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June 9, 1995

Docket No. 50-336
B15266

Re: 10CFR50.55a(g)(6)(ii)

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit No. 2
Second 10-Year Interval Inservice Inspection
Augmented Examination of Reactor Pressure Vessel

The purpose of this letter is to notify the NRC Staff of the inability to completely satisfy the requirements for the augmented reactor pressure vessel (RPV) shell weld examinations at Millstone Unit No. 2, and to request authorization to not perform any additional or alternative examinations.

Northeast Nuclear Energy Company (NNECO) has recently completed the Second 10-Year Interval Inservice Inspection (ISI) of its RPV in accordance with the requirements of ASME B&PV Code Section XI 1980 Edition, including the 1981 Winter Addenda, augmented by 10CFR50.55a, paragraph (g)(6)(ii)(A). These examinations were performed using automated ultrasonic testing (UT) equipment and automated ultrasonic examination data recording and analysis systems.

The augmented examination, however, was unable to obtain the "essentially 100%" (i.e., >90%) volumetric coverage of each weld as required by 10CFR50.55a, paragraph (g)(6)(ii)(A)(2). The lack of coverage exists on two Code Item B1.11 circumferential welds (#HS-1 and #SC-2) and three Code Item B1.12 longitudinal welds (#LSL-1, #MSL-1, and #USL-3). The examination limitations are attributed to the following internally-mounted components of the RPV:

- Hot Leg Nozzle Extensions
- Irradiation Specimen Tube Holders
- Flow Skirt
- Anti-rotation Lugs

These limitations are consistent with those experienced by other utilities with Combustion Engineering designed RPVs. Attachment 1 provides a report of the affected welds, the coverage limitations, weld figures, and the calculated percentage of UT volume for each weld examined.

A047

The results of the Second 10-Year Interval ISI detected indications in the Code Item B1.11 RPV circumferential welds (#SC-1 and #SC-2) and Code Item B1.12 RPV longitudinal welds (#USL-1, #USL-2, and #USL-3). Based on sizing data, these indications are code allowable in accordance with IWB-3500 of ASME Section XI. In addition, RPV welds outside the scope of Code Item B1.10 were also examined and indications were found that are also determined to be Code allowable per IWB-3500. This is the third ultrasonic examination of the RPV at Millstone Unit No. 2.

In 1975, preservice UT examinations were conducted from the outside diameter (OD) of the RPV utilizing a remote tracking tool. All of the RPV shell welds were examined and received essentially a 100% volumetric exam. In this case, full coverage was possible since access to the OD was not hampered by a high radiation environment. As a result of the high radiation environment, the industry has replaced OD UT systems with volumetric UT examinations from the inside diameter (ID) of RPVs.

In 1983, NNECO performed the First 10-Year Interval ISI UT examinations of the RPV from the ID. The ID exams were performed to the applicable requirements of the ASME B&PV Code Section XI 1974 Edition, including the 1975 Summer Addenda. Consistent with the requirements at that time, only 5% of the volume of each circumferential and 10% of the volume of each longitudinal RPV shell weld located within the beltline region was examined. NNECO chose, however, to exceed these requirements and examined a portion of all the RPV shell welds listed under Code Categories B-A and B-B.

In 1994, NNECO performed the Second 10-year Interval ISI Program RPV examinations. This program was developed to meet the requirements of the ASME B&PV Code Section XI 1980 Edition, up to and including the Winter 1981 Addenda. The requirements for RPV welds in this version of the Code were redefined under a revised Code Category B-A, "Pressure Retaining Welds in Reactor Vessels." The new requirements for these RPV shell welds states that one Code Item B1.11 circumferential and one Code Item B1.12 longitudinal weld within the beltline region must be examined. In addition, a note is provided in the IWB-2500 table which indicates that essentially 100% of the weld length shall be examined. As in 1983, NNECO chose to exceed the ISI requirements and included all of the RPV shell welds in the Second 10-Year Interval ISI Program.

NNECO has reviewed the 1994 UT results and concludes that the UT performed is adequate to confirm an acceptable level of quality and safety, and no further examination is warranted. In particular, no UT of the RPV OD is justified. This conclusion is based on the following:

- After 12 operating cycles, the OD surface condition of the RPV would likely not be conducive to a direct coupled UT technique without extensive surface preparation. This preparation would unnecessarily expose personnel to a high radiation environment. The radiation levels between the biological shield insulation and the vessel middle section are estimated to be in the range of 5 to 15 R/hr. Thus, full compliance to the augmented requirements of 10CFR50.55a from the OD surface of the RPV would result in unnecessary personnel exposure without a commensurate increase in the level of reliability, quality, or safety over the partial examinations reported in Attachment 1.

- All of the indications that were detected within the weld volumes examined are acceptable without analytical evaluation. Therefore, it is unlikely that the unexamined sections would not be acceptable for continued service.

- The cumulative total volume of welds examined was 91.5% of the Millstone Unit No. 2 RPV shell welds. Although this cumulative total cannot be used to meet the RPV augmented requirements, this percentage supports the fact that the in-vessel examination covered a significant volume of the RPV shell welds.

Based on the above, NNECO is not planning to perform any additional examinations on any of the RPV shell welds, and requests authorization of this alternative to the examination requirements by the Director of the Office of Nuclear Reactor Regulation pursuant to 10CFR50.55a, paragraph (g)(6)(ii)(A)(5). If you have any questions on this submittal, please contact Mr. Mario Robles, Jr. at (203) 440-2073.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: J. F. Opeka
Executive Vice President

BY: _____
E. A. DeBarba
Vice President

Attachment

cc: See Page 4

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

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Attachment 1

Millstone Nuclear Power Station, Unit No. 2

Second 10-Year Interval In Service Inspection
Augmented Examination of Reactor Pressure Vessel

June 1995

APPENDIX F

EXAMINATION AREA COVERAGE REPORT FOR MILLSTONE NUCLEAR POWER STATION, UNIT 2

This appendix describes the ultrasonic (UT) examination coverage obtained and examination limitations encountered during the 1994 inservice examination of the Millstone Nuclear Power Station, Unit 2, reactor pressure vessel (RPV) welds and selected components. The examinations were performed by Southwest Research Institute using automated scanning equipment and automated ultrasonic (AUT) examination data recording and analysis systems in accordance with a Scan Plan and procedures approved by Northeast Nuclear Energy Company (NNECO). These procedures comply with requirements of the 1980 Edition with Addenda through Winter 1981 of the American Society of Mechanical Engineers (ASME) Section XI and United States Nuclear Regulatory Commission Regulatory Guide 1.150, Revision 1, Appendix A.

The scope of the AUT examinations included all RPV shell, lower head, and nozzle weld areas for 100 percent of the accessible weld lengths, and the scope of the AUT examinations of the piping butt welds included the inlet nozzle-to-elbow, elbow-to-pipe, and elbow longitudinal welds.

