

CONSUMERS POWER COMPANY  
PALISADES NUCLEAR PLANT

REACTOR VESSEL EXAMINATION PROGRAM PLAN  
INTERVAL 2, PERIOD 3 AND INTERVAL 3, PERIOD 1

REVISION 2

JUNE 18, 1995

Prepared by:

*D. Kurek*  
D. Kurek  
Metallurgical and NDE Analysis  
Westinghouse Nuclear Technology Division

Approved by:

*Mark Munson for J. Munson 6-18-95*  
J. Munson  
Wes Dyne International

For the Utility:

*T. Fouty 6/18/95*  
T. Fouty  
Consumers Power Company  
Palisades Nuclear Plant

Consumers Power Company  
Palisades Nuclear Plant

Reactor Vessel Examination Program Plan  
Interval 2, Period 3 and Interval 3, Period 1

Examination

Items and areas listed on the attached tables are to be examined as indicated, in accordance with the Palisades Plant Outage Plan, based on the 1983 Edition of the ASME Code, Section XI, Summer 1983 Addenda for Interval 2, Period 3 examinations, and the 1989 Edition of Section XI for Interval 3, Period 1 examinations. In addition, the WesDyne International position on USNRC Regulatory Guide 1.150 Revision 1 will be utilized.

All examinations will be conducted to the maximum extent practical with the access provided and within the limitation of component geometry.

Vessel Tool Interface Parameters

1. Tool zero leg will be aligned at vessel 90° for weld examination.
2. Closure head guide studs are located at stud hold positions # 1 and 28. Stud holes are centered on a 192.12" bolt circle diameter, numbered clockwise starting with #1 stud hole centered at 0°.
3. All dimensions referenced from the flange bolt surface at the top of the vessel and from 0° vessel axis.

Examination Requirements

- Procedure CPAL-ISI-254 shall be used for remote reactor vessel examinations.
- Procedure PAL-ISI-54 shall be used for manual examinations of the reactor vessel upper shell to flange weld.
- Procedure PAL-ISI-55 shall be used for manual examinations of threads in flange.
- Procedure WDI-DP-01 shall be used for Dynapulser linearity verification.
- Procedure WDI-INST-10 shall be used for manual UT equipment calibration and qualification.

### Calibration

Calibration of the remote examination tool for ultrasonic examinations of the welds/volumes specified in the following tables shall be in accordance with approved procedure CPAL-ISI-254. Vessel shell welds shall be examined with augmented near-surface flaw detection techniques. Nozzle to pipe weld examinations will be conducted with 70° longitudinal wave transducers for the volumes of weld metal representing the inside 1/3 thickness, and with 45° shear wave transducers for the outer 2/3 thickness range. The 45° shear wave transducers are also used for augmented O.D. surface examinations per CPC Relief Request RR2.

### Examinations

Detailed parameters for the examination of each individual weld or area, including the location of each scan with reference to the vessel axis and datums, the number of scan increments and incremental distances are defined in the reactor vessel scan coverage computer output data.

PALISADES  
TABLE 1  
INTERVAL 2 PERIOD 3  
EXAMINATION/CALIBRATION REQUIREMENTS

Code Cat.	Code Item	Pkg. #	Item/Area Description	Weld No.	Search Unit	Refract Angle	No	Calibration Block Reflectors	Surf
B-A	B1.30	1	Vessel to Flange (I.D. Automated)	7-112	S-1	70-L	43-PAL	G.H.K	A
					S-2	70-L	43-PAL	G.H.K	A
	B1.12		Upper Shell Long at 90°	1-112A	S-3	45-S	43-PAL	D.E.F	A
					S-4	45-S	43-PAL	D.E.F	A
	B1.12		Upper Shell Long at 210°	1-112B	S-5	0° L	43-PAL	A.B.C	A
					S-6	60-S	43-PAL	D.E.F	A
	B1.12		Upper Shell Long at 330°	1-112C	S-7	45-L	43-PAL	G.H.Note 1	A
					S-8	60-S	43-PAL	D.E.F	A
B-A	B1.11	2	Upper to Interim Shell Circ.	8-112	S-1	70-L	43-PAL	G.H.K	A
					S-2	70-L	43-PAL	G.H.K	A
	B1.1		Interim to Lower Shell Circ.	9-112	S-3	45-S	44-PAL	D.E.F	A
					S-4	45-S	44-PAL	D.E.F	A
	B1.12		Interim Shell Long at 270°	2-112A	S-5	0° L	44-PAL	A.B.C	A
					S-6	60-S	44-PAL	D.E.F	A
	B1.12		Interim Shell Long at 30°	2-112B	S-7	45-L	43-PAL	G.H.Note 1	A
					S-8	60-S	44-PAL	D.E.F	A
	B1.12		Interim Shell Long at 150°	2-112C					
	B1.12		Lower Shell Long at 90°	3-112A					
	B1.12		Lower Shell Long at 210°	3-112B					
	B1.12		Lower Shell Long at 330°	3-112C					

Note 1 Sizing transducer.

