March 18, 1996

LICENSEE: Vermont Yankee Nuclear Power Corporation

FACILITY: Vermont Yankee Nuclear Power Station

SUBJECT: SUMMARY OF MARCH 13, 1996, MEETING WITH REPRESENTATIVES OF VERMONT YANKEE NUCLEAR POWER CORPORATION

On March 13, 1996, pursuant to notice, the NRC staff met with representatives of Vermont Yankee Nuclear Power Corporation (the licensee) at Rockville, Maryland, to discuss the licensee's plans for core shroud repair and reactor vessel inspection at the Vermont Yankee Nuclear Power Station (VYNPS) during the 1996 refueling outage (RFO). The list of attendees is provided as Attachment 1. The licensee requested the meeting to maintain open communication with the NRC staff regarding the licensee's plans. A handout of issues discussed at the meeting was prepared by the licensee and is provided as Attachment 2.

During the 1995 RFO, the licensee identified significant cracking in the horizontal H5 weld of the core shroud at VYNPS. The licensee evaluated the identified flaws and concluded that operation of VYNPS for one cycle could be justified. The NRC staff reviewed the licensee's evaluation and, in a safety evaluation dated April 27, 1995, concluded that continued operation of VYNPS for one additional cycle would not pose undue risk to the public health and safety. The staff also stated that the licensee must reinspect and/or repair the shroud during the 1996 RFO.

The licensee stated that it plans to install modifications to repair the core shroud at VYNPS during the 1996 RFO. The licensee's plans for the shroud repair will be formally submitted for NRC staff review on or about April 1, 1996. The 1996 RFO is scheduled to begin on or about August 24, 1996, and last approximately 29 days.

Sincerely,

Original signed by:

Daniel H. Dorman, Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-271

Attachments: 1. List of Attendees
2. Vermont Yankee 1996 Refueling Outage Reactor Pressure Vessel and Reactor Internals Activities

cc w/atts: See next page

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OFFICE	PDI-3:LA		PDI-1:PM		PDI-1:D			
NAME	SNorris		DDorman		LMarsh			
DATE	03/18/96		03/18/96		03/19/96			

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Daniel H. Dorman

Daniel H. Dorman, Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

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cc w/atts: See next page

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Ropes & Gray
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Vermont Department of Public Service
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Montpelier, VT 05602

Public Service Board
State of Vermont
120 State Street
Montpelier, VT 05602

Chairman, Board of Selectmen
Town of Vernon
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Mr. Robert J. Wanczyk, Plant Manager
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Citizens Awareness Network
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Shelburne Falls, MA 01370

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Vermont Yankee Nuclear Power Station
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Meeting Summary w/att. 1
E-Mail
W. Russell/F. Miraglia
R. Zimmerman
S. Varga
J. Zwolinski
L. Marsh
S. Norris
E. Jordan
DTerao
DWessman
KManoly
MMcBrearty
MModes
KKavanagh
LBanic
JDavis
JRajan
OGC
ACRS
WDean
RConte, RI

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Docket File
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PDI-1 Reading
D. Dorman
J. Linville, RI

200139

LIST OF ATTENDEES

MEETING WITH LICENSEE REPRESENTATIVES FOR

VERMONT YANKEE NUCLEAR POWER STATION

ROCKVILLE, MARYLAND

MARCH 13, 1996

NAME	AFFILIATION	TITLE
Dan Dorman	NRC/NRR/Project Directorate I-1	Project Manager
Jim Duffy	Vermont Yankee	Licensing Engineer
Paul Phelan	Vermont Yankee	Sr. Mech. Engineer
Carl Larsen	Yankee Atomic	Sr. NDE Engineer
John Hoffman	Yankee Atomic	Engineer
Dennis Girroir	Vermont Yankee	Sr. Engineer
Bill Fields	Yankee Atomic	Engineer
Ken Willens	Yankee Atomic	Principal Engineer
David Terao	NRC/NRR/EMCB	Section Chief
Dick Wessman	NRC/NRR/EMEB	Branch Chief
Kamal Manoly	NRC/NRR/EMEB	Section Chief
Michael McBrearty	NRC/R-I/DRS	Reactor Sys. Eng.
Michael C. Modes	NRC/R-I/DRS	Branch Chief
Kerri Kavanagh	NRC/NRR/SRXB	Reactor Sys. Eng.
Lee Banic	NRC/NRR/EMCB	Materials Eng.
Jim Davis	NRC/NRR/EMCB	Materials Eng.
Jai Rajan	NRC/NRR/EMEB	Mechanical Eng.

EMCB = Materials and Chemical Engineering Branch
EMEB = Mechanical Engineering Branch
SRXB = Reactor Systems Branch
R-I/DRS = Division of Reactor Safety, Region I

Presentation to USNRC

Vermont Yankee

1996 Refueling Outage

Reactor Pressure Vessel and Reactor Internals Activities

March 13, 1996

Core Shroud Repair

RPV Beltline Examination

Other Internals Inspections

Core Shroud Repair

Summary of 1995 UT Inspections

Summary of 1995 Flaw Evaluations

NRC Safety Evaluation Report

1996 Repair Plans

Ultrasonic examinations were performed on welds H1 through H7.

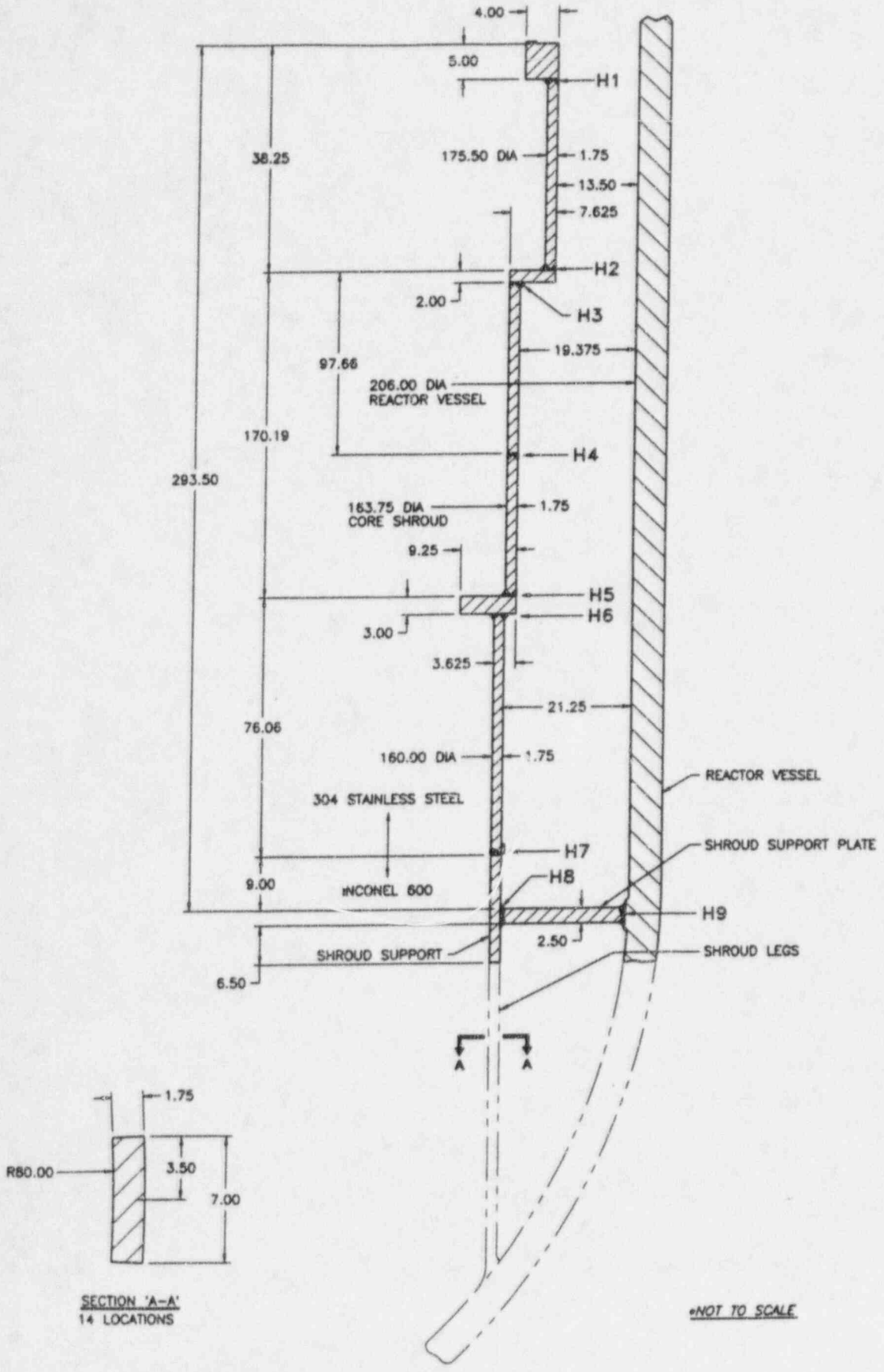
In excess of 50 percent of Welds H1 through H6 were examined. (Access restrictions limited H7 inspection to 33 percent of circumference)

Negligible flaw indications were detected in welds H1 through H3.

Minor flaw indications were detected in welds H4 and H6.

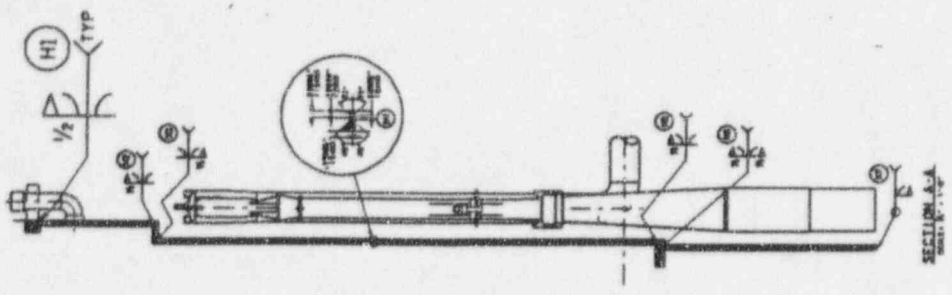
No flaws were detected in weld H7.

A relatively large number of indications were detected in weld H5.