The examination coverage for the RPV welds was determined in accordance with the requirements of Section V, T-441.4.3, T-441.5, T-441.6, and T-441.7. These requirements are as follows:

(1) Reflectors Oriented Parallel to the Weld

(a) The inner 25%t including the weld metal and adjacent base metal for 1/2t either side of the weld fusion line (volume A in the attached figures) must be completely scanned with the 50/70 search unit aimed at right angles to the weld axis. Scanning shall be performed in two directions 180 degrees to each other.

(b) The weld metal in the outer 75%t (volume B in the attached figures) must be completely scanned by two angle beams, (45 and 60 degrees) with the search units aimed at right angles to the weld axis. Scanning shall be performed in two directions 180 degrees to each other.

(c) The adjacent base metal in the outer 75%t for 1/2t either side of the weld fusion line (volumes C and D in the attached figures) must be completely scanned by two angle beams (45 and 60 degrees), but need not be completely scanned by both angle beams from both directions (any combination of two angle beams will satisfy the requirement).

(d) For those examinations performed from the nozzle bores and flange seal surface, the ultrasonic beams must be directed essentially perpendicular to the plane of the weld to detect reflectors parallel to the welds. The beam angles used must be sufficient to provide complete coverage of the required volumes from one direction.

(2) Reflectors Oriented Transverse to the Weld

(a) The inner 25%t including the weld metal and adjacent base metal for 1/2t either side of the weld fusion line (volume A in the attached figures) must be scanned with the 50/70 search unit beam directed parallel to the weld axis. Scanning shall be performed in two directions 180 degrees to each other to the extent possible. Areas blocked by geometric conditions shall be examined from at least one direction.

(b) The weld metal and adjacent base metal in the outer 75%t for 1/2t either side of the weld fusion line (volumes B, C, and D, in the attached figures) must be scanned with the 45- and 60-degree search unit beams directed parallel to the weld axis. Scanning shall be performed in two directions 180 degrees to each other to the extent possible. Areas blocked by geometric conditions shall be examined from at least one direction.

(3) Laminar Reflectors

The base material through which the angle beams pass must be scanned with a straight-beam search unit to detect laminar reflectors which might affect interpretation of angle-beam results. The required volume to be examined is limited to only those volumes that receive coverage with angle beams. This could be all, or any part of the ABCDEF volumes shown in the attached figures.

(4) Planar Reflectors

Straight-beam scanning for planar reflectors must be performed on the entire weld and adjacent base material (volumes A, B, C, and D in the attached figures).

The examination coverage for nozzle-to-elbow and elbow-to-pipe welds was determined in accordance with the requirements of NNECO Request for Relief No. RR-10. As an alternative to the surface examination of requirements of Section XI, a full volumetric examination of the weld and heat-affected zone was performed as described below:

(1) Reflectors Parallel to the Weld

The weld and adjacent base metal for 1/2 inch either side of the weld fusion line (volume shown in Figure 9) must be examined from two sides of he weld using the SLIC-40 search unit. The ultrasonic beam must pass through the volume in two opposing directions.

(2) Reflectors Transverse to the Weld

The weld and adjacent base metal for 1/2 inch either side of the weld fusion line (volume shown in Figure 9) must be examined with the SLIC-40 search unit. The ultrasonic beam is directed parallel to the weld to detect reflectors transverse to the weld. The ultrasonic beam must pass through the volume in two opposing directions.

The integral extensions, the irradiation specimen holders, the core stabilizing lugs, and the flow skirt on the lower head limited scanning accessibility to the full length and/or width of some areas from the inside surface. Figure 1 provides information on the locations of these areas.

The examination coverage obtained is compared to the weld and base metal volumes identified as the examination areas in Figures 2 through 9 contained in this report. The ASME Code-specified techniques for AUT RPV examinations were augmented by special, SwRI-qualified techniques to obtain complete and highly sensitive coverage of the underclad and near-surface material volumes.

AUT examination coverage tables in this appendix quantify the volume of material examined with each ultrasonic technique for each examination area. Additional parallel examinations were performed from the vessel wall for the upper shell-to-flange welds and were not factored into the examination tables since the complete Code coverage was obtained from the vessel flange seal surface. The parallel examinations from the vessel wall were limited due to the inside flange taper. The parallel examination coverage obtained from the vessel wall is:

Vol	Angles	Beam	Covearge
A	50/70	2 Dir	66%
B	45/60	2 Dir	34%
C	45/60	1 Dir	100%
D	45/60	1 Dir	88%

The following contains an explanation of each item listed in the Examination Coverage Tables.

Summary Number - The examination Summary Sheet Number that is assigned to each particular weld.

Weld Number - The specific weld identification number as supplied by NNECO.

Exam Area Identification - Description of the weld type or component identification.

Exam Volume and Figure - The specific volume as identified in ASME Section XI, Regulatory Guide 1.150, and Figures 2 through 9.

Beam Angle(s) - The refracted longitudinal- or shear-wave angles used for the examination.

Exam Type - As defined in Article 4 of ASME Section V, the type of flaw that each examination is intended to detect, e.g., flaws transverse or parallel to the weld, straight beam for planar or laminar flaws etc.

Beam Direction(s) - For each volume, the number of directions that the beam was directed to detect the type of flaw (parallel or transverse to the weld).

Code Coverage - The Percent of coverage for each volume, as a function of beam angle(s), exam type, and beam direction(s) combined.

Remarks - This section is used to explain the source or cause of any limitations encountered.

NOTES:

1. The Average shown as a percent is a simple average of the coverage for all required examinations performed.

2. All straight-beam (0 degree) examination directions are listed as "N/A" because a straight beam can only be introduced into the volume in a single direction.

3. The examination limitations report and coverage tables are restricted to examinations performed by SwRI, and do not reflect limitations from examinations performed by others during previous inservice inspections, or examinations that have been deferred.

4. The required volume for straight-beam lamination examinations is defined as only the area through which the angle beam(s) pass.