General Note Core region base metal examinations, where indicated, shall be performed with calibration package #2.

PALISADES  
TABLE 1  
INTERVAL 2 PERIOD 3  
EXAMINATION/CALIBRATION REQUIREMENTS

Code Cat.	Code Item	Pkg. #	Item/Area Description	Weld No.	Search Unit	Refract Angle	No	Calibration Block Reflectors	Surf
B-A	B1.11	3	Lower Shell to Lower Head	10-112	L-1	70-L	43-PAL	G.H	A
	B1.21		Lower Head Circ.	4-113	L-2	70-L	43-PAL	G.H	A
	B1.22		Lower Head Meridional ~0°	1-113A	L-3	45-S	36-PAL	D.E.F	A
	B1.22		Lower Head Meridional ~60°	1-113B	L-4	45-S	36-PAL	D.E.F	A
	B1.22		Lower Head Meridional ~120°	1-113C	L-5	0° L	36-PAL	A.B.C	A
	B1.22		Lower Head Meridional ~180°	1-113D	L-6	60-S	36-PAL	D.E.F	A
	B1.22		Lower Head Meridional ~240°	1-113E	L-7	45° L	43-PAL	G.H.Note 1	A
	B1.22		Lower Head Meridional ~300°	1-113F	L-8	60-S	36-PAL	D.E.F	A
B-D	B3.90	4	Inlet Nozzle to shell at 60°	5-114A	B-1	30-L	45-PAL	A.D.E	A
	B3.90		Inlet Nozzle to shell at 120°	5-114B	B-2	10-L	45-PAL	A.D.E	A
	B3.90		Inlet Nozzle to shell at 240°	5-114C	B-3	50-L	45-PAL	A.B	A
	B3.90		Inlet Nozzle to shell at 300°	5-114D	B	0° FOC	45-PAL	B	A
B-D	B3.100	5	Inlet Nozzle Inner Radius 60°	5-114A-IRS	IR3-IR4	70-L	ISI-IRI	N1	Corner Corner
	B3.100		Inlet Nozzle Inner Radius 120°	5-114B-IRS	IR5-IR6	70-L	ISI-IRI	N1	
	B3.100		Inlet Nozzle Inner Radius 240°	5-114C-IRS					
	B3.100		Inlet Nozzle Inner Radius 300°	5-114D-IRS					
			(Bore portion of inlet inner radius Ref. package 6)						

Note 1 Sizing transducer.

PALISADES  
TABLE 1  
INTERVAL 2 PERIOD 3  
EXAMINATION/CALIBRATION REQUIREMENTS

Code Cat.	Code Item	Pkg. #	Item/Area Description	Weld No.	Search Unit	Refract. Angle	No	Calibration Block Reflectors	Surf
BJ-	B9.11R	6	Inlet Nozzle to Spool Piece	1A-16	B-4	70°L	19-PAL	G.H.J	Clad
	B9-12R		Spool Long Seam	1A-16-LU1	B-5	70°L	19-PAL	G.H.J	Clad
	B9.12R		Spool Long Seam	1A-16-LU2	B-7	70°L	19-PAL	G.H.J	Clad
	B9-11		Spool to Elbow	1A-15	B-8	70°L	19-PAL	G.H.J	Clad
	B9-12		Elbow Long Seam (Note 2)	1A-15-LD1	B-6	0° L	19-PAL	Back Wall	Clad
	B9-12		Elbow Long Seam (Note 2)	1A-15-LD2					
	B9.11R		Inlet Nozzle to Spool Piece	1B-14					
	B9.12R		Spool Long Seam	1B-14-LU1					
	B9.12R		Spool Long Seam	1B-14-LU2					
	B9.11		Spool to Elbow	1B-13					
	B9.12		Elbow Long Seam (Note 2)	1B-13LD1					
	B9.12		Elbow Long Seam (Note 2)	1B-13-LD2					
	B9.11R		Inlet Nozzle to Spool Piece	2B-15					
	B9.12R		Spool Long Seam	2B-15-LU1					
	B9.12R		Spool Long Seam	2B-15-LU2					
	B9.11		Spool to Elbow	2B-14					
	B9.12		Elbow Long Seam (Note 2)	2B-14-LD1					
	B9.12		Elbow Long Seam (Note 2)	2B-14-LD2					

Note 2: Accessible portion of elbow long seam length, (20") will be four directionally examined with package 6 and 7.