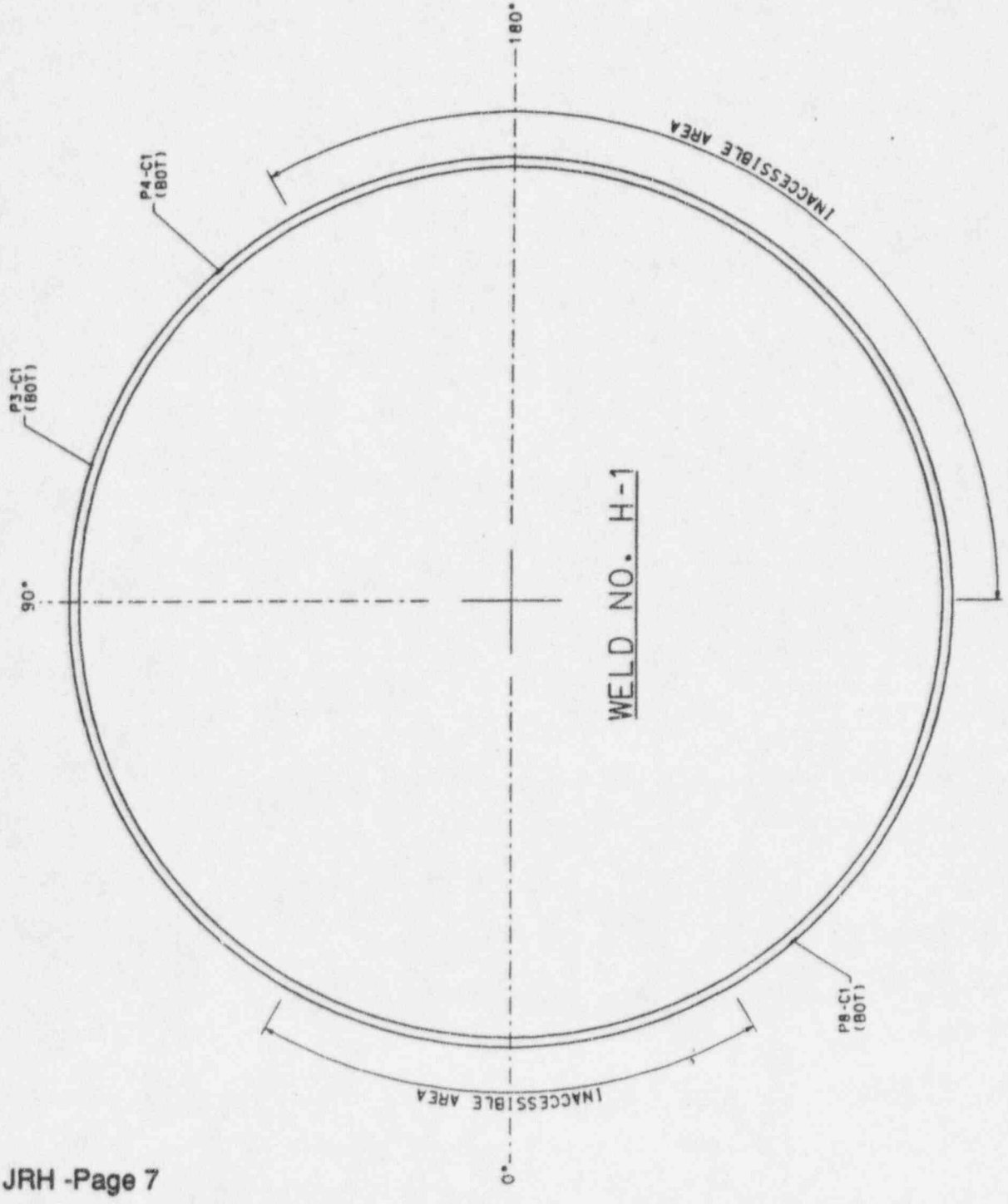
VERMONT YANKEE - SHROUD WELDS

JRH -Page 6



FOR INFORMATION ONLY

CORE SHROUD
WELD NO. H-1



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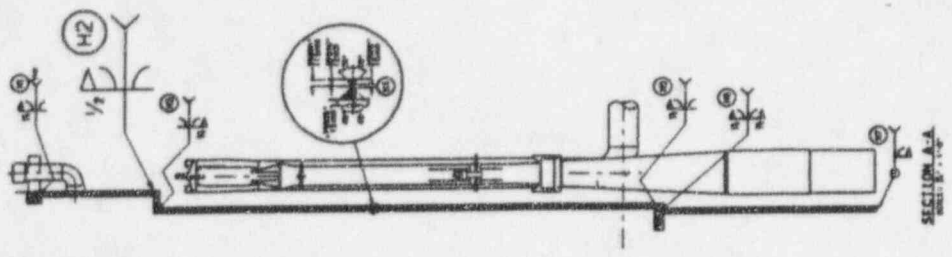
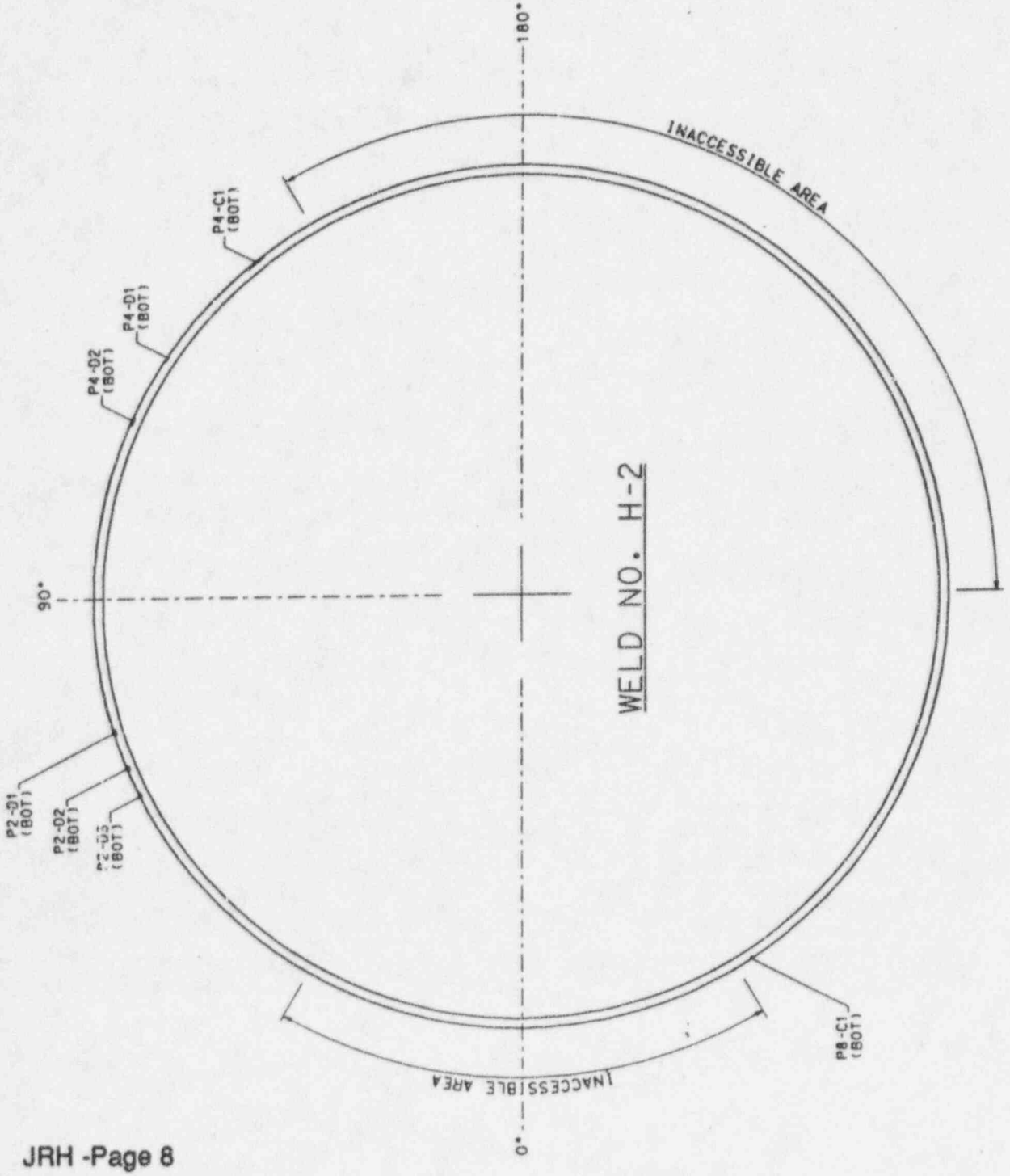


