VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 11, 2005

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

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NLOS/GDM R0
Docket No. 50-280
License No. DPR-32

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 1
ASME SECTION XI INSERVICE INSPECTION PROGRAM
PARTIAL EXAMINATION RELIEF REQUESTS FOR TEN YEAR REACTOR VESSEL EXAMINATIONS

Virginia Electric and Power Company (Dominion) performed inservice inspection (ISI) examinations at Surry Power Station Unit 1 for the third ten-year ISI interval to the requirements of the 1989 Edition of the ASME Section XI Code. Some of the ten-year examinations on the Surry Unit 1 reactor vessel during the fall 2004 refueling outage were performed consistent with Relief Request CMP-028, Revision 1, which was approved by NRC letter dated November 4, 2003. Certain examinations were only partially performed (e.g. coverage achieved was less than 90%) due to physical interferences that prohibited attaining full weld coverage.

Pursuant to 10 CFR 50.55a(g)(6)(i), relief is requested from certain requirements of the ASME Section XI Code associated with examinations where only partial coverage could be obtained. Relief Requests PRT-07 and PRT-08 are included in Attachments 1 and 2 and provide the basis for this request. The relief requests have been approved by the Station Nuclear Safety and Operating Committee.

If you have any questions or require additional information regarding the attached relief requests, please contact Mr. Gary D. Miller at (804) 273-2771.

Very truly yours,

E. S. Grecheck
Vice President – Nuclear Support Services

Attachments

Commitments made in this letter: None

cc: U. S. Nuclear Regulatory Commission
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Attachment 1

Relief Request PRT-07

Virginia Electric and Power Company
(Dominion)
Surry Power Station Unit 1

Virginia Electric & Power Company
Surry Power Station Unit 1
Third Ten Year Interval

Relief Request No. PRT-07

I. Identification of Components

Weld No.	1-01
Drawing	11448-WMKS-RC-R-1.1
ASME Class	1
Description	Reactor Vessel Shell-to-Flange Weld

II. Code Requirement

The 1989 Edition of ASME Section XI Table IWB-2500-1, examination category B-A, item number B1.30, requires volumetric examination of the reactor vessel shell-to-flange weld. The volume to be examined includes the weld plus 1/2t (t= thickness) of base material on each side of the weld for essentially 100% of the weld length. The subject examination volume is required to be examined in four directions; two opposing perpendicular and two opposing parallel beam directions in relationship to the weld axis.

III. Basis for Relief

The ultrasonic examination of the reactor vessel shell-to-flange weld was performed using a combination of manual and remote automated ultrasonic examination techniques. The manual examination was applied from the flange surface with techniques in accordance with the requirements of ASME Section V, Article 4. The remote automated ultrasonic examinations were performed from the vessel shell inside surface using techniques qualified by demonstration for Appendix VIII, Supplements 4 and 6 of the 1995-96 Addenda of ASME Section XI as allowed by approved relief request SR-030 (NRC Letter dated October 16, 2004). These automated techniques are noted to produce more accurate, reliable and repeatable procedures of examinations than the standard Section V techniques previously used.

Figure 1 shows the reactor vessel and associated welds. Figures 2 and 3 illustrate the weld profile and show scan orientation and directions. Coverage of the examination volume is obtained by combining the manual examination performed from the flange surface with the automated coverage obtained from the vessel shell

surface. The examination performed from the flange surface provides examination coverage with the ultrasonic sound beam directed essentially normal to the weld axis. Coverage from the flange provides coverage of the examination volume in one beam direction, perpendicular to the weld axis. The ASME Section XI, Appendix VIII, Supplements 4 and 6 techniques are applied from the vessel inside surface, scanning in four directions to the extent possible. Due to the surface geometry of the flange, the ability to scan the necessary areas to provide complete coverage of the examination volume in four directions is limited. The examination tool end effector, which holds the ultrasonic transducers, is not able to maintain the necessary surface contact on the non-parallel surface of the flange taper located just above the weld. The area most affected by this surface geometry limitation is the 1/2t base material volume above the weld. The total examination coverage obtained for the weld volume was 97.6%. Table 1 provides the breakdown of coverage of the required examination volume. The overall coverage of the entire examination volume using the combined techniques is 85.17%.