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
002000	BHC-1 (Item No. B1.21)	Bottom Head to Peel Segment Torus	A	1 & 2	50/70	Parallel	2 Directions	100%	
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	
002100	HS-1 (Item No. B1.11)	Lower Shell to Bottom Head	A	1 & 2	50/70	Parallel	2 Directions	82%	Limited examination due to the flow skirt and anti-rotation lugs.
			A		50/70	Transverse	2 Directions	88%	
			B		45 & 60	Parallel	2 Directions	73%	
			BCD		45 & 60	Transverse	2 Directions	79%	
			C		45 & 60	Parallel	1 Direction	95%	
			D		45 & 60	Parallel	1 Direction	95%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	98%	
							Average	89%	
002200	BHV-1 (Item No. B1.22)	Peel Segment at 30°	A	1 & 3	50/70	Parallel	2 Directions	50%	Limited examination due to the flow skirt.
			A		50/70	Transverse	2 Directions	47%	
			B		45 & 60	Parallel	2 Directions	31%	
			BCD		45 & 60	Transverse	2 Directions	35%	
			C		45 & 60	Parallel	1 Direction	31%	
			D		45 & 60	Parallel	1 Direction	31%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	35%	
							Average	45%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam		Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
			Volume	Figure					
002300	BHV-2	Peel Segment	A	1 & 3	50/70	Parallel	2 Directions	48%	Limited
	(Item No. B1.22)	at 90°	A		50/70	Transverse	2 Directions	47%	examination
			B		45 & 60	Parallel	2 Directions	48%	due to the
			BCD		45 & 60	Transverse	2 Directions	35%	flow skirt.
			C		45 & 60	Parallel	1 Direction	48%	
			D		45 & 60	Parallel	1 Direction	48%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	40%	
							Average	52%	
002400	BHV-3	Peel Segment	A	1 & 3	50/70	Parallel	2 Directions	50%	Limited
	(Item No. B1.22)	at 150°	A		50/70	Transverse	2 Directions	47%	examination
			B		45 & 60	Parallel	2 Directions	31%	due to the
			BCD		45 & 60	Transverse	2 Directions	35%	flow skirt.
			C		45 & 60	Parallel	1 Direction	31%	
			D		45 & 60	Parallel	1 Direction	31%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	35%	
							Average	36%	
002500	BHV-4	Peel Segment	A	1 & 3	50/70	Parallel	2 Directions	48%	Limited
	(Item No. B1.22)	at 210°	A		50/70	Transverse	2 Directions	47%	examination
			B		45 & 60	Parallel	2 Directions	48%	due to the
			BCD		45 & 60	Transverse	2 Directions	35%	flow skirt.
			C		45 & 60	Parallel	1 Direction	48%	
			D		45 & 60	Parallel	1 Direction	48%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	40%	
							Average	52%	

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1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
002600	BHV-5 (Item No. B1.22)	Peel Segment at 270°	A	1 & 3	50/70	Parallel	2 Directions	50%	Limited examination due to the flow skirt.
			A		50/70	Transverse	2 Directions	47%	
			B		45 & 60	Parallel	2 Directions	31%	
			BCD		45 & 60	Transverse	2 Directions	35%	
			C		45 & 60	Parallel	1 Direction	31%	
			D		45 & 60	Parallel	1 Direction	31%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	35%	
							Average	45%	
002700	BHV-6 (Item No. B1.22)	Peel Segment at 330°	A	1 & 3	50/70	Parallel	2 Directions	58%	Limited examination due to the flow skirt.
			A		50/70	Transverse	2 Directions	44%	
			B		45 & 60	Parallel	2 Directions	58%	
			BCD		45 & 60	Transverse	2 Directions	33%	
			C		45 & 60	Parallel	1 Direction	58%	
			D		45 & 60	Parallel	1 Direction	58%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	33%	
							Average	55%	
002800	FS-1 (Item No. B1.30)	Upper Shell to Flange	ABCD	1 & 4	1, 6, & 12	Parallel	N/A	100%	In addition, parallel examinations were performed from the vessel wall. This information is contained in the text of this appendix.
			A		50/70	Transverse	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
002900	SC-1 (Item No. B1.11)	Middle to Upper Shell	A	1 & 5	50/70	Parallel	2 Directions	100%	Limited examination due to the outlet nozzle integral extension.
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	96%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	99%	
003000	SC-2 (Item No. B1.11)	Lower to Middle Shell	A	1 & 5	50/70	Parallel	2 Directions	87%	Limited examination due to the irradiation specimen tube holders.
			A		50/70	Transverse	2 Directions	87%	
			B		45 & 60	Parallel	2 Directions	87%	
			BCD		45 & 60	Transverse	2 Directions	87%	
			C		45 & 60	Parallel	1 Direction	87%	
			D		45 & 60	Parallel	1 Direction	87%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	87%	
							Average	89%	
003100	LSL-1 (Item No. B1.12)	Lower Shell Longitudinal at 90°	A	1 & 3	50/70	Parallel	2 Directions	51%	Limited examination due to the irradiation specimen tube holders.
			A		50/70	Transverse	2 Directions	81%	
			B		45 & 60	Parallel	2 Directions	12%	
			BCD		45 & 60	Transverse	2 Directions	80%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	91%	
							Average	77%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
003200	LSL-2 (Item No. B1.12)	Lower Shell Longitudinal at 210°	A	1 & 3	50/70	Parallel	2 Directions	100%	
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	
003300	LSL-3 (Item No. B1.12)	Lower Shell Longitudinal at 330°	A	1 & 3	50/70	Parallel	2 Directions	100%	
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	
003400	MSL-1 (Item No. B1.12)	Middle Shell Longitudinal at 90°	A	1 & 3	50/70	Parallel	2 Directions	22%	Limited examination due to the irradiation specimen tube holders.
			A		50/70	Transverse	2 Directions	44%	
			B		45 & 60	Parallel	2 Directions	25%	
			BCD		45 & 60	Transverse	2 Directions	66%	
			C		45 & 60	Parallel	1 Direction	67%	
			D		45 & 60	Parallel	1 Direction	61%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	51%	
							Average	55%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
003500	MSL-2 (Item No. B1.12)	Middle Shell Longitudinal at 210°	A	1 & 3	50/70	Parallel	2 Directions	100%	
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	
003600	MSL-3 (Item No. B1.12)	Middle Shell Longitudinal at 330°	A	1 & 3	50/70	Parallel	2 Directions	100%	
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	
003700	USL-1 (Item No. B1.12)	Upper Shell Longitudinal at 90°	A	1 & 3	50/70	Parallel	2 Directions	100%	
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	100%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	100%	