FOR INFORMATION ONLY

CORE SHROUD
WELD NO. H-2



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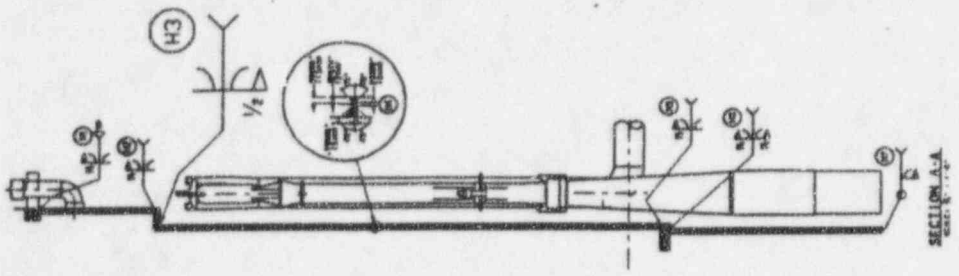
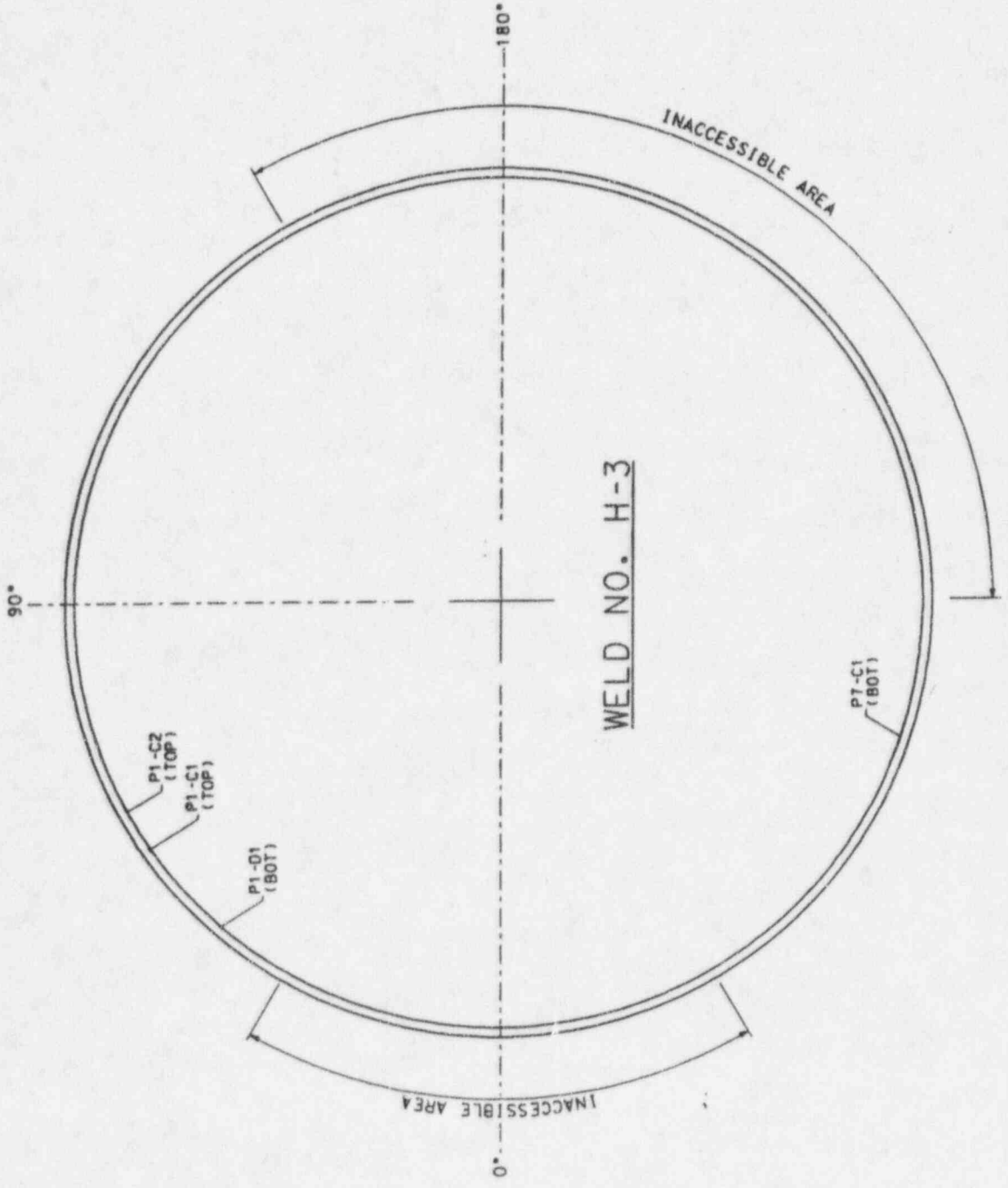
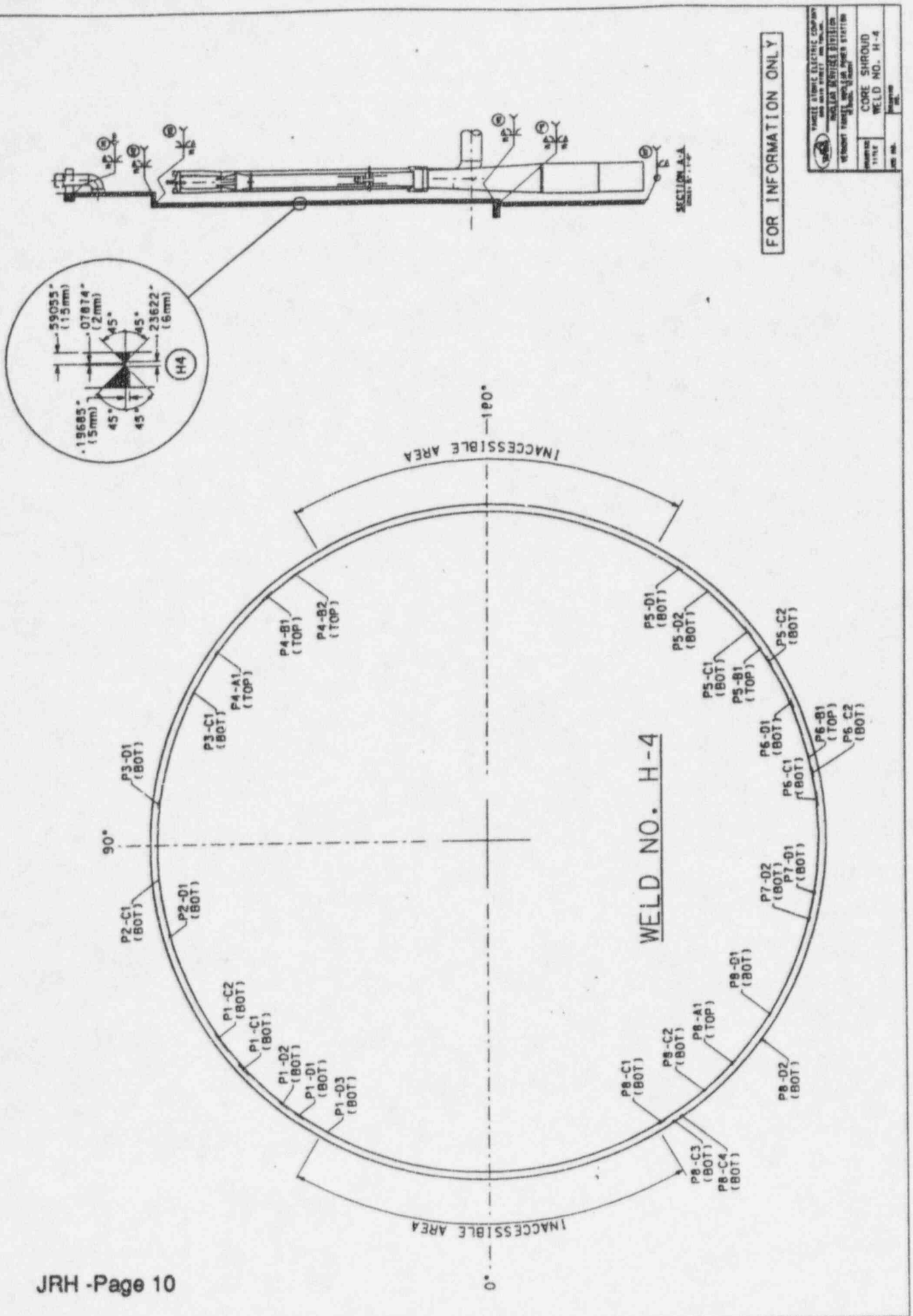


FOR INFORMATION ONLY

CORE SHROUD
WELD NO. H-3



JRH -Page 9


FOR INFORMATION ONLY
CORE SHROUD
WELD NO. H-4
SECTION A-A
.59055" (15mm)
.07874" (2mm)
45°
45°
.23622" (6mm)
.19685" (15mm)
45°
45°
H4
180°
INACCESSIBLE AREA
90°
WELD NO. H-4
0°
INACCESSIBLE AREA
P4-B1 (TOP)
P4-B2 (TOP)
P4-A1 (TOP)
P3-C1 (BOT)
P3-D1 (BOT)
P5-D1 (BOT)
P5-D2 (BOT)
P5-C2 (BOT)
P5-C1 (BOT)
P5-B1 (TOP)
P6-D1 (BOT)
P6-B1 (TOP)
P6-C2 (BOT)
P6-C1 (BOT)
P7-D2 (BOT)
P7-D1 (BOT)
P2-C1 (BOT)
P2-D1 (BOT)
P8-D1 (BOT)
P1-C2 (BOT)
P1-C1 (BOT)
P8-A1 (TOP)
P8-C2 (BOT)
P1-D2 (BOT)
P1-D1 (BOT)
P1-D3 (BOT)
P8-C1 (BOT)
P8-D2 (BOT)
P8-C3 (BOT)
P8-C4 (BOT)