IV. Alternative Examination

As part of the requirement of Table IWB-2500-1, Category B-P, Item B15.10, a visual VT-2 inspection is conducted on the reactor vessel every refueling outage to detect evidence of through wall leakage on the vessel. This examination has been performed in conjunction with approved Relief Request RR-014, which addresses visual inspection of the bottom of the reactor vessel. The reactor vessel was visually inspected for the Third Inspection Interval and will continue to receive similar inspection in the Fourth Inspection Interval by approved Relief Request SPT-004, Revision 1. Furthermore, Technical Specifications have surveillance requirements that monitor leakage and radiation levels of the reactor coolant system.

The station leakage monitoring methods, the VT-2 visual examination of the bottom of the reactor vessel performed every refueling outage and the limited coverage volumetric examination revealing no indications provide an acceptable level of quality and safety. The weld in question has been examined to the greatest extent achievable with greater reliability and accuracy than in previous intervals. Dominion proposes that the examination already performed at the reduced coverage be considered as meeting the Code requirements.

Figure 1 Reactor Vessel Welds

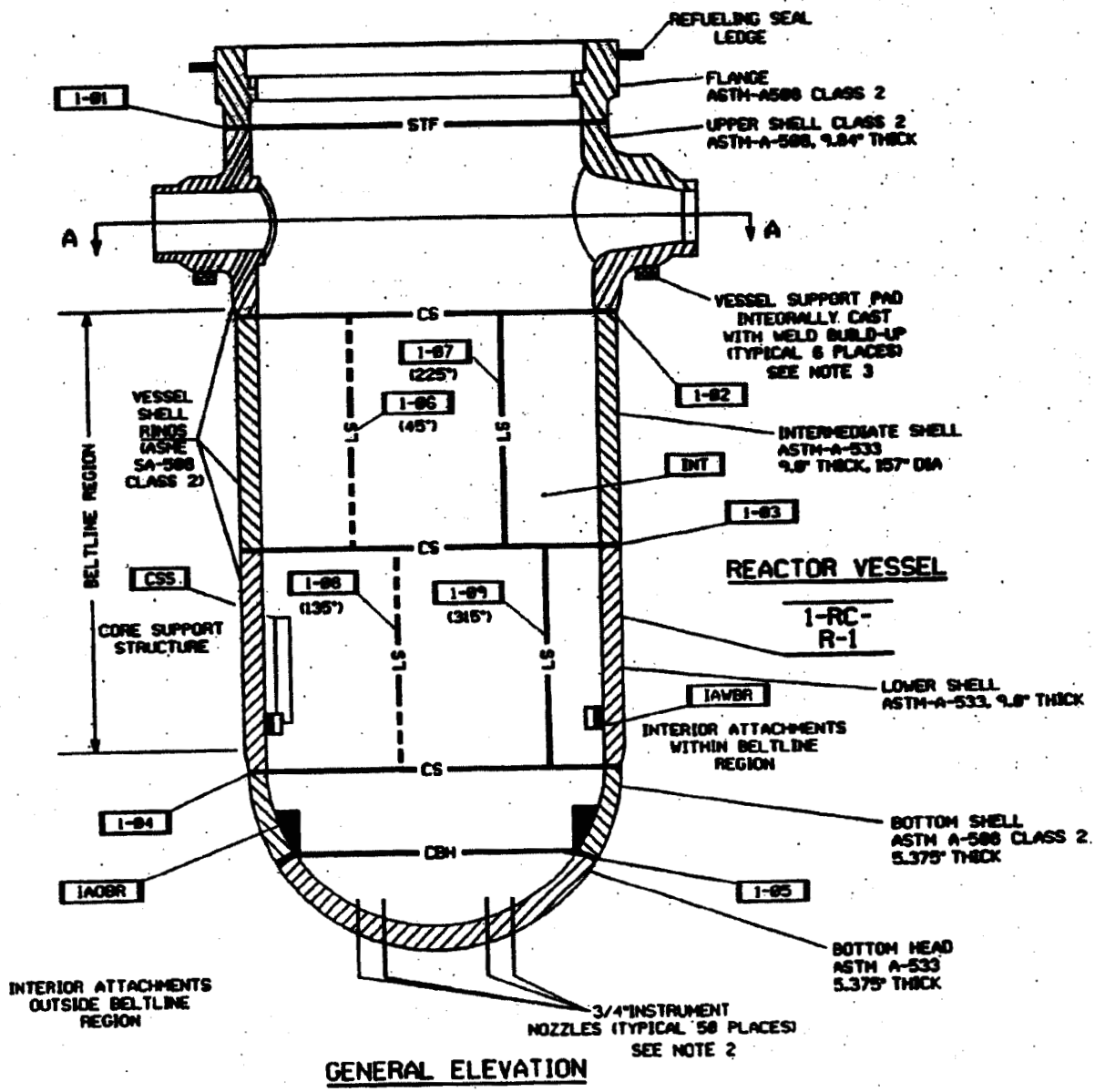


Figure 2 Scans from Flange Surface
Weld 1-01

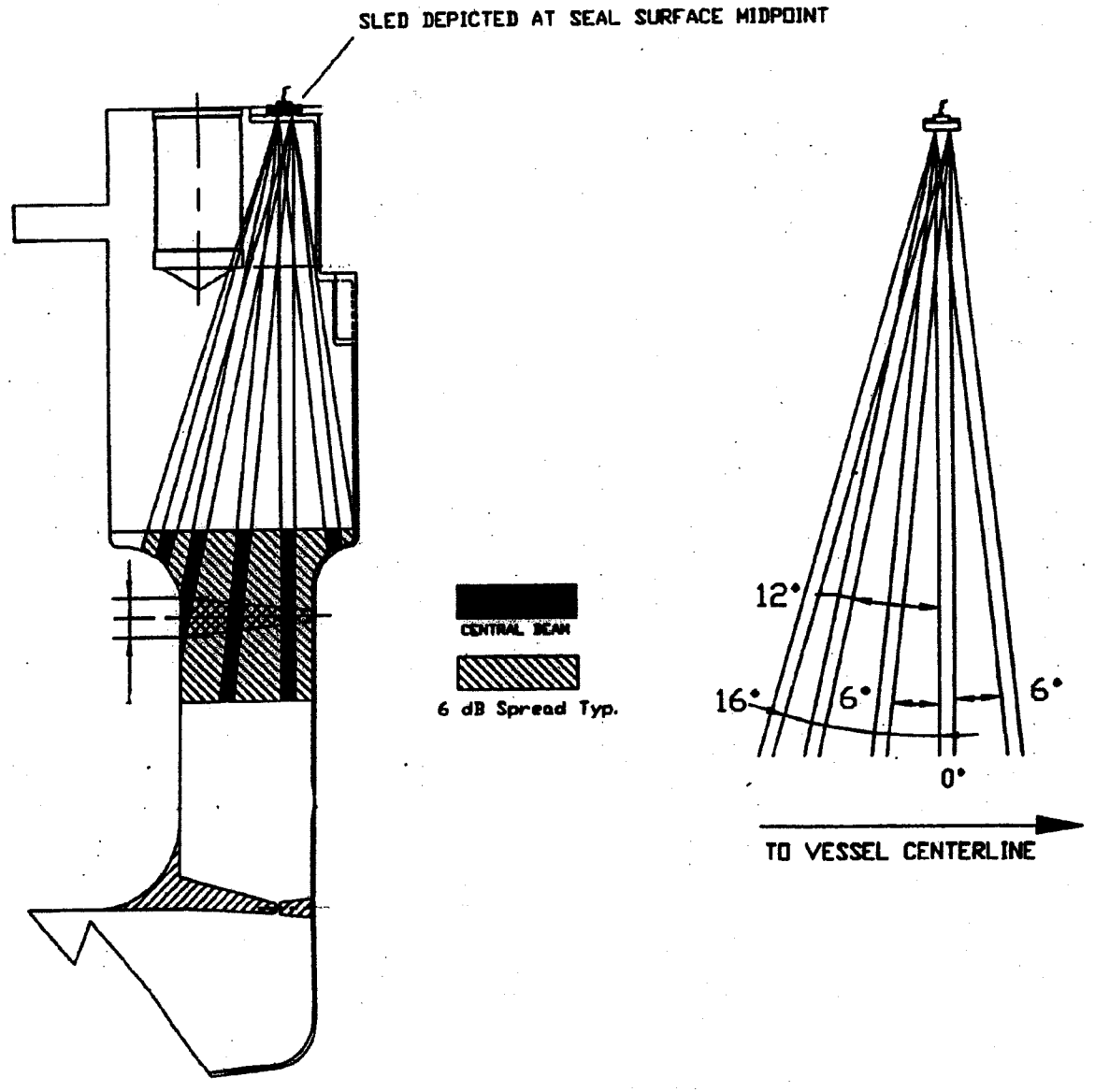
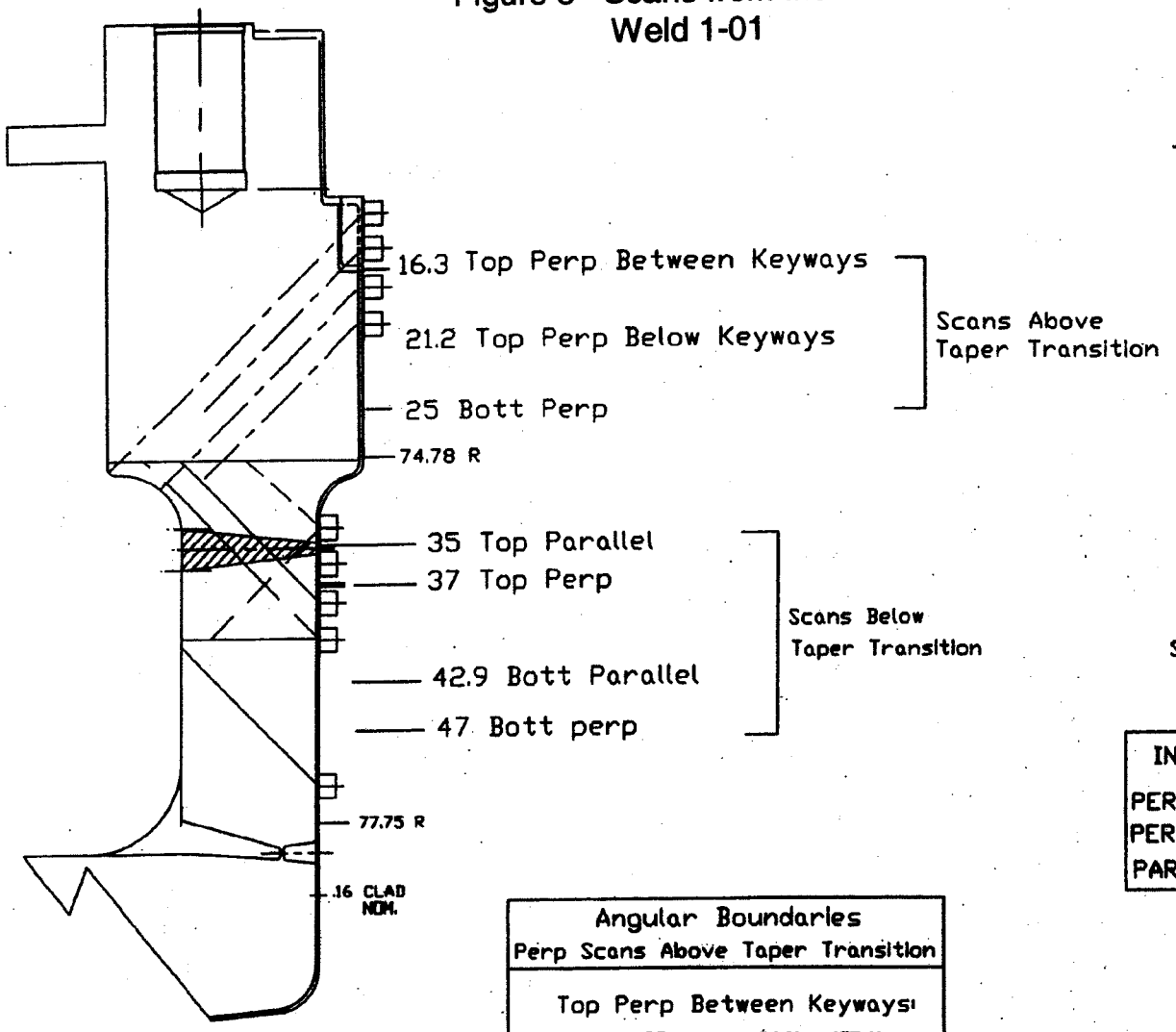
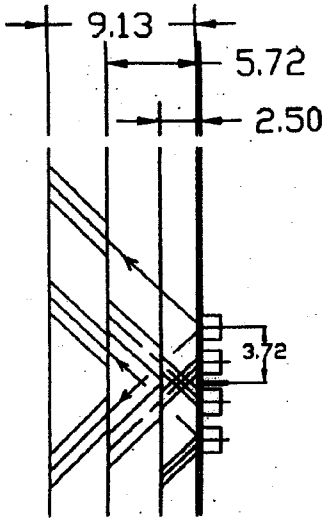