**PALISADES**  
**TABLE 1**  
**INTERVAL 2 PERIOD 3**  
**EXAMINATION/CALIBRATION REQUIREMENTS**

Code Cat.	Code Item	Pkg. #	Item/Area Description	Weld No.	Search Unit	Refract. Angle	No	Calibration Block Reflectors	Surf
B-J	B9.11R	6	Inlet Nozzle to Spool Piece	2A-15					
	B9.12R		Spool Long Seam	2A-15-LU1					
	B9.12R		Spool Long Seam	2A-15-LU2					
	B9-11		Spool to Elbow	2A-14					
	B9-12		Elbow Long Seam (Note 2)	2A-14-LD1					
	B9-12		Elbow Long Seam (Note 2)	2A-14-LD2					
Note 3	B9.11R	7	Inlet Nozzle to Spool Piece	1A-16	B-9 B-10 B-11 B-12	45°S 45°S 45°S 45°S	NZL-MKP-52 NZL-MKP-52 NZL-MKP-52 NZL-MKP-52	N3 N3 N3 N3	Clad Clad Clad Clad
Note 3	B9.12R		Spool Long Seam	1A-16-LU1					
Note 3	B9.12R		Spool Long Seam	1A-16-LU2					
Note 3	B9.11R		Inlet Nozzle to Spool Piece	1B-14					
Note 3	B9.12R		Spool Long Seam	1B-14-LU1					
Note 3	B9.12R		Spool Long Seam	1B-14-LU2					

Note 2: Accessible portion of elbow long seam length, (2.0"), will be four directionally examined with package 6 and 7.

Note 3: Per requirements of Palisades Relief Request RR2.



PALISADES  
TABLE 1  
INTERVAL 2 PERIOD 3  
EXAMINATION/CALIBRATION REQUIREMENTS

Code Cat.	Code Item	Pkg. #	Item/Area Description	Weld No.	Search Unit	Refract Angle	No	Calibration Block Reflectors	Surf
Note 3	B9.11R	7	Inlet Nozzle to Spool Piece	2A-15					
Note 3	B9.12R		Spool Long Seam	2A-15-LU1					
Note 3	B9.12R		Spool Long Seam	2A-15-LU2					
Note 3	B9.11R		Inlet Nozzle to Spool Piece	2B-15					
Note 3	B9.12R		Spool Long Seam	2B-15-LU1					
Note 3	B9.12R		Spool Long Seam	2B-15-LU2					
B-D	B3.90	8	Inlet Nozzle to Shell at 60°	5-114A	T1	45-S	43-PAL	DEF	A
	B3.90		Inlet Nozzle to Shell at 120°	5-114B	T2	60-S	43-PAL	DEF	A
	B3.90		Inlet Nozzle to Shell at 240°	5-114C	T3	0°	43-PAL	A.B.C	A
	B3.90		Inlet Nozzle to Shell at 240°	5-114C	T4	70-L	43-PAL	G.J	A
	B3.90		Inlet Nozzle to Shell at 240°	5-114D	T5	70-L	43-PAL	G.J	A
					T6	45-Skew	43-PAL	DEF	A
					T7	60-S	43-PAL	DEF	A
					T8	45-S	43-PAL	DEF	A

Note 3. Per requirements of Palisades Relief Request RR2.