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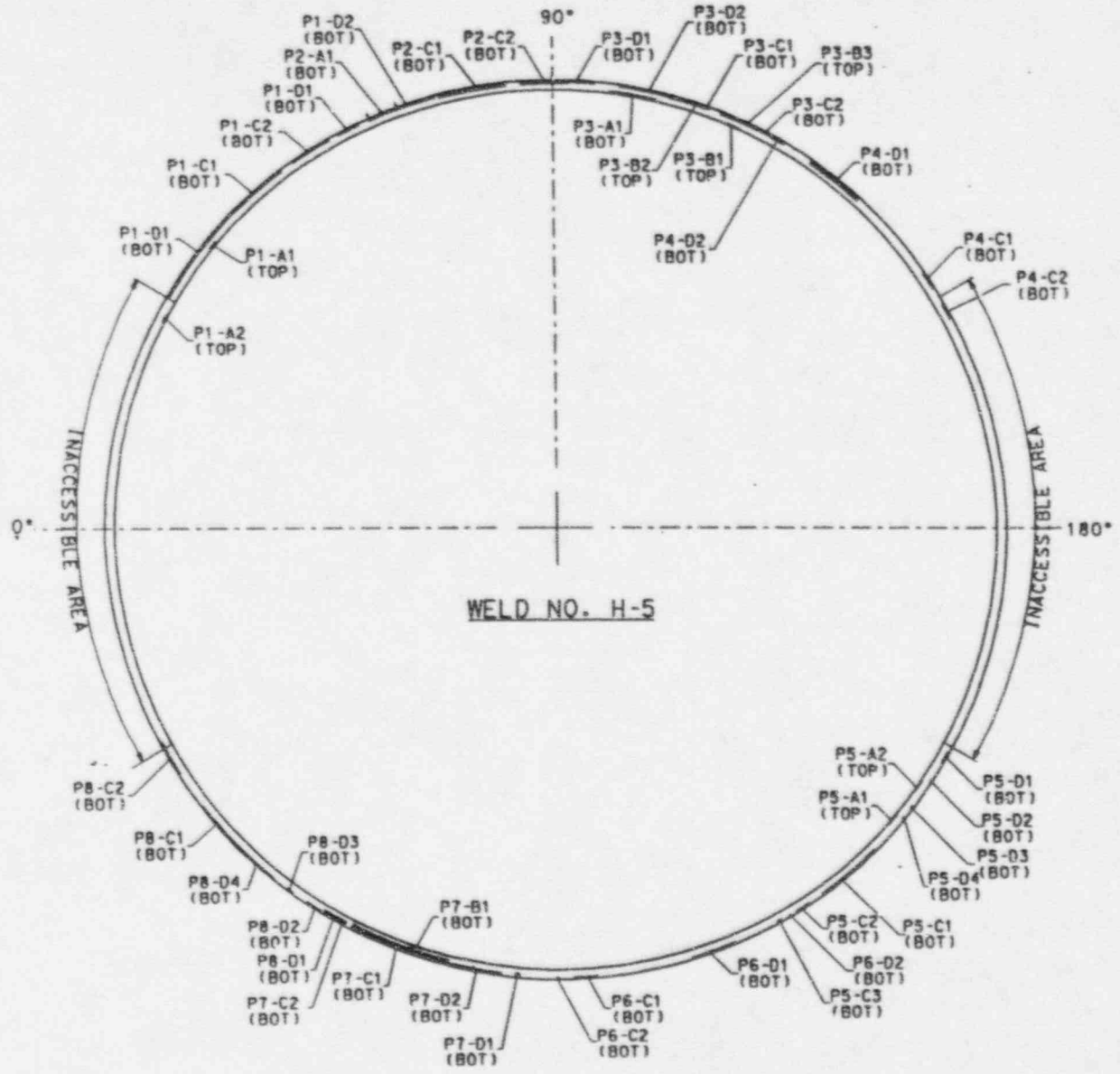
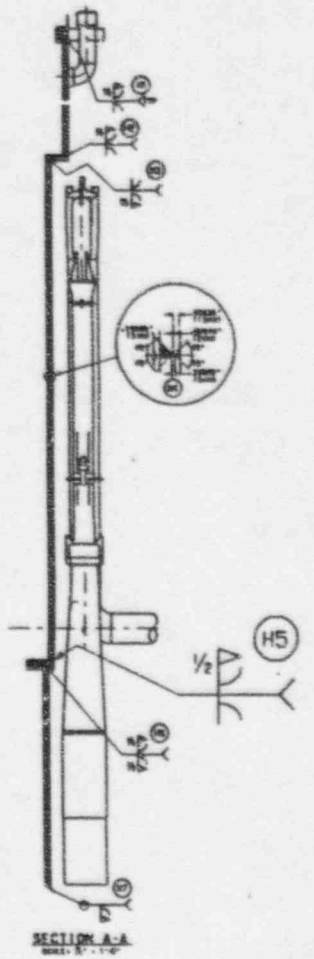
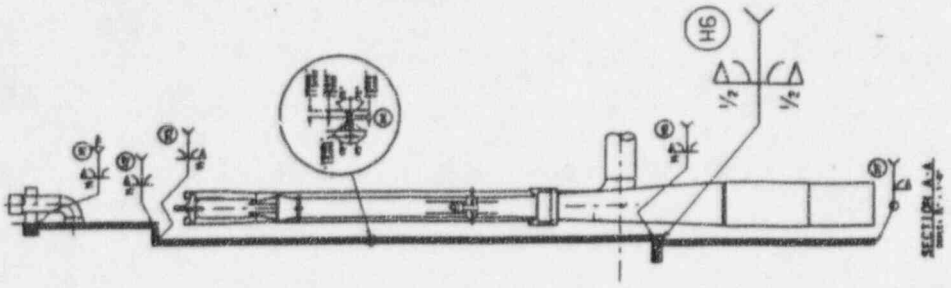




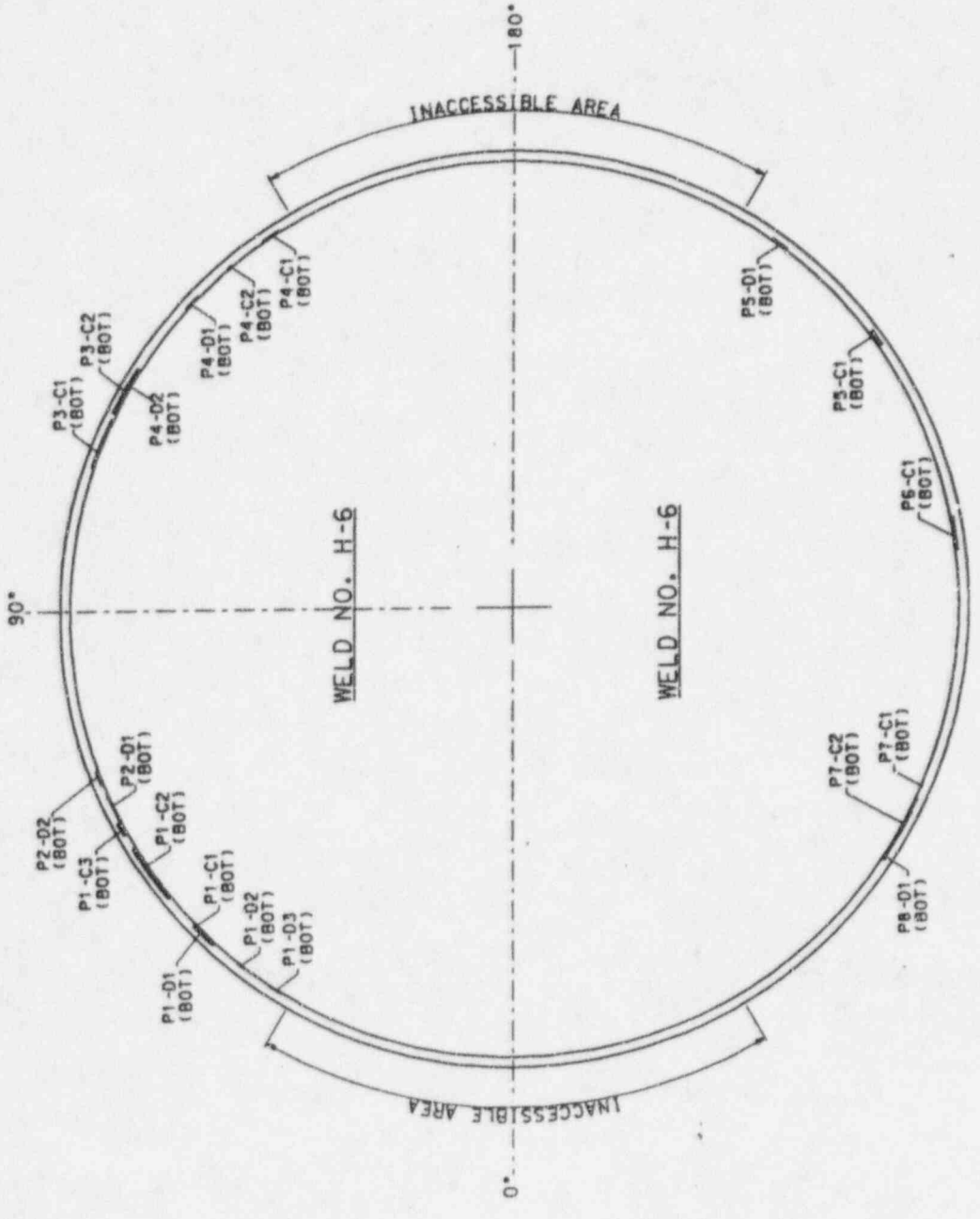
FOR INFORMATION ONLY

YANKEE ATOMIC ELECTRIC COMPANY
NUCLEAR SERVICES DIVISION
VERMONT YANKEE NUCLEAR POWER STATION
CORE SHROUD
WELD NO. H-5



FOR INFORMATION ONLY

CORE SHROUD
WELD NO. H-6



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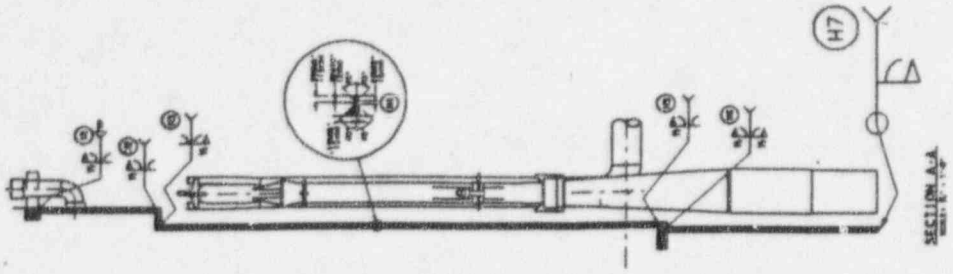
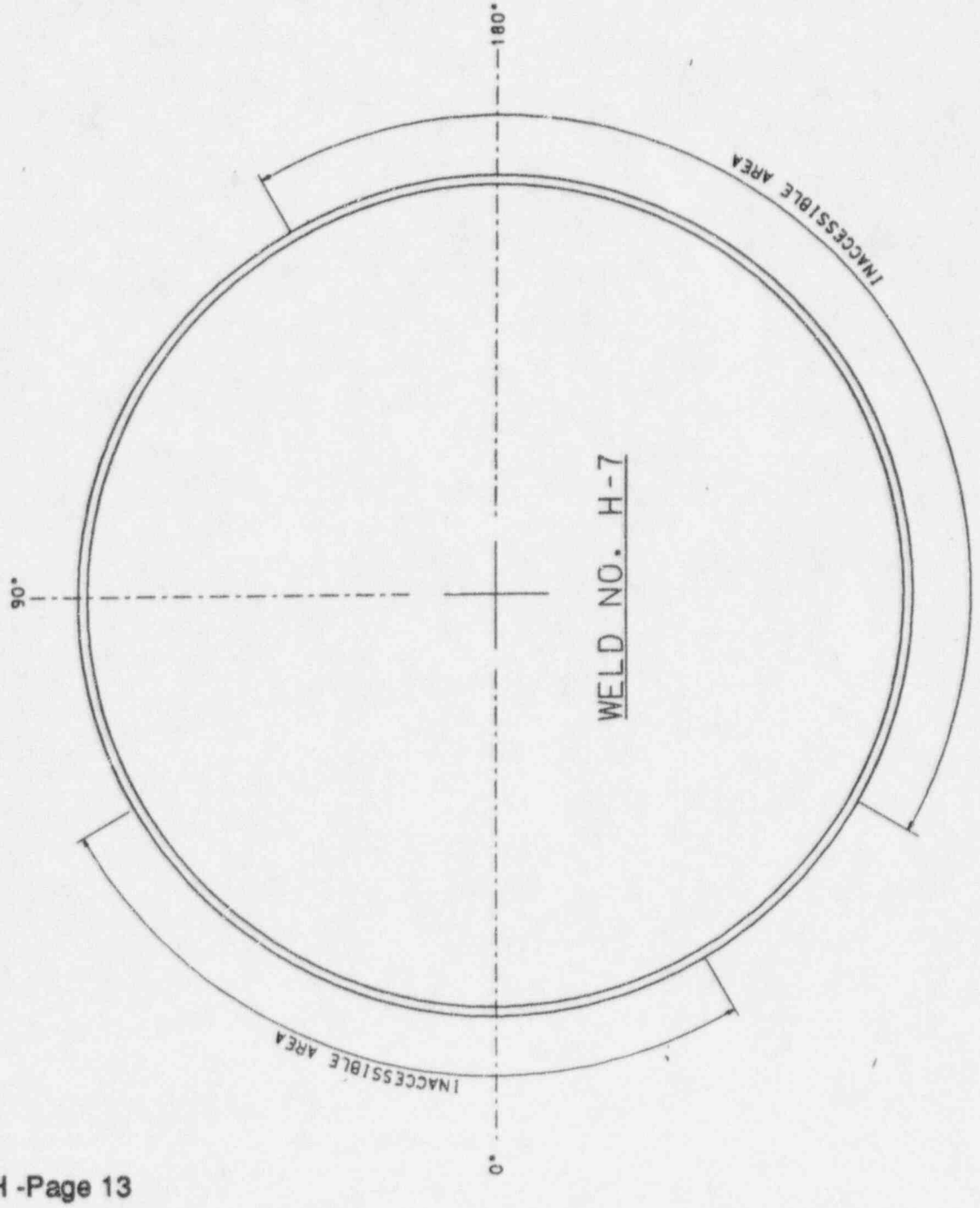