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Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam		Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
			Volume	Figure					
003800	USL-2 (Item No. B1.12)	Upper Shell Longitudinal at 210°	A	1 & 3	50/70	Parallel	2 Directions	87%	Limited examination due to the integral extension on outlet nozzle NS-4.
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	59%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	93%	
003900	USL-3 (Item No. B1.12)	Upper Shell Longitudinal at 330°	A	1 & 3	50/70	Parallel	2 Directions	68%	Limited examination due to the integral extension on outlet nozzle NS-1.
			A		50/70	Transverse	2 Directions	100%	
			B		45 & 60	Parallel	2 Directions	37%	
			BCD		45 & 60	Transverse	2 Directions	100%	
			C		45 & 60	Parallel	1 Direction	100%	
			D		45 & 60	Parallel	1 Direction	100%	
			ABCDEF		0	Lamination	N/A	100%	
			ABCD		0	Planar (Weld)	N/A	100%	
							Average	88%	
004000	NS-1 (Item No. B3.90)	Outlet Nozzle to Shell at 0°	A&B	1 & 6	5 & 45	Parallel	1 Direction	100%	Limited examination due to the integral extension.
			B		50/70	Transverse	2 Directions	5%	
			A		45 & 60	Transverse	2 Directions	13%	
			A&B		0	Lamination	N/A	100%	
			A&B		0	Planar (Weld)	N/A	12%	
							Average	46%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
004100	NS-2 (Item No. B3.90)	Inlet Nozzle to Shell at 60°	A&B	1 & 7	5 & 45	Parallel	1 Direction	100%	
			B		50/70	Transverse	2 Directions	100%	
			A		45 & 60	Transverse	2 Directions	100%	
			A&B		0	Lamination	N/A	100%	
			A&B		0	Planar (Weld)	N/A	100%	
							Average	100%	
004200	NS-3 (Item No. B3.90)	Inlet Nozzle to Shell at 120°	A&B	1 & 7	5 & 45	Parallel	1 Direction	100%	
			B		50/70	Transverse	2 Directions	100%	
			A		45 & 60	Transverse	2 Directions	100%	
			A&B		0	Lamination	N/A	100%	
			A&B		0	Planar (Weld)	N/A	100%	
							Average	100%	
004300	NS-4 (Item No. B3.90)	Outlet Nozzle to Shell at 180°	A&B	1 & 6	5 & 45	Parallel	1 Direction	100%	Limited examination due to the integral extension.
			B		50/70	Transverse	2 Directions	5%	
			A		45 & 60	Transverse	2 Directions	13%	
			A&B		0	Lamination	N/A	100%	
			A&B		0	Planar (Weld)	N/A	12%	
							Average	46%	
004400	NS-5 (Item No. B3.90)	Inlet Nozzle to Shell at 240°	A&B	1 & 7	5 & 45	Parallel	1 Direction	100%	
			B		50/70	Transverse	2 Directions	100%	
			A		45 & 60	Transverse	2 Directions	100%	
			A&B		0	Lamination	N/A	100%	
			A&B		0	Planar (Weld)	N/A	100%	
							Average	100%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam Volume	Exam Figure	Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
004500	NS-6 (Item No. B3.90)	Inlet Nozzle to Shell at 300°	A&B B A A&B A&B	1 & 7	5 & 45 50/70 45 & 60 0 0	Parallel Transverse Transverse Lamination Planar (Weld)	1 Direction 2 Directions 2 Directions N/A N/A Average	100% 100% 100% 100% 100% 100%	
004600	IR-1 (Item No. B3.100)	Nozzle Inner Radius at 0°	M-N-O-P	8	50/70	Transverse	2 Directions	100%	
004700	IR-2 (Item No. B3.100)	Nozzle Inner Radius at 60°	M-N-O-P	8	50/70	Transverse	2 Directions	100%	
004800	IR-3 (Item No. B3.100)	Nozzle Inner Radius at 120°	M-N-O-P	8	50/70	Transverse	2 Directions	100%	
004900	IR-4 (Item No. B3.100)	Nozzle Inner Radius at 180°	M-N-O-P	8	50/70	Transverse	2 Directions	100%	
005000	IR-5 (Item No. B3.100)	Nozzle Inner Radius at 240°	M-N-O-P	8	50/70	Transverse	2 Directions	100%	
005100	IR-6 (Item No. B3.100)	Nozzle Inner Radius at 300°	M-N-O-P	8	50/70	Transverse	2 Directions	100%	
005700	P-9-L-3 (Item No. B9.12)	Pipe LS far side from P-9-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam		Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
			Volume	Figure					
005800	P-9-L-4 (Item No. B9.12)	Pipe LS far side from P-9-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
005900	P-9-C-2 (Item No. B9.11)	Pipe to Elbow	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006000	P-9-L-1-A (Item No. B9.12)	Elbow LS long side from P-9-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006100	P-9-L-2-A (Item No. B9.12)	Elbow LS short side from P-9-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006200	P-9-L-1 (Item No. B9.12)	Elbow LS long side from P-9-C-1	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006300	P-9-L-2 (Item No. B9.12)	Elbow LS short side from P-9-C-1	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables (Cont'd)

Summary Number	Weld Number	Exam Area Identification	Exam		Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
			Volume	Figure					
006400	P-9-C-1 (Item No. B9.11)	Elbow to Reactor Vessel Extension	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006500	P-14-L-3 (Item No. B9.12)	Pipe LS far side P-14-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006600	P-14-L-4 (Item No. B9.12)	Pipe LS far side P-14-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006700	P-14-C-2 (Item No. B9.11)	Pipe to Elbow	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006800	P-14-L-1-A (Item No. B9.12)	Elbow LS long side from P-14-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
006900	P-14-L-2-A (Item No. B9.12)	Elbow LS short side from P-14-C-2	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
007000	P-14-L-1 (Item No. B9.12)	Elbow LS long side from P-14-C-1	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	

Millstone Nuclear Power Station, Unit 2
1994 Reactor Vessel Inservice Inspection
Examination Coverage Tables

Summary Number	Weld Number	Exam Area Identification	Exam		Beam Angle(s)	Exam Type	Beam Direction(s)	Code Coverage	Remarks
			Volume	Figure					
007100	P-14-L-2 (Item No. B9.12)	Elbow L3 short side from P-14-C-1	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	
007200	P-14-C-1 (Item No. B9.11)	Elbow to reactor vessel extension	A-B-C-D A-B-C-D	9	SLIC-40 SLIC-40	Parallel Transverse	2 Directions 2 Directions Average	100% 100% 100%	