**PALISADES**  
**TABLE 2**  
**INTERVAL 3 PERIOD 1**  
**EXAMINATION/CALIBRATION REQUIREMENTS**

Code Cat.	Code Item	Cal. Pkg. #	Item/Area Description	Weld No.	Search Unit	Ref.act. Angle	No	Calibration Block Reflectors	Surf
B-D	B3.90	1	Outlet Nozzle to Shell at 0°	5-114E	B-1	30°L	45-PAL	A,D,E	A
					B-2	10°L	45-PAL	A,D,E	A
			Outlet Nozzle to Shell at 180°	5-114F	B-3	50°L	45-PAL	A,B	A
					B	0° FOC	45-PAL	B	A
B-D	B3.100	2	Outlet Nozzle Inner Radius - 0°	5-114E-IRS	IR3-IR4	70°L	NI	ISI-IR1	Corne
			Outlet Nozzle Inner Radius - 180°	5-114F-IRS	IR5-IR6	70°L	NI	ISI-IR1	r Corne r
B-D	B3.90	3	Outlet Nozzle to Shell - Tan Scan - 0°	5-114E	T1	45°S	43-PAL	D,E,F	A
					T2	60°S	43-PAL	D,E,F	A
			Outlet Nozzle to Shell - Tan Scan - 180°	5-114F	T3	0°	43-PAL	A,B,C	A
					T4	70°L	43-PAL	G,J	A
					T5	70°L	43-PAL	G,J	A
					T6	45°Skew	43-PAL	D,E,F	A
					T7	60°S	43-PAL	D,E,F	A
					T8	45°S	43-PAL	D,E,F	A
B-J	B9.11 R	4	Outlet Nozzle to Spool Piece	1H-1	B4	70°L	20-PAL	G,H,J	CLAD
			Spool to Pipe	1H-2	B5	70°L	20-PAL	G,H,J	CLAD
	B9.11		Outlet Nozzle to Spool Piece	2H-1	B6	0° L	20-PAL	Back Wall	CLAD
	B9.11 R		Spool to Pipe	2H-2	B7	70°L	20-PAL	G,H,J	CLAD
B-J Note 1	B9.11 R	5	Outlet Nozzle to Spool Piece	1H-1	B8	70°L	20-PAL	G,H,J	CLAD
	B9.11 R		Outlet Nozzle to Spool Piece	2H-1	B-9	45°S	NZL-MKP-52	N3	CLAD
					B-10	45°S	NZL-MKP-52	N3	CLAD
					B-11	45°S	NZL-MKP-52	N3	CLAD
					B-12	45°S	NZL-MKP-52	N3	CLAD

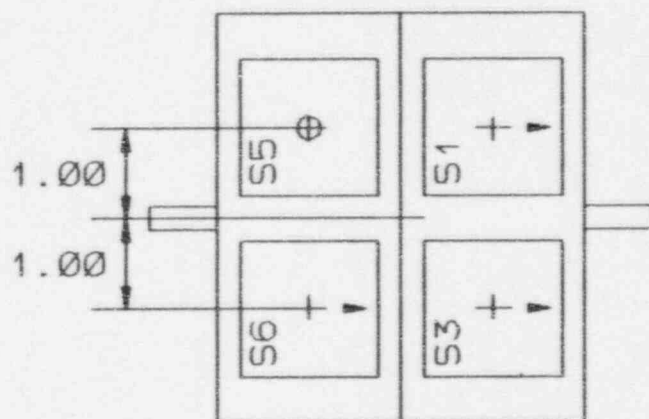
PALISADES  
TABLE 3  
MANUAL EXAMINATIONS, INTERVAL 2 AND 3  
EXAMINATION/CALIBRATION REQUIREMENTS

Code Cat.	Code Item	Pkg. #	Item/Area Description	Weld No.	Search Unit	Refract. Angle	Calibration Block Reflectors		Surf
B-A	B1.30	N/A	Vessel to Flange	7-112	M1	6° in	6-PAL	A/B C	A A A A A
			Seal Surface Exam		M2	16° out	6-PAL	A/B C	
					M3	12° out	6-PAL	A/B C	
					M4	6° out	6-PAL	A/B C	
					Manual Technique	M5	0°	6-PAL	
B-G-1	B6.40	N/A	Threads in Flange	1 through 54	M6	5-L	35-PAL	C.B.A	B