FOR INFORMATION ONLY

CORE SHROUD
WELD NO. H-7



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All uninspected regions were assumed to be 100 percent cracked through wall (very conservative assumption; exceeds BWRVIP requirements).

Other than weld H5, all detected flaws were assumed to be through wall.

Flaw growth rate assumed to be 5E-5 inches per hour.

UT sizing uncertainty of 0.3 inches utilized per USNRC requirements.
(Actual inspection qualification testing demonstrated accuracy better than 0.15 inches.)

Flaw evaluations were performed using limit load option of DLL Computer Code (EOL fluence to shroud ID <3E20 n/cm^2)

Factors of Safety for Limiting Case

H1 > 43

H2 > 28

H3 > 27

H4 > 8

H5 > 2

H6 > 5

H7 > 2

(H5 based on one cycle; all other welds based on two cycles)

USNRC issued a Safety Evaluation Report accepting the results of the Vermont Yankee analyses and authorized one cycle of operation.

Vermont Yankee required to reinspect or repair the core shroud prior to startup from the 1996 refueling outage.

Core shroud will be repaired during the 1996 refueling outage.

Repair is designed to meet or exceed all normal, upset, emergency and faulted design conditions specified in the Vermont Yankee FSAR.

Repair meets or exceeds the requirements of the BWRVIP shroud repair document.

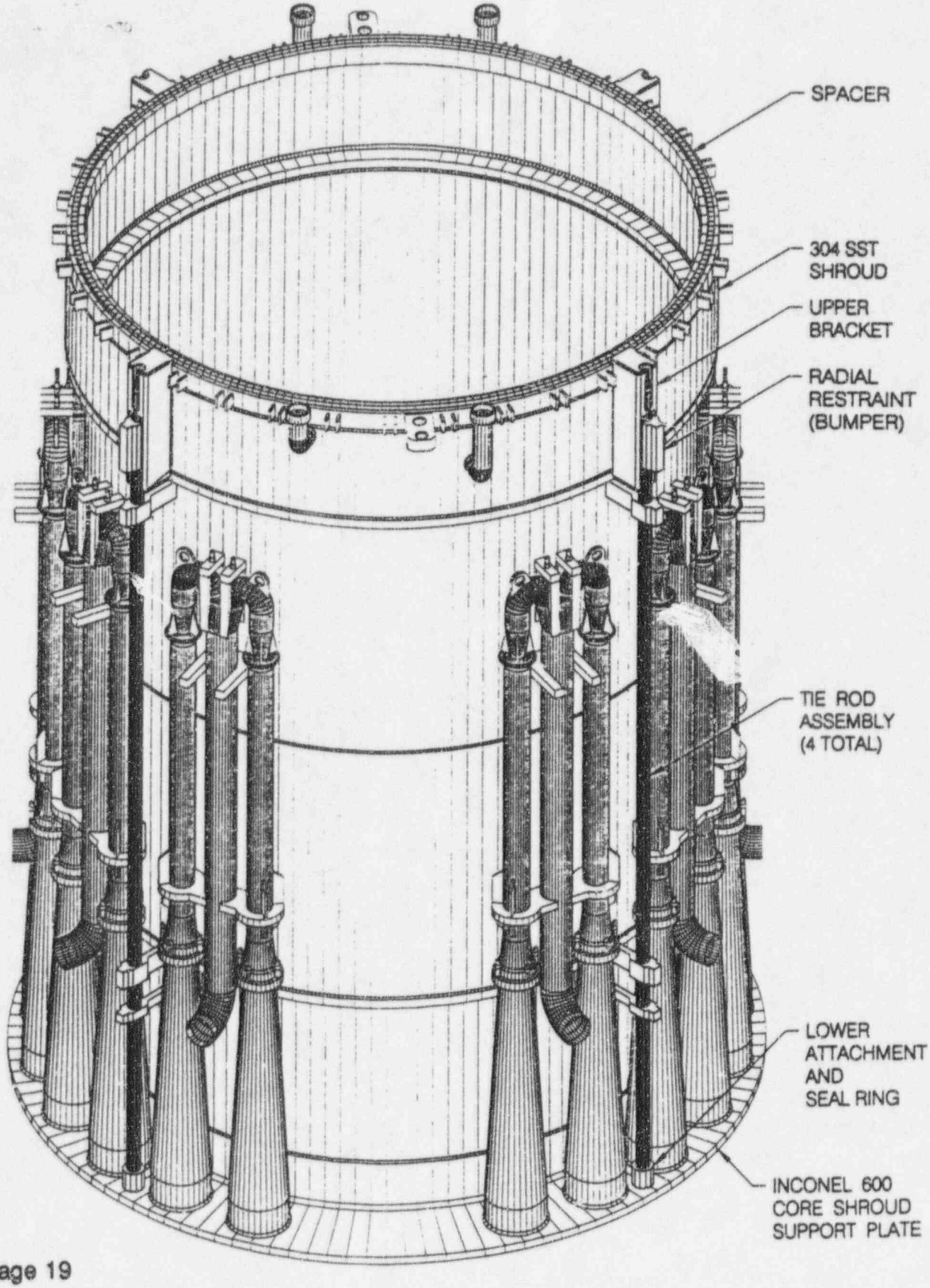
Repair consists of tie rods and radial supports that structurally replace all or part of welds H3 through H7.

Shroud repair design performed by MPR Associates.

Shroud repair installation will be performed by Framatome Technologies, Inc.

Extensive oversight during design, fabrication and installation by Yankee Atomic and Vermont Yankee engineering staff.

Independent third party review performed.



VERMONT YANKEE SHROUD REPAIR

Conservatisms in Design

All internal delta P loads increased by 20 percent above the FSAR values to accommodate possible future fuel changes and/or possible future power uprate.

FSAR values for delta P based on 1665 MWt power; current licensed core power is 1593 MWt.

Seismic input based on USNRC Reg. Guide 1.60 response spectrum and associated damping, modal combination methods, etc. (This is the same methodology utilized for the recirculation system pipe replacement and continues the VY philosophy for seismic upgrade. Accepted by USNRC as a conservative alternative to the original design basis.)

Allowable stresses based on ASME Code, Section III, Subsection NG.

(Original core shroud was not an ASME Code component.)

All design reliant weld lengths confirmed by UT.

Previously inspected circumferential welds at H1 and H2 will be utilized as design reliant welds.

Design Overview

Time History Analyses

Analyzed cases include unrepaired shroud, repaired shroud with intact welds and bounding cases with failed welds (48 load cases evaluated to determine bounding cases).

Repair hardware and design-reliant components quantitatively evaluated for compliance with ASME Section III Subsection NG Code stress limits.

Existing plant hardware evaluated by comparing loads in the unrepaired and repaired configurations.

ECCS performance evaluated considering leakage through potential shroud weld flaws and repair attachment locations.

Flow induced vibration of repair hardware evaluated, as well as effect of hardware on flow resistance in reactor vessel.

Fabrication/Installation Overview

Materials selected for IGSCC resistance (0.03 w/o max carbon for 300 series stainless steel and 0.04 w/o max carbon for XM-19).

All stainless steel material solution-annealed for IGSCC resistance.

ASTM A262 Practice E test performed on all austenitic materials.

EPRI recommended processing performed on X-750 components.

Materials processing and fabrication controls imposed to maintain IGSCC resistance of materials.

No welding.

Four holes machined in shroud support plate.

No machining required for upper attachment.

Shroud head bolts also being replaced with IGSCC resistant design.

All installation processes will be qualification tested and mock-up trained.