Figure 3 Scans from Inside Vessel
Weld 1-01





SHELL SLED PARMATERS
PERP SCAN DIRECTION

INCREMENT SIZE
PERP (74.78R) = .383°
PERP (77.75R) = .365°
PARALLEL = 0.5"

Angular Boundaries Perp Scans Above Taper Transition	
Top Perp Between Keyways:	
4.6° - 85.4°	94.6° - 175.4°
184.6° - 265.4°	274.6° - 355.4°
Top Perp Under Keyways	
355.4° - 4.6°	85.4° - 94.6°
175.4° - 184.6°	265.4° - 274.6°

Table 1 Surry Unit 1 Reactor Vessel Flange to Upper Shell Weld 1-01 Coverage Percentages

Beam Direction	45 degree L Dual		45 degree L Single		45 degree Shear	
	Examination Volume Coverage[1]					
	Weld	Volume	Weld	Volume	Weld	Volume
CCW	100	53.5	100	53.5	100	53.5
CW	100	53.5	100	53.5	100	53.5
UP	100	100	71.6	52.5	100	100
DOWN[2]	100	100	100	100	100	99

Note[1]: The examination volume coverage calculations are broken down into coverage of the weld volume (Weld) and the 1/2t base material volume (Volume) for each examination transducer and beam direction.

Note[2]: The coverage in the down direction is the total coverage obtained combining the examination techniques from the flange face and the vessel ID surface.

Note: The examination volume coverage is calculated by averaging the combined coverage obtained in each of the required examination beam directions with each of the qualified transducers.

Scans Parallel to the Weld Axis - CCW/CW
Scans Perpendicular to the Weld Axis - UP/DN

Examination Coverage = 85.17%

Attachment 2

Relief Request PRT-08

Virginia Electric and Power Company
(Dominion)
Surry Power Station Unit 1

Virginia Electric & Power Company
Surry Power Station Unit 1
Third Ten Year Interval

Relief Request No. PRT-08

I. Identification of Components

Weld No.	1-04
Drawing	11448-WMKS-RC-R-1.1
ASME Class	1
Description	Reactor Vessel Circumferential Shell Weld

II. Code Requirement

The 1989 Edition of ASME Section XI Table IWB-2500-1, examination category B-A, item number B1.11, requires volumetric examination of the reactor vessel circumferential shell weld. The volume to be examined includes the weld plus 1/2t (t=thickness) of base material on each side of the weld for essentially 100% of the weld length. The examination volume is addressed in two regions to provide the necessary coverage with qualified examination techniques. The clad to base metal interface, including 15%t of the vessel wall (measured from the clad to base metal interface) and the remaining 85% of the vessel thickness. The clad to base metal interface region shall be examined from four orthogonal directions using procedures and personnel qualified in accordance with Supplement 4 of Appendix VIII. The remaining 85% of the vessel thickness shall be examined from four orthogonal directions (when possible) using procedures and personnel qualified in accordance with Supplement 6 to Appendix VIII. When access restricts coverage in four directions, coverage of the remaining 85% of the examination volume is considered fully examined if coverage is obtained in one parallel and one perpendicular direction using a procedure and personnel qualified for single-side examination in accordance with Supplement 6.

III. Basis for Relief

The ultrasonic examination of the reactor pressure vessel circumferential shell weld is conducted in accordance with techniques qualified by demonstration for Appendix VIII, Supplements 4 and 6 of the 1995-96 Addenda of ASME Section XI.

There are four core support lugs located at 0 degree, 90 degree, 180 degree, and 270 degree positions of the vessel inside surface just above the weld which restrict complete coverage of the required examination volume. The ultrasonic examination of this weld was performed by scanning the accessible scan surfaces between the support lugs and below the support lugs. Figure 1 shows the general configuration of the reactor vessel and location of weld 1-04. Figures 2 and 3 show the ultrasonic scanning boundaries for this weld with the restrictions due to the core support lugs. The size of the ultrasonic manipulator end effector limits how close the individual transducers can be positioned to the support lugs while scanning. The proximity of the end effector to the support lugs limits the amount of coverage obtained with each of the qualified transducers. Table 1 provides the breakdown of percent coverage of the required examination volume by scan direction and transducer. The achieved coverage of the required examination volume applying the qualified techniques is 73.4%.