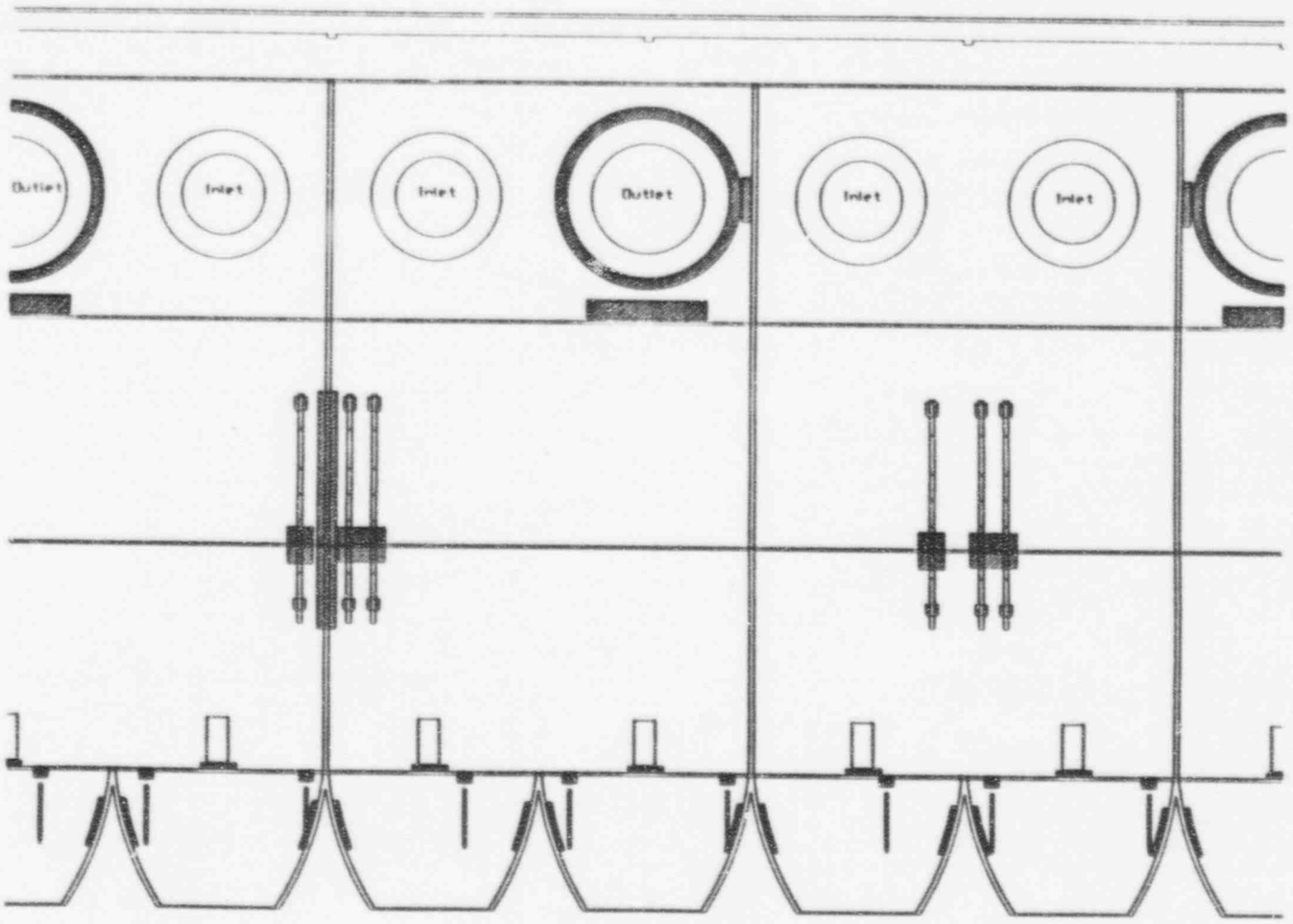
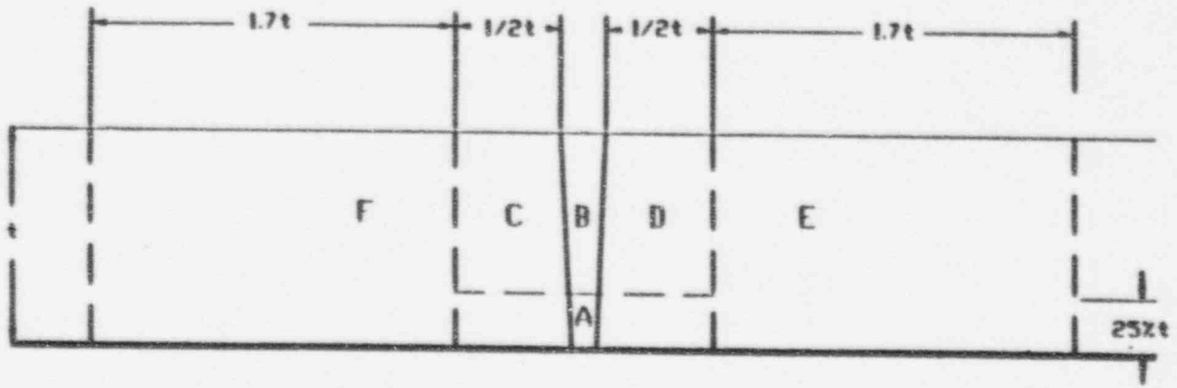