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

TOOLING SYSTEM

- REFUEL AND AUXILIARY BRIDGES
- CORE COVER/PUSHER TOOL
- EDM FIXTURES
- GAP MEASUREMENT TOOL
- BRIDGE MARIONETTE TOOLS
- POLE TOOLS (BRACKET, NUT RUNNER/TENSIONER, CRIMP TOOLS)

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

CORE COVER

- INSTALLED ON SHROUD STEAM DAM/FLANGE
- ACTS AS STRONG BACK FOR REPAIR SPACER RING
- HAS PUSHER TOOL ON 360° TRACK; ASSISTS TOOL AND PART INSTALLATION
- PROVIDES PROTECTION FOR CORE REGION

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

EDM FIXTURES

- WILL BE TESTED AND QUALIFIED
- CONSISTS OF ALIGNMENT JIG AND EDM CUTTING FIXTURE
- DEBRIS COLLECTED BY PRESSURE FLUSH USING FILTERS

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

GAP MEASUREMENT TOOL

- POLE DELIVERED WITH MEASUREMENT CARRIAGE
- MEASUREMENTS TAKEN VISUALLY AT REPAIR BUMPER/RESTRAINT LOCATIONS

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

MOCKUP WORK

- FULL SIZE MOCKUP FOR TOOL TESTING/QUALIFICATION
- SAME MOCKUP FOR PERSONNEL TRAINING
- EDM PROCESS QUALIFICATION USES SPECIAL TEST FIXTURE

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

REPAIR INSTALLATION PROCESS

- INSTALL AUXILIARY BRIDGE AND PREPARE REFUEL BRIDGE
- INSTALL CORE COVER AND SPACER RING
- EDM TIE ROD ATTACHMENT AT BAFFLE PLATE AND HONE
- PERFORM GAP MEASUREMENTS
- MACHINE RADIAL SUPPORT MEMBERS (OFF SITE)
- INSTALL TIE ROD AND LOWER OUTER SLEEVE
- INSTALL THREE LOWER RADIAL SUPPORTS
- INSTALL BRACKET
- INSTALL UPPER RADIAL SUPPORT

VERMONT YANKEE
REPAIR INSTALLATION TOOLING

REPAIR INSTALLATION PROCESS, cont.

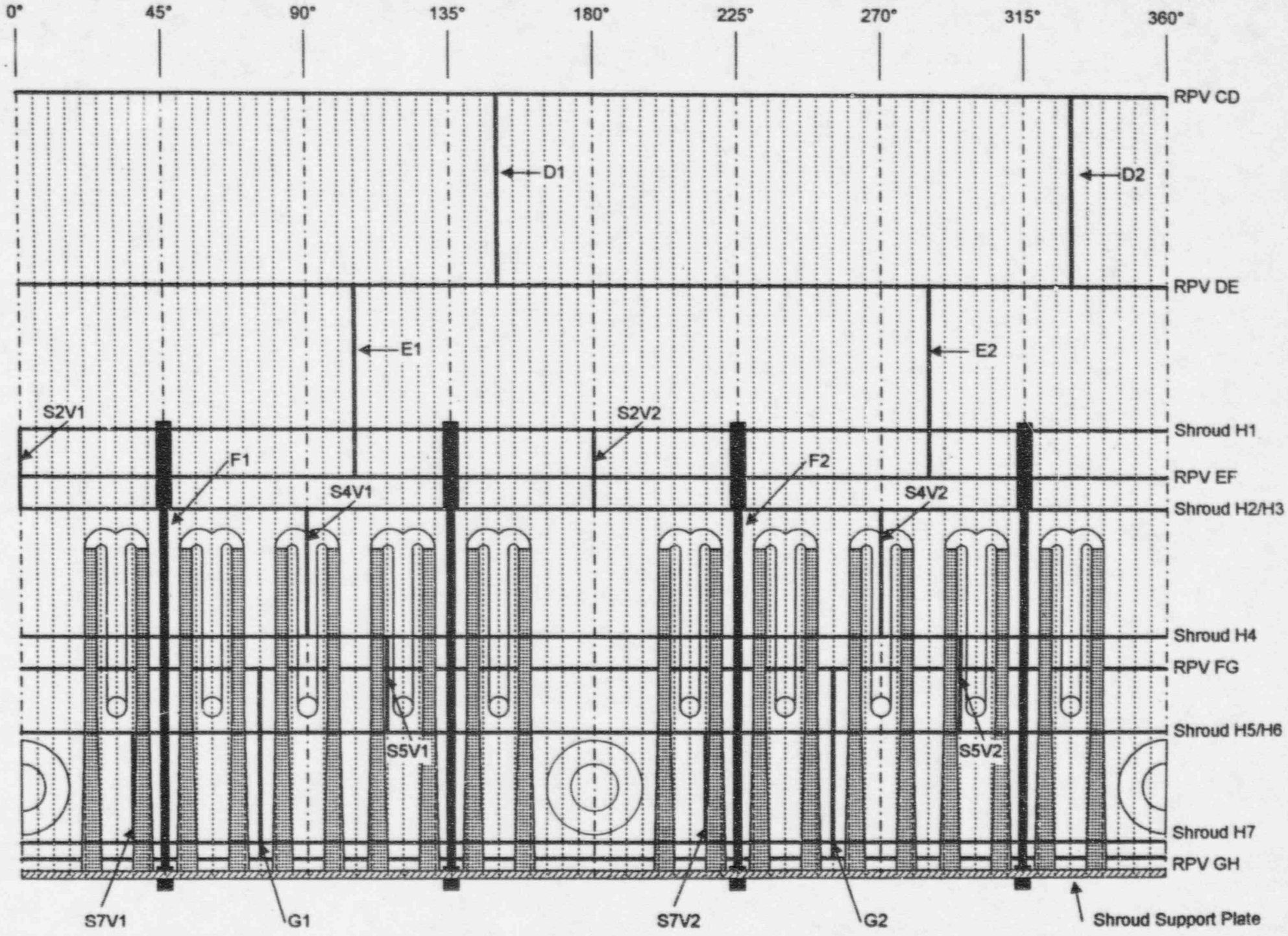
- INSTALL NUT
- TENSION ROD AND TORQUE NUT
- CRIMP LOCKING CUP
- VISUAL INSPECT
- REMOVE EQUIPMENT, CORE COVER, AND AUX BRIDGE

VERMONT YANKEE
CORE SHROUD DESIGN RELIANT WELD EXAMINATION

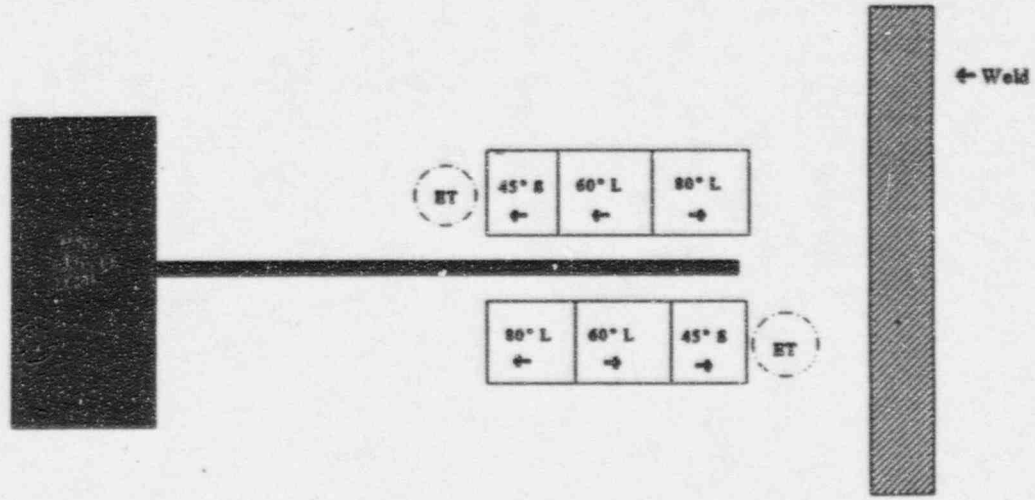
DESIGN RELIANT WELD INSPECTION INTRODUCTION

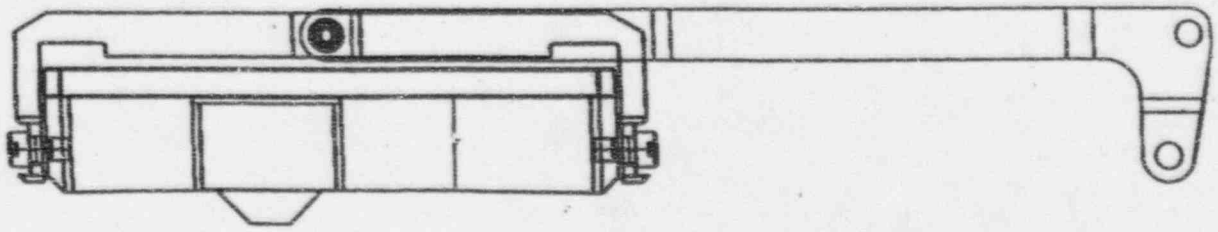
- 6 VERTICAL SHROUD WELDS
- 6 RING SEGMENT WELDS
- H-8 SHROUD TO BAFFLE PLATE CIRC WELD
- H-9 BAFFLE PLATE TO RPV SHELL CIRC WELD
- H-1 AND H-2 1995 INSPECTION WILL BE USED VS.
  SHROUD FLANGE RING WELDS AND TOP VERTICAL WELDS (H-1 TO H-2)