IV. Alternative Examination

As part of the requirement of Table IWB-2500-1, Category B-P, Item B15.10, a visual VT-2 inspection is conducted on the reactor vessel every refueling outage to detect evidence of through wall leakage on the vessel. This examination has been performed in conjunction with approved Relief Request RR-014, which addresses visual inspection of the bottom of the reactor vessel. The reactor vessel was visually inspected for the Third Inspection Interval and will continue to receive similar inspection in the Fourth Inspection Interval by approved Relief Request SPT-004, Revision 1. Furthermore, Technical Specifications have surveillance requirements that monitor leakage and radiation levels of the reactor coolant system.

The station leakage monitoring methods, the VT-2 visual examination of the bottom of the reactor vessel performed every refueling outage, and the limited coverage volumetric examination revealing no indications provide an acceptable level of quality and safety. The weld in question has been examined to the greatest extent achievable with greater reliability and accuracy than in previous intervals. Dominion proposes that the examination already performed at the reduced coverage be considered as meeting the Code requirements.

Figure 1 Reactor Vessel Welds

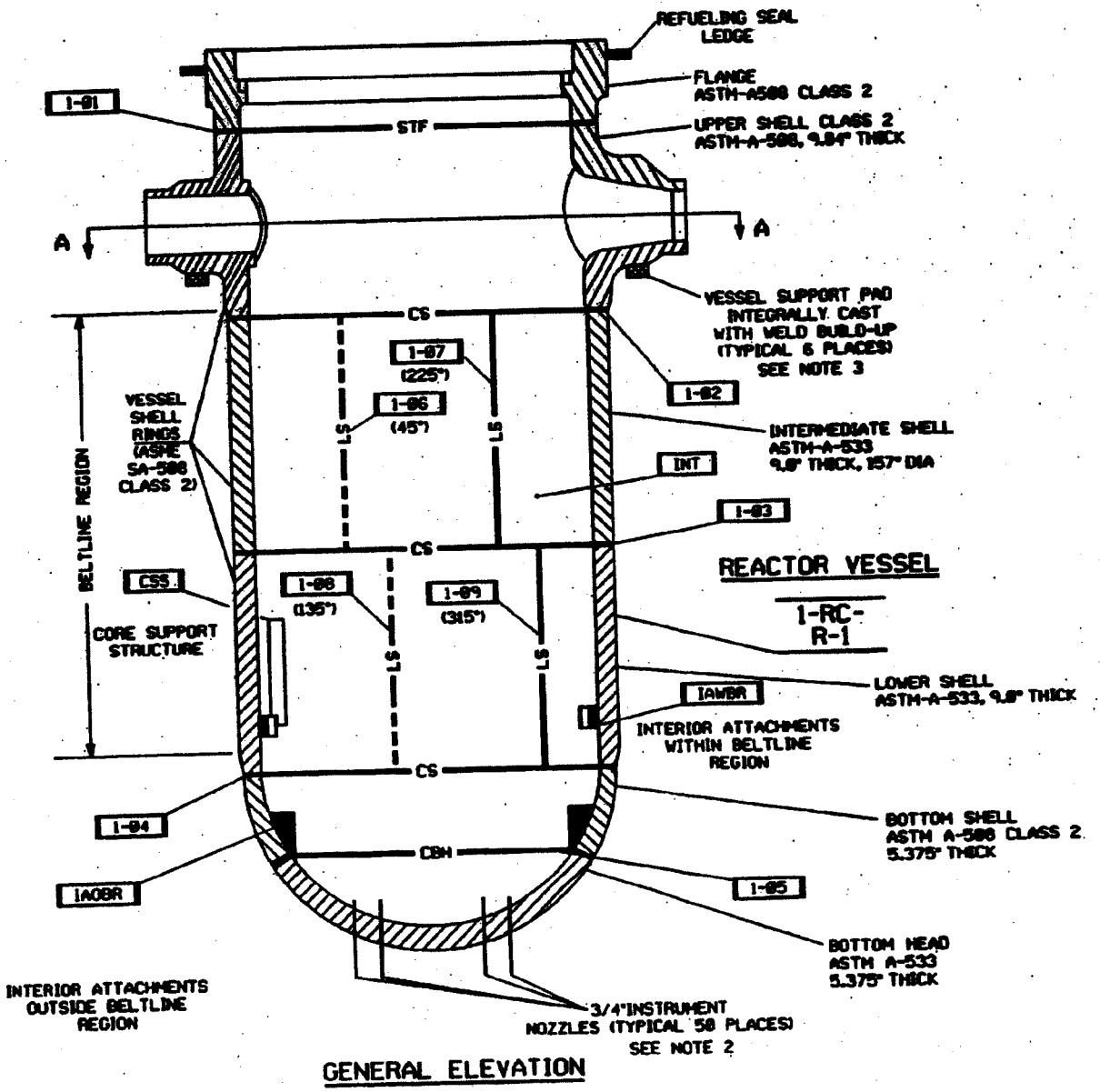
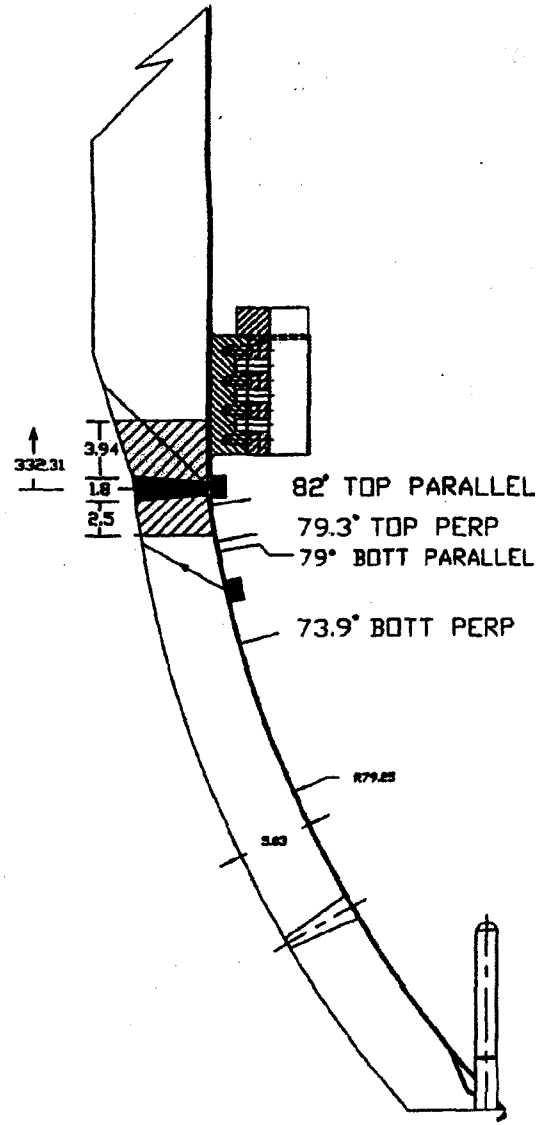


Figure 2 Scanning Under Core Lugs
Weld 1-04



ANGULAR SCANNING BOUNDARY UNDER CORE LUGS

PERP SCANS

UNDER 0° LUG	UNDER 90° LUG	UNDER 180° LUG	UNDER 270° LUG
352.75° - 72.5°	82.75° - 97.25°	172.75° - 187.25°	262.75° - 277.25°