Note 1 - per requirements of Palisades Relief Request RR-2

VIEW FROM TOOL CENTER LINE  
TOP SLED

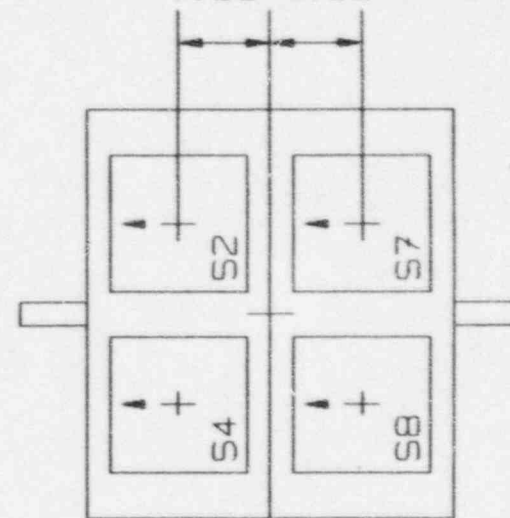
TOP OF VESSEL  
'C' AXIS SCANS



CIRC. WELD

BOTTOM SLED

1.00 1.00



13.02

TRANSDUCER	REFRACTED ANGLE	DIRECTION
S1	70°L	CW/DOWN
S2	70°L	CCW/UP
S3	45°S	CW/DOWN
S4	45°S	CCW/UP
S5	0°L	---
S6	60°S	CW/DOWN
S7	* 45°L	CCW/UP
S8	60°S	CCW/UP

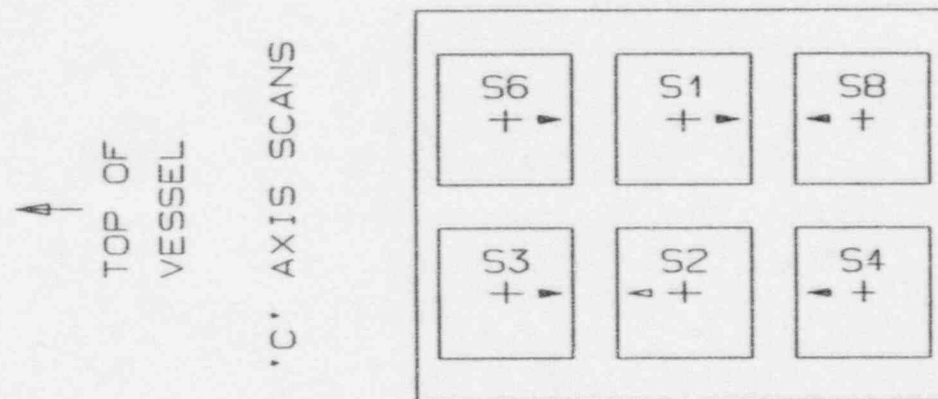
\* SIZING TRANSDUCER

ROTATE CCW 90°  
FOR 'A' AXIS  
SCANNING.

40mm TRANSDUCER  
CASE SIZE

# LOWER HEAD TRANSDUCER SLEDS

VIEW FROM TOOL CENTER LINE



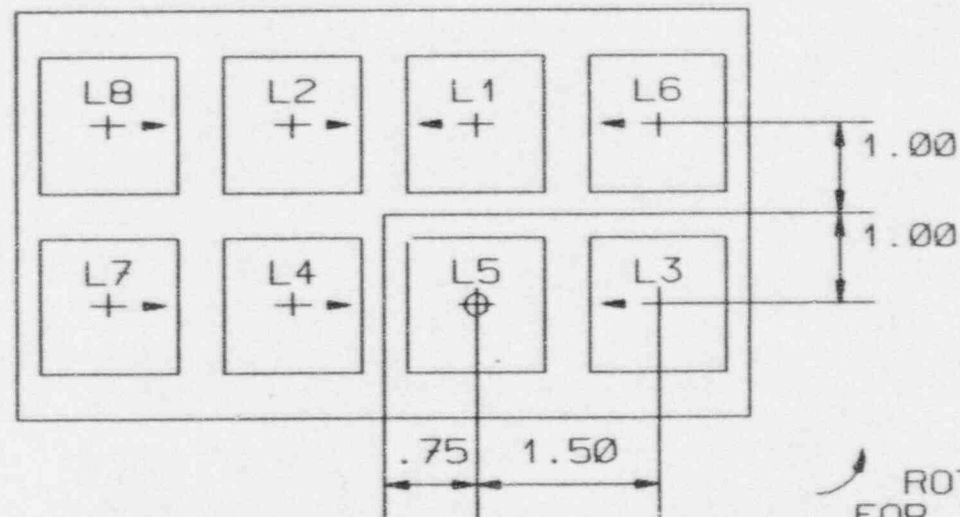
ROTATE 90° CCW  
FOR 'A' AXIS SCANS

TRANSDUCER	REFRACTED ANGLE	DIRECTION
S1	70°L	CW / DOWN
S2	70°L	CCW / UP
S3	45°S	CW / DOWN
S4	45°S	CCW / UP
S6	60°S	CW / DOWN
S8	60°S	CW / UP