Vermont Yankee Reactor Vessel and Core Shroud Weld Locations



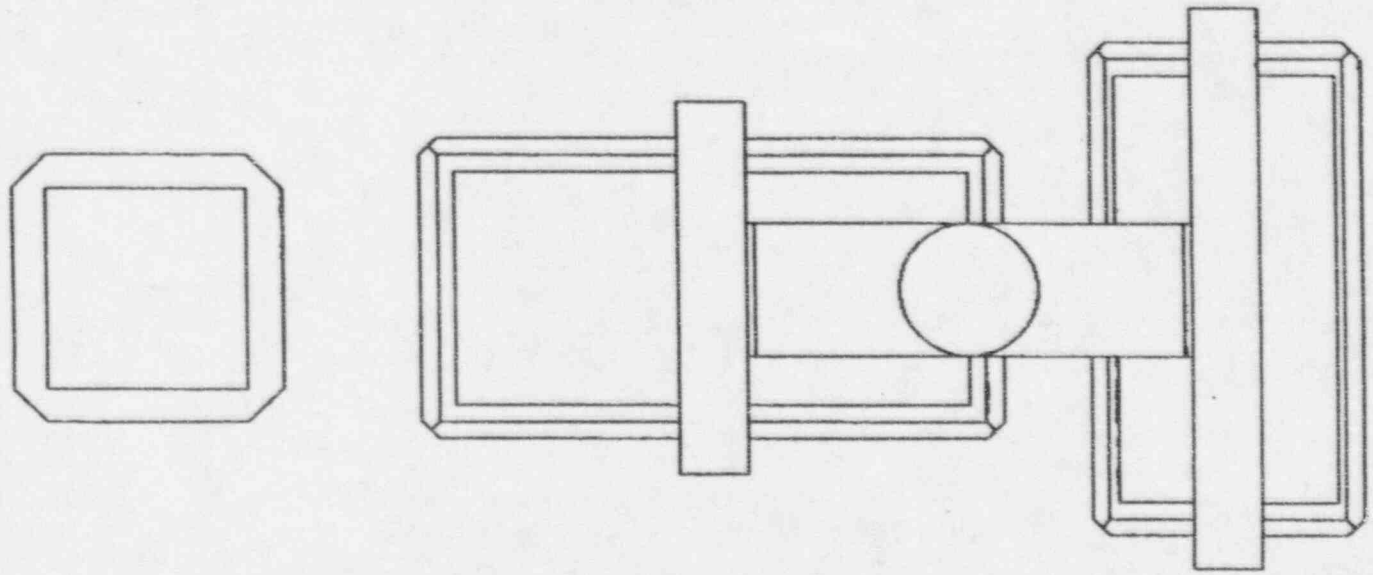
VERMONT YANKEE
CORE SHROUD DESIGN RELIANT WELD EXAMINATION





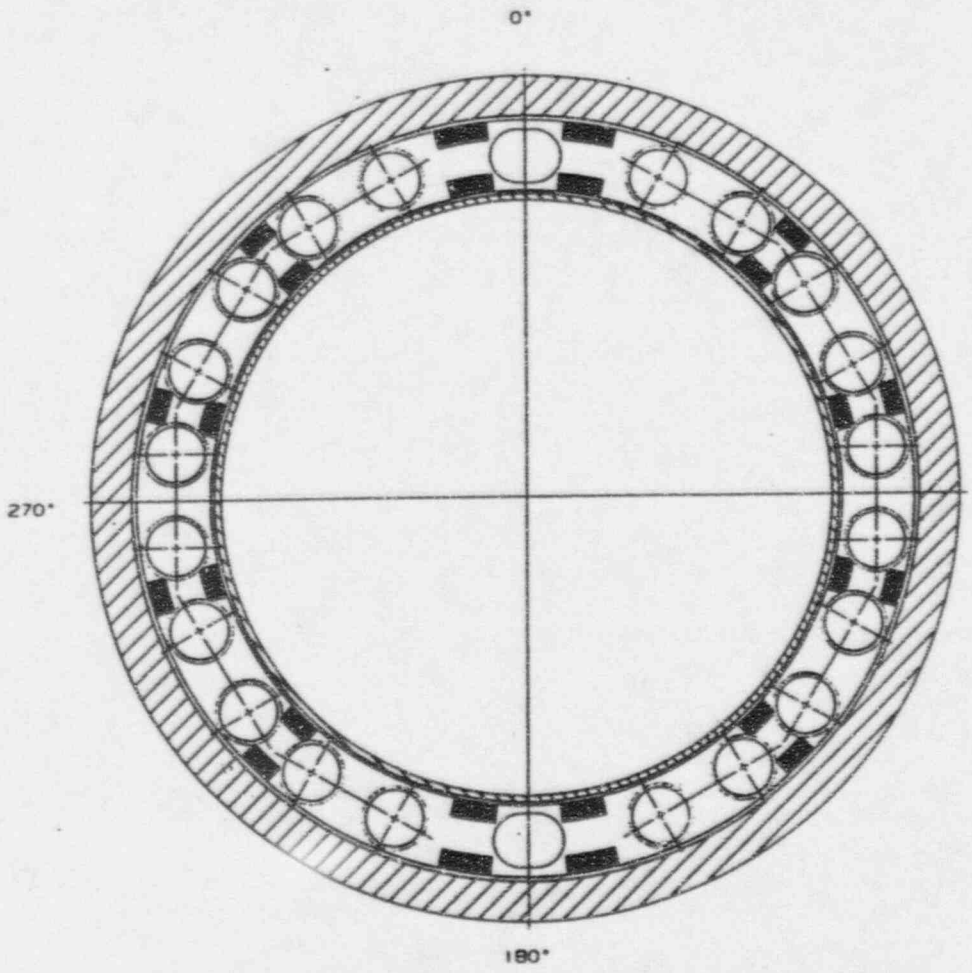
ANTICIPATED VERTICAL/RING SEGMENT TRANSDUCER CONFIGURATION

VERMONT YANKEE
CORE SHROUD DESIGN RELIANT FEATURE EXAMINATION



ANTICIPATED BAFFLE PLATE TRANSDUCER CONFIGURATION

VERMONT YANKEE
CORE SHROUD DESIGN RELIANT WELD EXAMINATION



ANTICIPATED ACCESS BAFFLE PLATE -- WELDS H-8 AND H-9

VERMONT YANKEE
CORE SHROUD DESIGN RELIANT WELD EXAMINATION

SUMMARY OF NDE TECHNIQUES

- VERTICAL WELDS AND RING SEGMENT WELDS

60° L	2(.5"x.5")	2 MHz	FOCUSED AT 1.7"
CREEPER	2(.4"x.6")	2 MHz	FOCUSED AT 0.2"
45° S	1.0"x1.0"	1.5 MHz	PULSE/ECHO
Eddy Current	0.1" Dia.		CROSS-POINT
Eddy Current	0.1" Dia.		PANCAKE (WELD LOCATOR)

- BAFFLE PLATE -- WELDS H-8 AND H-9

45° L	2(.5"x.5")	2 MHz	FOCUSED AT 2.0"
CREEPER	2(.4"x.6")	2 MHz	FOCUSED AT 0.2"
60° L	2(.25"x.5")	1.5 MHz	CURVED SHOE FOR TRANSVERSE FLAWS
Eddy Current	0.1" Dia.		CROSS-POINT

VERMONT YANKEE
CORE SHROUD INSPECTION TOOLING

H-8/H-9 INSPECTION TOOL

- NEW TOOL BEING DEVELOPED
- INSTALLS IN TWELVE LOCATIONS, INCLUDING 0° AND 180°

VERTICAL, RING SEGMENT, AND CIRC WELD TOOL

- USES EXISTING AND MODIFIED TOOLING
- WILL INSPECT 8 SEGMENTS BETWEEN JET PUMPS WITH LIMITED COVERAGE AT 0° AND 180°

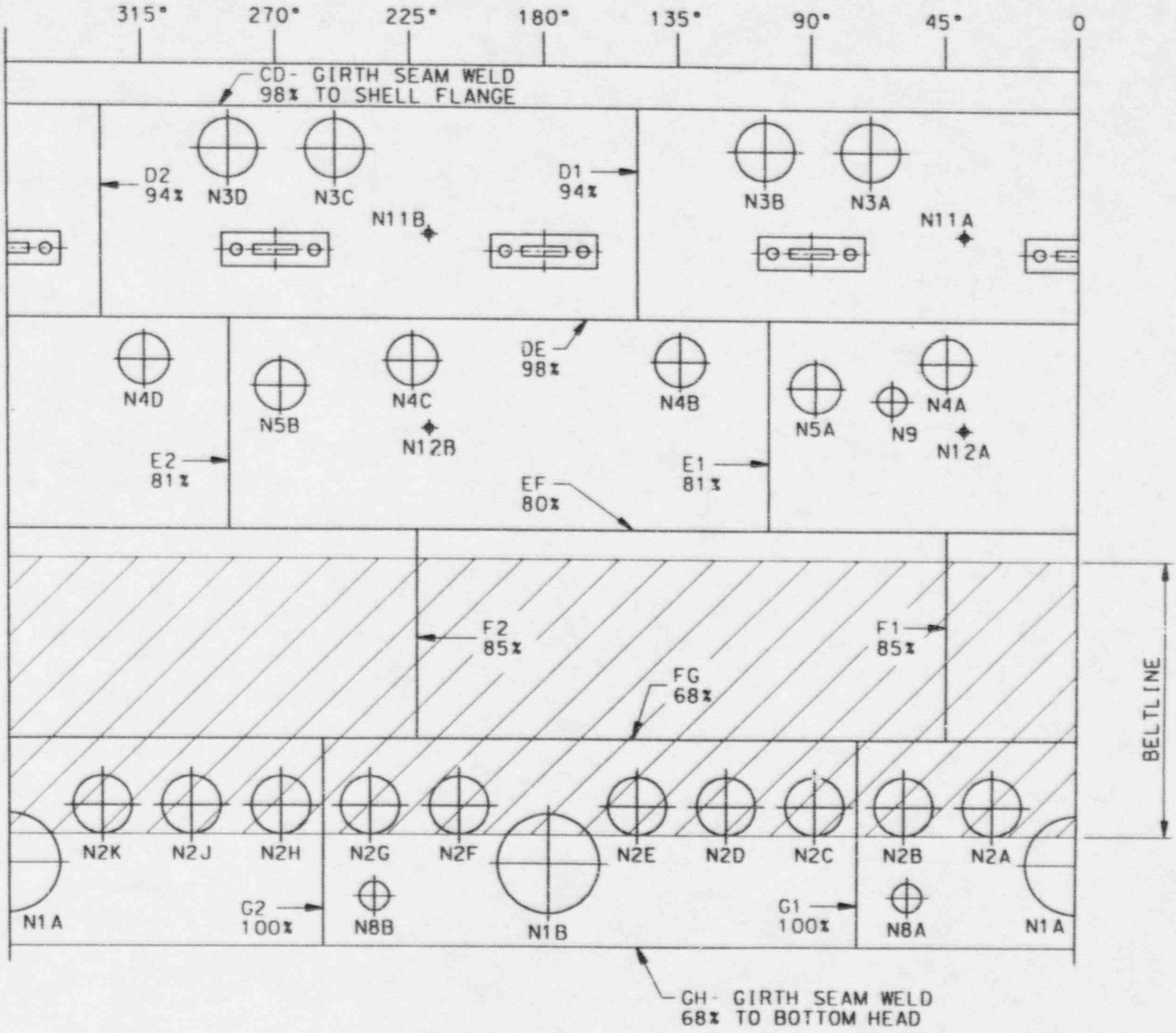
MOCKUP WORK

- FULL SIZE MOCKUP FOR TOOL TESTING/QUALIFICATION
- SAME MOCKUP FOR PERSONNEL TRAINING

VERMONT YANKEE
BELTLINE EXAMINATION

RPV BELTLINE/SHELL-WELD EXAMINATION

- 5 CIRC WELDS
- 8 VERTICAL WELDS
- TOTAL EXPECTED ACCESS APPROXIMATELY 85%
- RELIEF REQUEST FOR WELDS W/NDE COVERAGE < 90%
- WILL REVISIT BWR-VIP/EPRI REDUCTION IN SCOPE (50% VERTICAL WELDS, NO CIRC WELDS)