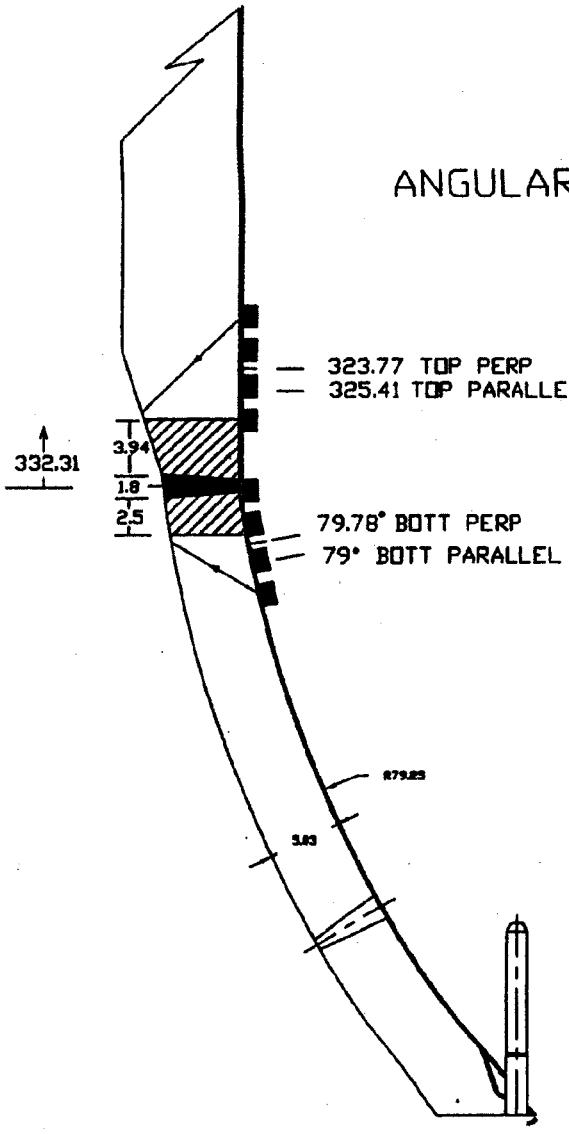
PARALLEL SCANS

UNDER 0° LUG	UNDER 90° LUG	UNDER 180° LUG	UNDER 270° LUG
351.5° - 8.5°	81.5° - 98.5°	171.5° - 188.5°	261.5° - 278.5°

NOTES:
1) PERP EXAM STRATEGY UNDER THE LUGS IS TO MAXIMIZE COVERAGE WITH THE 45° FRONT FACING EXTRA PROBE.
2) EXAMINER AND TOOL OPERATOR TO INSURE THAT SCANS UNDER THE LUGS AND SCANS BETWEEN THE LUGS OVERLAP.
3) PERP SCANS MAYBE COMBINED WITH LOWER HEAD CIRC WELD PERP SCANS PROVIDING ALL BOUNDARIES ARE MET.

INCREMENT SIZE
PARALLEL - 0.5°
PERP - .365°

Figure 3 Scanning Between Core Lugs
Weld 1-04



ANGULAR SCANNING BOUNDARY BETWEEN CORE SUPPORT LUGS

PERP SCANS

BETWEEN 0° AND 90°	BETWEEN 90° AND 180°	BETWEEN 180° AND 270°	BETWEEN 270° AND 0°
7.25° - 82.75°	97.25° - 172.75°	187.25° - 262.75°	277.25° - 352.75°

PARALLEL SCANS

BETWEEN 0° AND 90°	BETWEEN 90° AND 180°	BETWEEN 180° AND 270°	BETWEEN 270° AND 0°
8.5° - 81.5°	98.5° - 171.5°	188.5° - 261.5°	278.5° - 351.5°

NOTES: 1) PERP SCANS MAY BE COMBINED WITH LOWER HEAD CIRC WELD PERP SCANS PROVIDING ALL BOUNDARIES ARE MET
2) EXAMINER AND TOOL OPERATOR TO INSURE THAT SCANS UNDER THE LUGS AND SCANS BETWEEN THE LUGS OVERLAP.

INCREMENT SIZE:
PARALLEL - 0/5°
PERP .365°

Table 1 Surry Unit 1 Reactor Vessel Lower Circumferential Shell Weld 1-04 Coverage Percentages

Beam Direction	45 degree L Dual		45 degree L Single		45 degree Shear	
	Examination Volume Coverage[1]					
	Weld	Volume	Weld	Volume	Weld	Volume
CCW	73.3	78.1	87.9	83.0	87.9	83.0
CW	73.3	78.1	87.9	83.0	87.9	83.0
UP	77.7	77.7	77.7	77.7	100	96.3
DOWN	77.7	12.2	77.7	80.8	77.7	14.6

Note[1]: The examination volume coverage calculations are broken down into coverage of the weld volume (Weld) and the 1/2**t** base material volume (Volume) for each examination transducer and beam direction.

Note: The examination volume coverage is calculated by averaging the combined coverage obtained in each of the required examination beam directions with each of the qualified transducers.

Scans Parallel to the Weld Axis - CCW/CW
Scans Perpendicular to the Weld Axis - UP/DN

Examination Coverage = 73.4%