PALISADES - 6 POCKET SHELL WELD SCAN SLED

VIEW FROM TOOL CENTER LINE  
MEGATRON E.E. SLED

↑  
TOP OF  
' VESSEL  
'C' AXIS SCANS



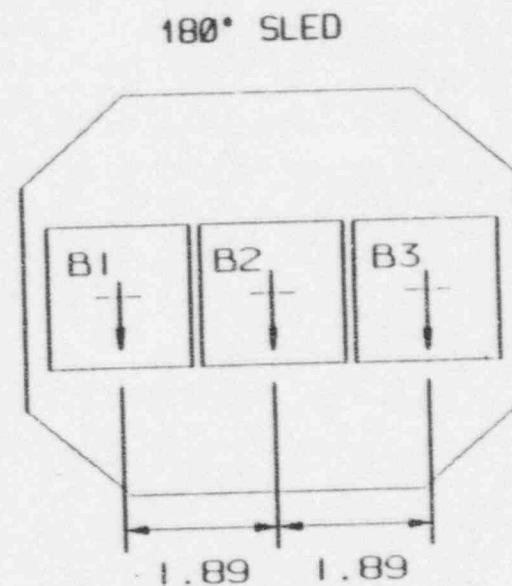
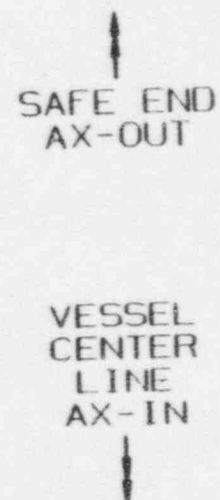
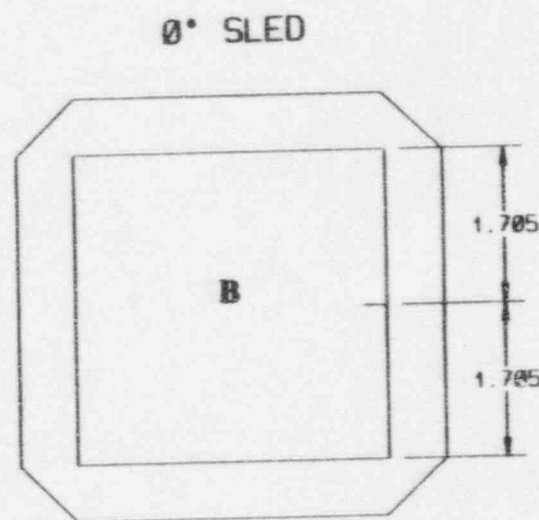
↶ ROTATE 90° CCW  
FOR 'A' AXIS SCANS

TRANSDUCER	REFRACTED ANGLE	DIRECTION
L1	70°L	CW / UP
L2	70°L	CCW / DOWN
L3	45°S	CW / UP
L4	45°L *	CCW / DOWN
L5	0°L	-----
L6	60°S	CW / UP
L7	45°S	CCW / DOWN
L8	60°S	CCW / DOWN

\* SIZING XDCER

Palisades - Lower Head Scan Sled

# VIEW FROM TOOL CENTER LINE



TRANSDUCER	REFRACTED ANGLE	DIRECTION
B1	30°L	AX-IN
B2	10°L	AX-IN
B3	50°L	AX-IN

B

0° Focused (supplemental)