315°
270°
225°
180°
135°
90°
45°
0
CD- GIRTH SEAM WELD
98% TO SHELL FLANGE
D2
94%
N3D
N3C
N11B
D1
94%
N3B
N3A
N11A
N4D
N5B
N4C
N12B
DE
98%
N4B
N5A
N9
N4A
N12A
E2
81%
E1
81%
EF
80%
F2
85%
F1
85%
FG
68%
BELTLINE
N2K
N2J
N2H
N2G
N2F
N2E
N2D
N2C
N2B
N2A
N1A
G2
100%
N8B
N1B
G1
100%
N8A
N1A
GH- GIRTH SEAM WELD
68% TO BOTTOM HEAD

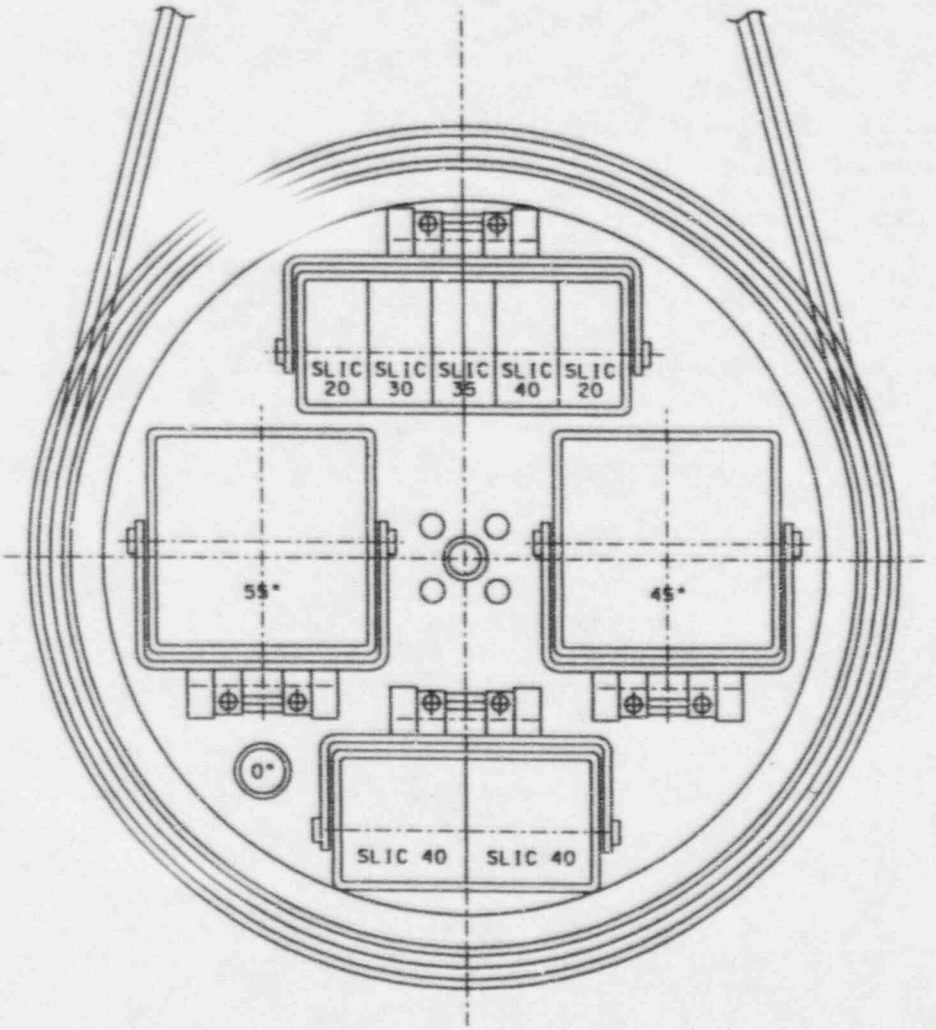
VERMONT YANKEE
BELTLINE EXAMINATION

BELTLINE NDE TECHNIQUES

QUALIFIED TO APPENDIX VIII, SUPPLEMENTS 4 AND 6

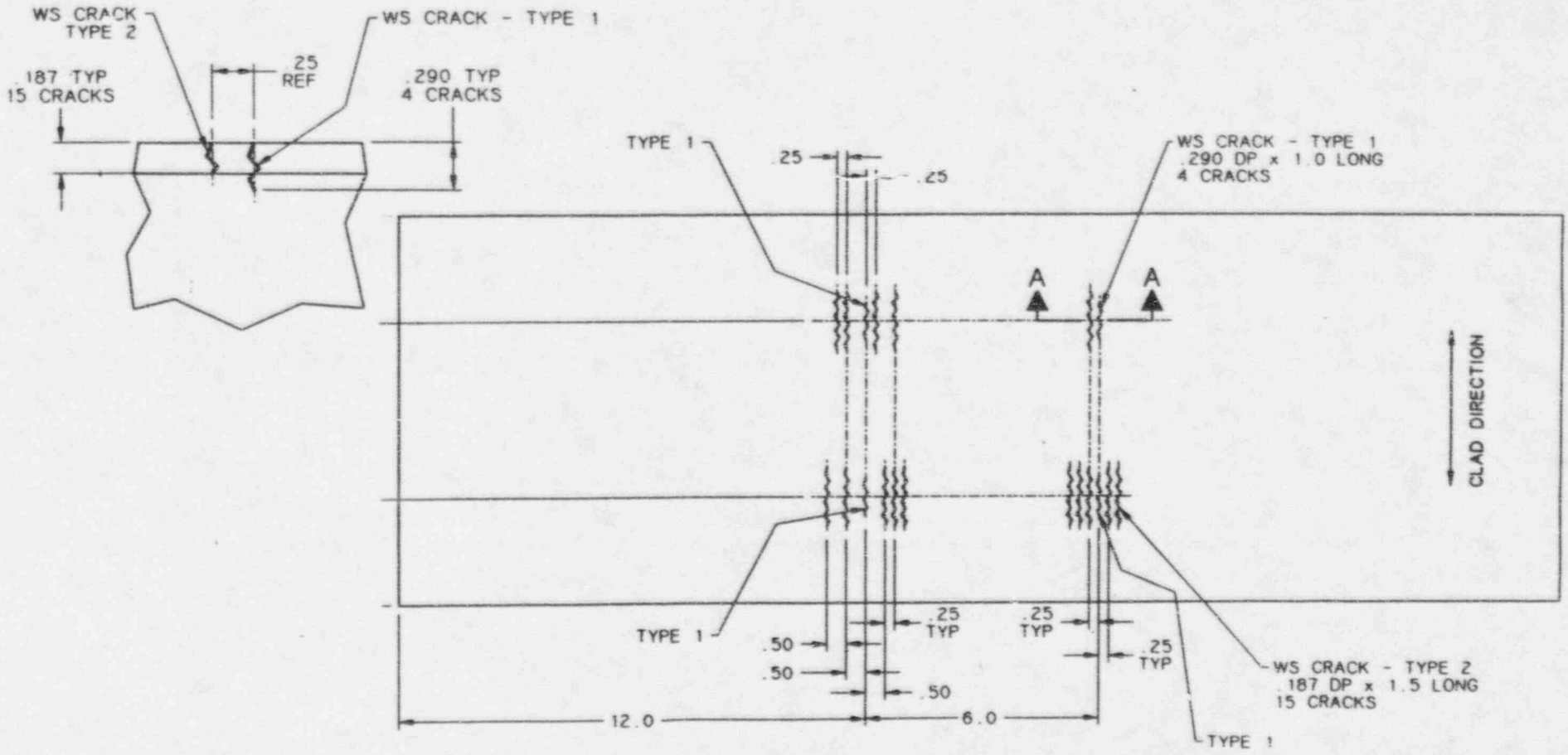
- QUALIFIED LARGER RASTER INCREMENT
- QUALIFIED FOR ONE-SIDED DETECTION
- QUALIFIED FOR ONE-SIDED SIZING
- WILL NOT BE FOLLOWING 1986 ASME XI & ASME V Art. 4
- CLAD CRACKING SIMULATION

VERMONT YANKEE
BELTLINE EXAMINATION



PROBE PACKAGE

VERMONT YANKEE
BELTLINE EXAMINATION



CLAD CRACK BLOCK

VERMONT YANKEE
RPV BELTLINE INSPECTION TOOLING

BELTLINE EXAM TOOLING

- USES USAM (ABB) TOOL
- TWO CONFIGURATIONS: UPPER AND LOWER
- ROLLS AROUND VESSEL FLANGE AND TRAVELS 360°
- USES EXISTING AND NEWLY DEVELOPED TOOLING
- MODIFIED TO ACCESS LOWER WELD FROM ANNULUS
- MODIFIED TO ACCEPT SWRI PROBE PACKAGE

VERMONT YANKEE
CORE SPRAY EXAMINATION

CORE SPRAY PIPING EXAMINATION

- INTEND TO PERFORM AUTOMATED NDE OF PIPING WELDS
- WILL DEMONSTRATE TECHNIQUES IN ACCORDANCE WITH BWR-VIP USING CORE SPRAY PIPE MOCKUP
- ANTICIPATE HIGH ANGLE L-WAVE UT

VERMONT YANKEE
REACTOR AND INTERNALS WORK

SUBMITTALS

	TARGET DATE
• SHROUD MODIFICATIONS	April 1, 1996
• SHROUD INSPECTION PLANS	June 1996
• RPV INSPECTION PLANS	June 1996
• RPV COVERAGE RELIEF REQUEST	November 1996

VERMONT YANKEE
REACTOR AND INTERNALS WORK

DEMONSTRATIONS

• SHROUD NDE TECHNIQUES	EPRI NDE CENTER	April 1-4, 1996
• SHROUD NDE TOOLING	LYNCHBURG, VA.	June 1996
• SHROUD REPAIR TOOLING	LYNCHBURG, VA.	June 1996
• RPV BELTLINE TOOLING	SAN ANTONIO, TX	June 1996