Figure 1

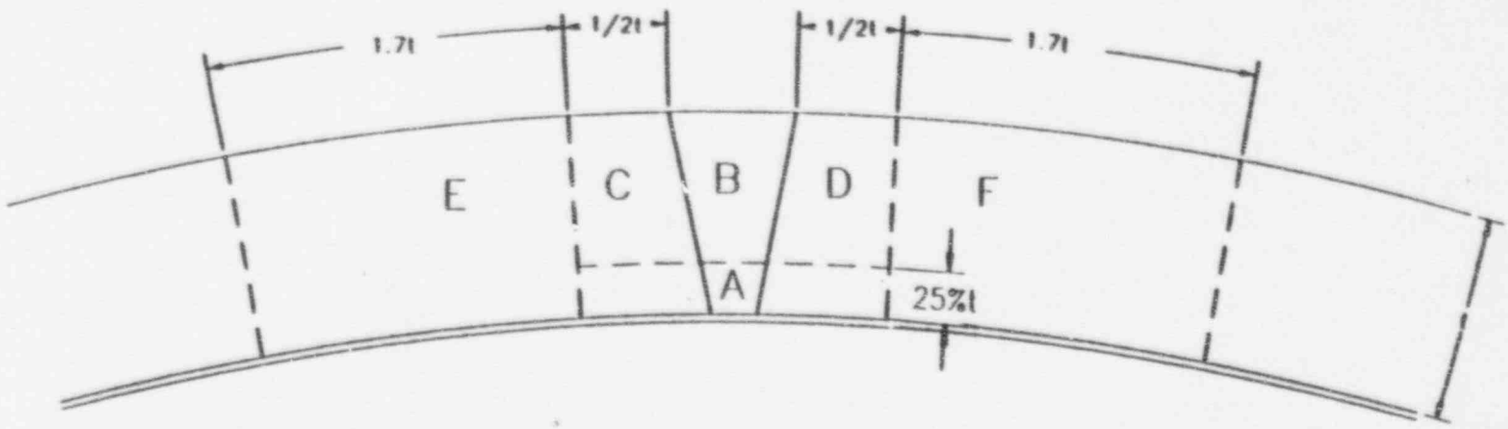
Millstone, Unit 2
28 February 1995



Vessel Shell Circumferential Welds
Other Than Vessel-to-Flange

Figure 2

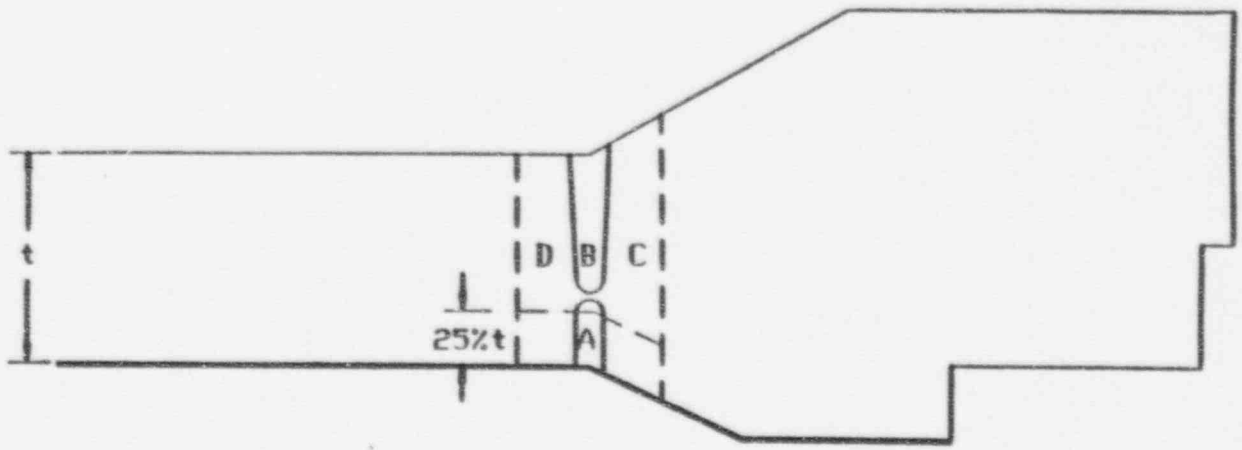
Millstone, Unit 2
28 February 1995



Longitudinal and Meridional Welds

Figure 3

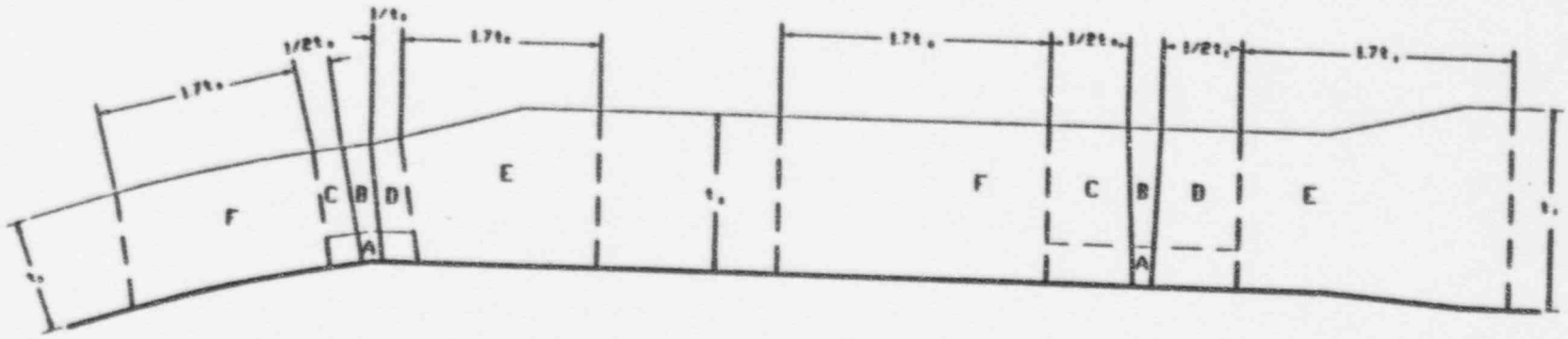
Millstone, Unit 2
28 February 1995



Vessel-to-Flange Weld

Figure 4

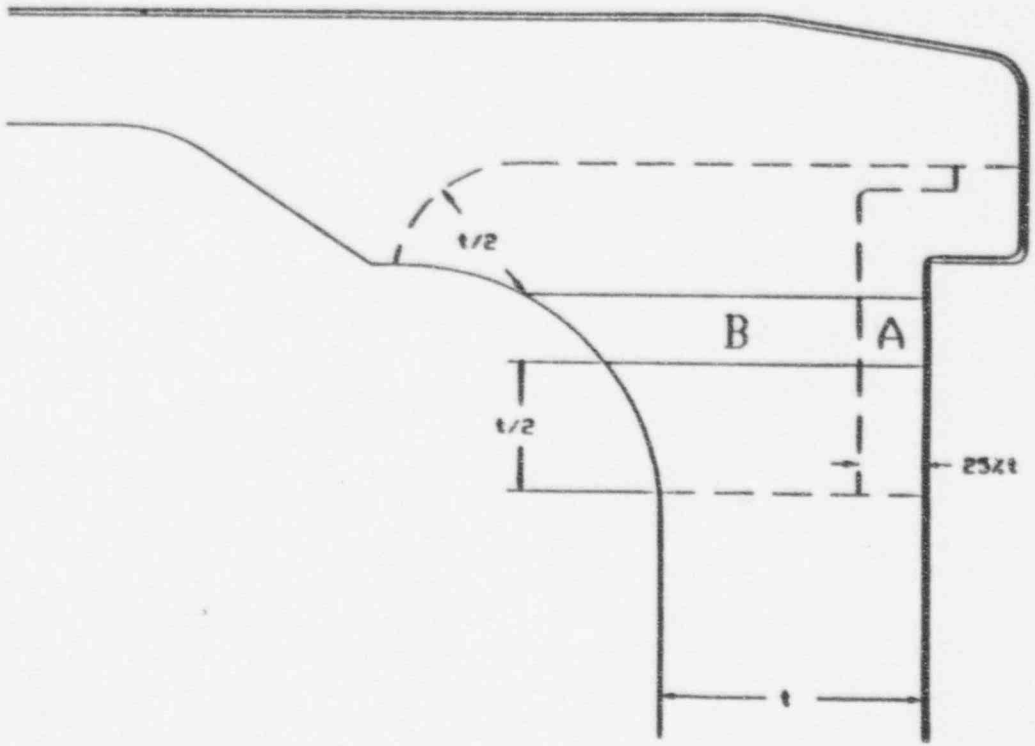
