	60	(C-Si)	Casting
		SA-226	. . .	47[2]	(C-Si)	ERW Tube
		SA-234	Marking WPB	60	(C-Mn-Si)	Piping Fitting
		SA-266	Cl. 1	60	(C-Si)	Forging
		SA-283	A	45		
			B	50	(C)	Plate
			C	55		
			D	60		
		SA-285	A	45		
			B	50	(C)	Plate
			C	55		
		SA-333	1	55	(C-Mn)	Smls. and Welded Pipe
			6	60	(C-Mn-Si)	Smls. and Welded Pipe
		SA-334	1	55	(C-Mn)	Welded Tube
			6	60	(C-Mn-Si)	Welded Tube

See Notes at end of QW-422.

be normalized unless otherwise specified by the purchaser.

5.4 If approved by the purchaser, cooling rates faster than those obtained by cooling in air are permissible for improvement of the toughness, provided the plates are subsequently tempered in the temperature range 1100 to 1300°F [595 to 705°C].

6. Chemical Requirements

6.1 The steel shall conform to the chemical requirements shown in Table 1 unless otherwise modified in accordance with Supplementary Requirement S17, Vacuum Carbon-Deoxidized Steel, in Specification A 20/A 20M.

7. Metallurgical Structure

7.1 All steel shall have a fine austenitic grain size.

8. Mechanical Requirements

8.1 *Tension Test Requirements*—The material as represented by the tension-test specimens shall conform to the requirements shown in Table 2.

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall not apply unless specified in the order.

A list of standardized supplementary requirements for use at the option of the purchaser are included in ASTM Specification A 20/A 20M. Those which are considered suitable for use with this specification are listed below by title.

S1. Vacuum Treatment,
S2. Product Analysis,
S3. Simulated Post-Weld Heat Treatment of Mechanical Test Coupons,
S4.1 Additional Tension Test,
S5. Charpy V-Notch Impact Test,
S6. Drop Weight Test,
S7. High Temperature Tension Test,
S8. Ultrasonic Examination in accordance with Specification A 435/A 435M,
S9. Magnetic Particle Examination,
S11. Ultrasonic Examination in accordance with Specification A 577/A 577M,
S12. Ultrasonic Examination in accordance with Specification A 578/A 578M,
S14. Bend Test, and
S17. Vacuum Carbon-Deoxidized Steel.

TABLE 1 Chemical Requirements

Elements	Composition, %			
	Grade 55 [Grade 380]	Grade 60 [Grade 415]	Grade 65 [Grade 450]	Grade 70 [Grade 485]
Carbon, max[A]:				
½ in. [12.5 mm] and under	0.18	0.21	0.24	0.27
Over ½ in. to 2 in. [12.5 to 50 mm], incl	0.20	0.23	0.26	0.28
Over 2 in. to 4 in. [50 to 100 mm], incl	0.22	0.25	0.28	0.30
Over 4 to 8 in. [100 to 200 mm], incl	0.24	0.27	0.29	0.31
Over 8 in. [200 mm]	0.26	0.27	0.29	0.31
Manganese:				
½ in. [12.5] and under:				
Heat analysis[B]	0.60–0.90	0.60–0.90	0.85–1.20	0.85–1.20
Product analysis[B]	0.55–0.98	0.55–0.98	0.79–1.30	0.79–1.30
Over ½ in [12.5]:				
Heat analysis	0.60–1.20	0.85–1.20	0.85–1.20	0.85–1.20
Product analysis	0.55–1.30	0.79–1.30	0.79–1.30	0.79–1.30
Phosphorus, max[A]	0.035	0.035	0.035	0.035
Sulfur, max[A]	0.04	0.04	0.04	0.04
Silicon:				
Heat analysis	0.15–0.40	0.15–0.40	0.15–0.40	0.15–0.40
Product analysis	0.13–0.45	0.13–0.45	0.13–0.45	0.13–0.45

[A] Applies to both heat and product analysis.

[B] Grade 60 plates ½ in. [12.5 mm] and under in thickness may be specified to have 0.85–1.20 % manganese on heat analysis, and 0.79–1.30 % manganese on product analysis.

TABLE 2 Tensile Requirements

	Grade			
	55 [380]	60 [415]	65 [450]	70 [485]
Tensile strength, ksi [MPa]	55–75 [380–515]	60–80 [415–550]	65–85 [450–585]	70–90 [485–620]
Yield strength, min.[B] ksi [MPa]	30 [205]	32 [220]	35 [240]	38 [260]
Elongation in 8 in. [200 mm], min, %	23[A]	21[A]	19[A]	17[A]
Elongation in 2 in. [50 mm], min, %	27[A]	25[A]	23[A]	21[A]

[A] See Specification A 20/A 20M.