Millstone, Unit 2
28 February 1995



Vessel Welds with Tapers

Figure 5

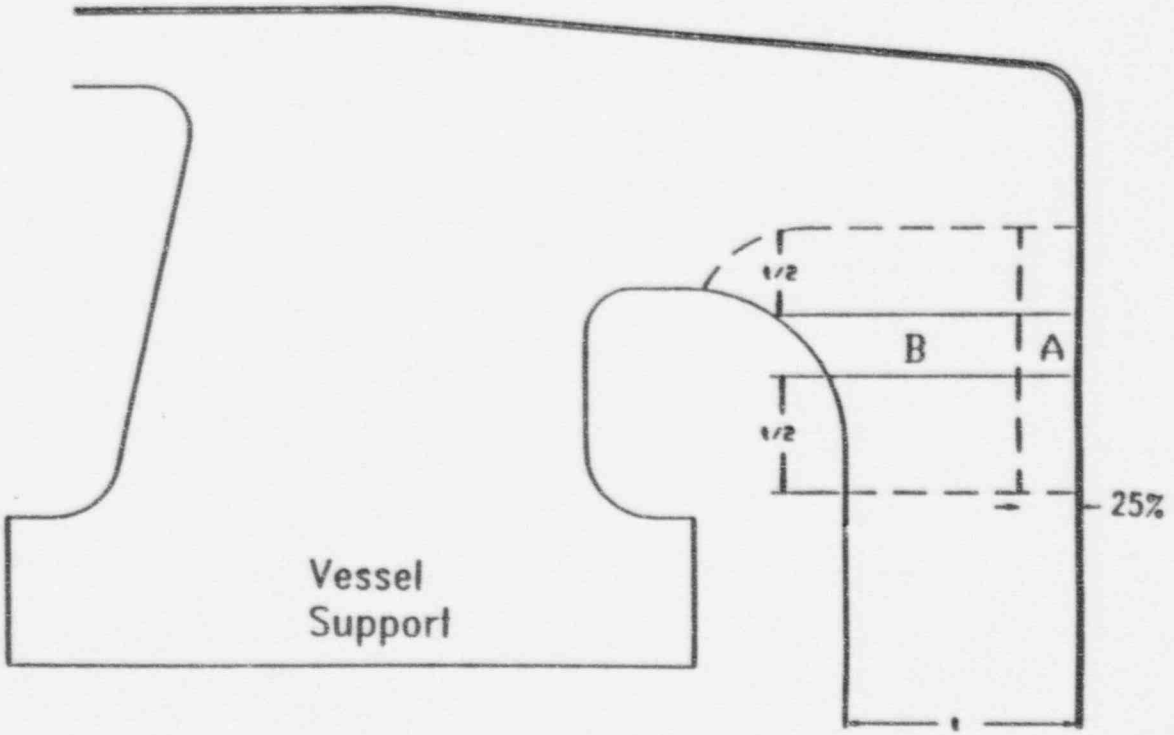
Millstone, Unit 2
28 February 1995



Outlet Nozzle-to-Shell Welds

Figure 6

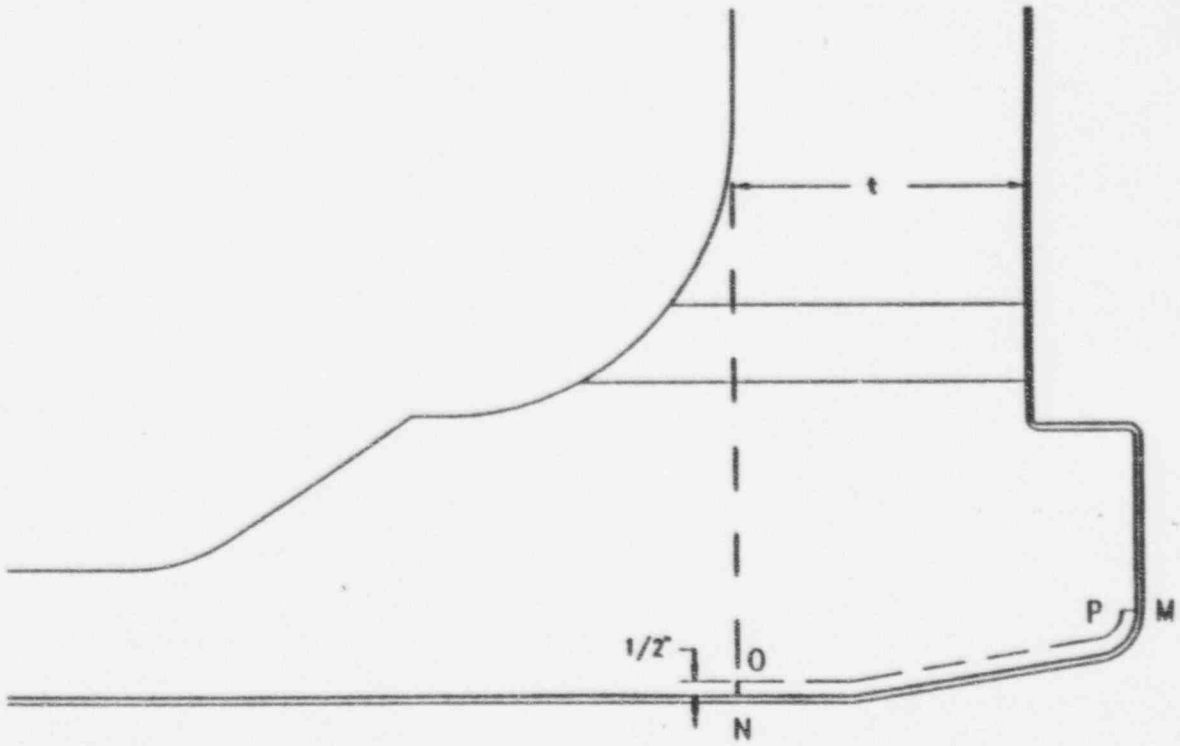
Millstone, Unit 2
28 February 1995



Inlet Nozzle-to-Shell Welds

Figure 7

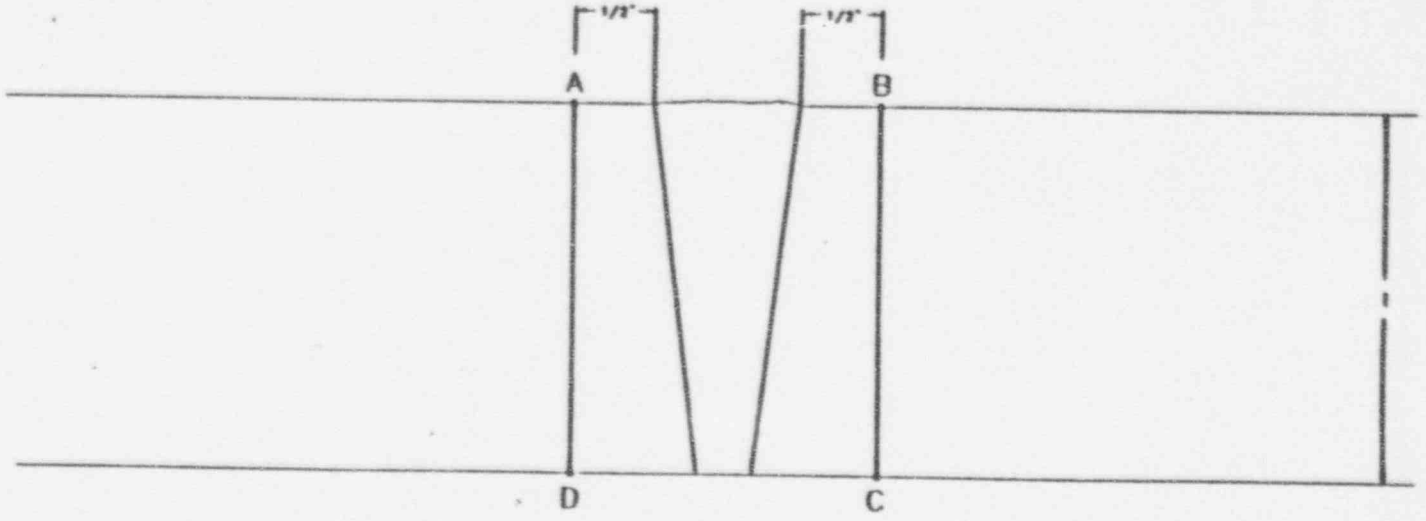
Millstone, Unit 2
28 February 1995



Exam Volume M-N-O-P as Defined
in Figure IWB-2500-7(a)