[B] Determined by either the 0.2 % offset method or the 0.5 % extension-under-load method.

the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract, the producer may use his own, or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to ensure that the material conforms to the prescribed requirements.

SUPPLEMENTARY REQUIREMENTS FOR PIPE REQUIRING SPECIAL CONSIDERATION

One or more of the following supplementary requirements shall apply only when specified in the purchase order. The purchaser may specify a different frequency of test or analysis than is provided in the supplementary requirement. Subject to agreement between the purchaser and manufacturer, retest and retreatment provisions of these supplementary requirements may also be modified.

S1. Product Analysis

S1.1 Product analysis shall be made on each length of pipe. Individual lengths failing to conform to the chemical composition requirements shall be rejected.

S2. Transverse Tension Test

S2.1 A transverse tension test shall be made on a specimen from one end or both ends of each pipe NPS 8 and over. If this supplementary requirement is specified, the number of tests per pipe shall also be specified. If a specimen from any length fails to meet the required tensile properties (tensile, yield, and elongation), that length shall be rejected subject to retreatment in accordance with Specification A 530 and satisfactory retest.

S3. Flattening Test

S3.1 The flattening test of Specification A 530 shall be made on a specimen from one end or both ends of each pipe. Crop ends may be used. If this supplementary requirement is specified, the number of tests per pipe shall also be specified. If a specimen from any length fails because of lack of ductility prior to satisfactory completion of the first step of the flattening test requirement, that pipe shall be rejected subject to retreatment in accordance with Specification A 530 and satisfactory retest. If a specimen from any length of pipe fails because of a lack of soundness, that length shall be rejected, unless subsequent retesting indicates that the remaining length is sound.

S4. Metal Structure and Etching Test

S4.1 The steel shall be homogeneous as shown by etching tests conducted in accordance with the appropriate sections of Method E 381. Etching tests shall be made on a cross section from one end or both ends of each pipe and shall show sound and reasonably uniform material free from injurious laminations, cracks, and similar objectionable defects. If this supplementary requirement is specified, the number of tests per pipe required shall also be specified. If a specimen from any length shows objectionable defects, the length shall be rejected, subject to removal of the defective end and subsequent retests indicating the remainder of the length to be sound and reasonably uniform material.

EXPLANATORY NOTES

NOTE 1—Consideration should be given to possible graphitization of the material at the higher temperatures at which it may be used.

NOTE 2—Grade A rather than Grade B pipe should be used for close coiling, cold bending, or for forge welding. The purpose for which the pipe is to be used should be stated in the order. This note is not intended to prohibit the cold bending of Grade B seamless pipe.

TABLE 1 Chemical Requirements

	Composition, %		
	Grade A	Grade B	Grade C
Carbon, max	0.25	0.30	0.35
Manganese	0.27–0.93	0.29–1.06	0.29–1.06
Phosphorus, max	0.048	0.048	0.048
Sulfur, max	0.058	0.058	0.058
Silicon, min	0.10	0.10	0.10

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S83

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall not apply unless specified in the order.

A list of standardized supplementary requirements for use at the option of the purchaser are included in Specification A 20/A 20M. Those which are considered suitable for use with this specification are listed below by title.

S3. Simulated Post-Weld Heat Treatment of Mechanical Test Coupons.

S4.1 Additional Tension Test.

S14. Bend Test.

Also listed below are additional optional supplementary requirements suitable for this specification.

S57. The copper content, by heat analysis shall be 0.20 0.35 percent and by product analysis 0.18-0.37 percent.

S58. The maximum incidental copper content by heat analysis shall not exceed 0.25 percent.

TABLE 1 Chemical Requirements

Elements	Composition, percent		
	Grade A	Grade B	Grade C
Carbon, max[a]	0.17	0.22	0.28
Manganese, max			
Heat analysis	0.90	0.90	0.90
Product analysis	0.98	0.98	0.98
Phosphorus, max[a]	0.035	0.035	0.035
Sulfur, max[a]	0.040	0.040	0.040

[a] Applied to both heat and product analysis.

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TABLE 2 Tensile Requirements

	Grade A		Grade B		Grade C	
	ksi	[MPa]	ksi	[MPa]	ksi	[MPa]
Tensile strength	45–65	[310–450]	50–70	[345–485]	55–75	[380–515]
Yield strength, min[A]	24	[165]	27	[185]	30	[205]
Elongation in 8 in. or [200 mm], min, %[B]	27		25		23	
Elongation in 2 in. or [50 mm], min, %	30		28		27	

[A] Determined by either the 0.2 % offset method or the 0.5 % extension-under-load method.
[B] See Specification A 20/A 20M.