Figure 8

Millstone, Unit 2
28 February 1995



Butt Welds
Exam Volume A-B-C-D

Figure 9

Millstone; Unit 2
28 February 1995

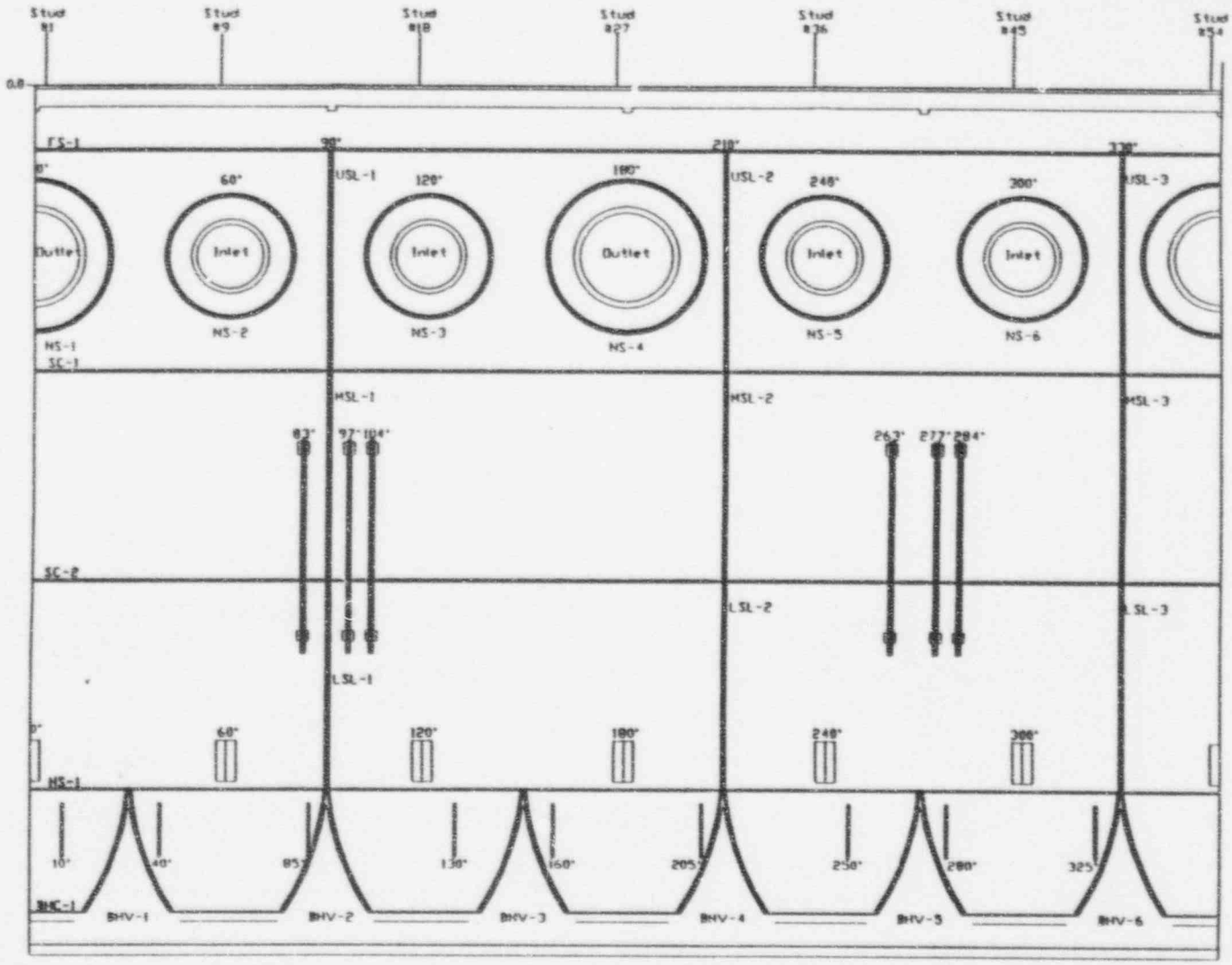


Figure A-1. Vessel Rollout

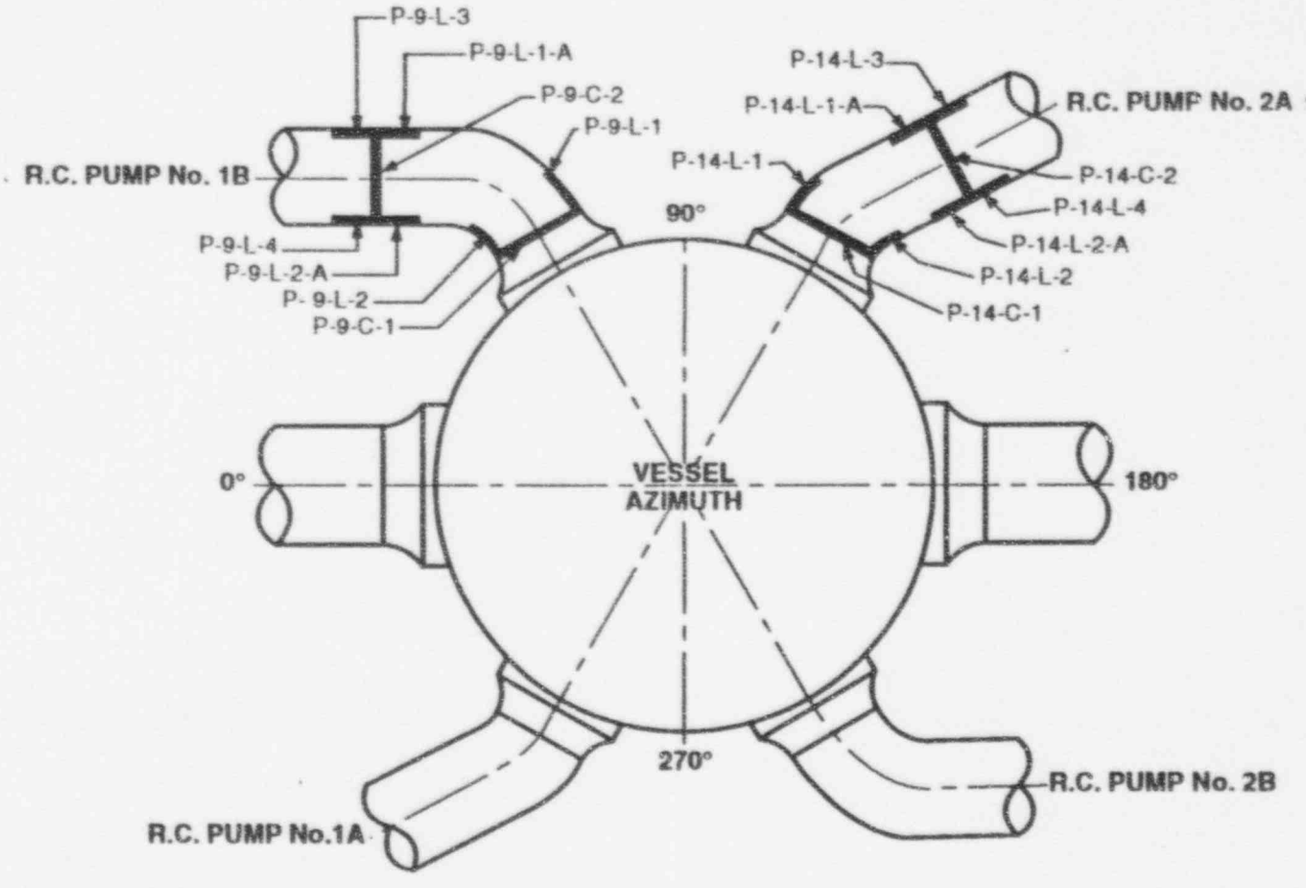


Figure A-2. Reactor Coolant Piping System