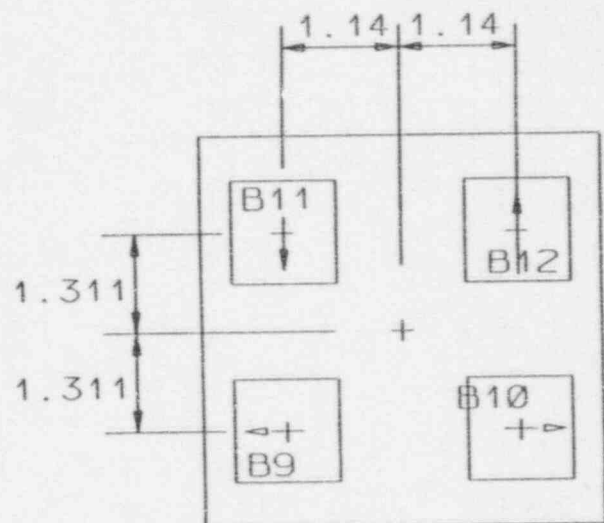
# NOZZLE BORE TRANSDUCER SLEDS

VIEW FROM TOOL CENTER LINE

270° SLED

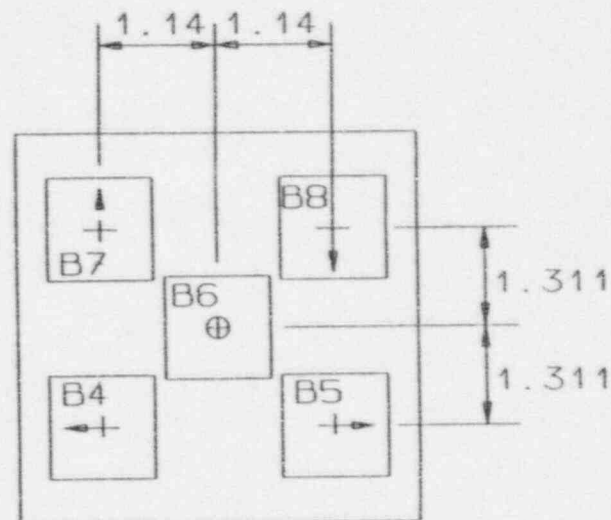
DOCKING POSITION

90° SLED



SAFE END  
AX-OUT

VESSEL  
CENTER  
LINE  
AX-IN

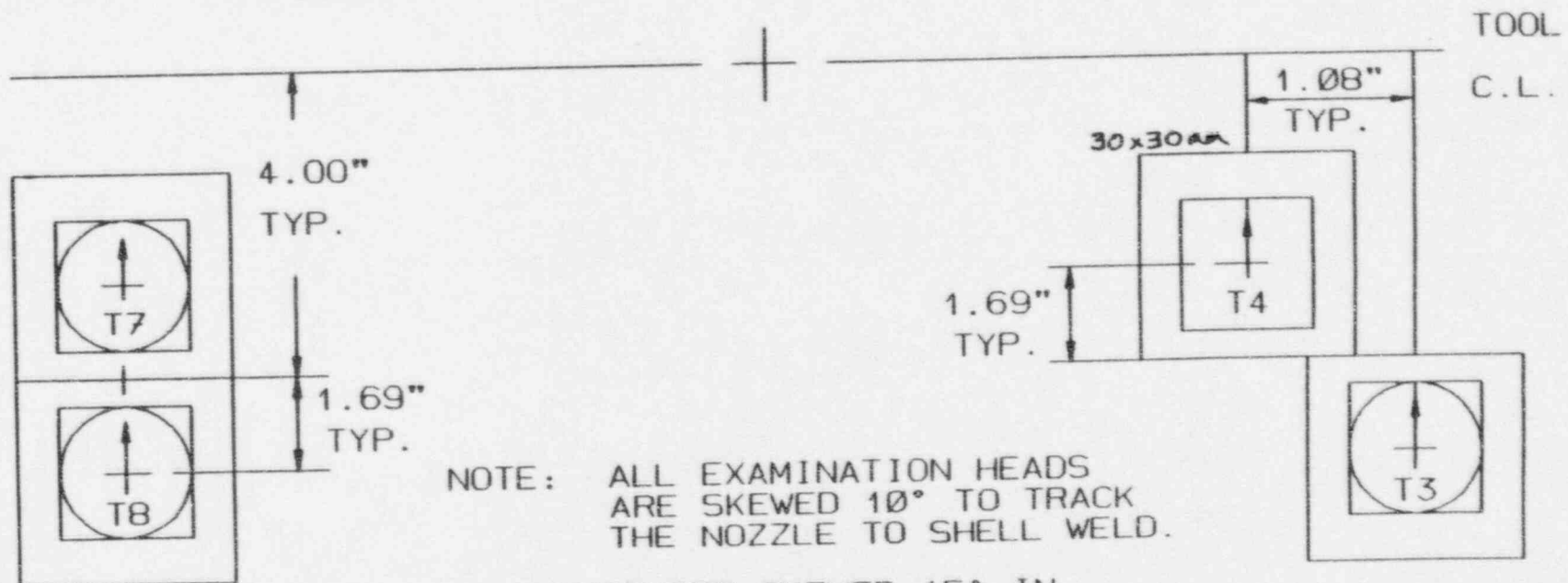
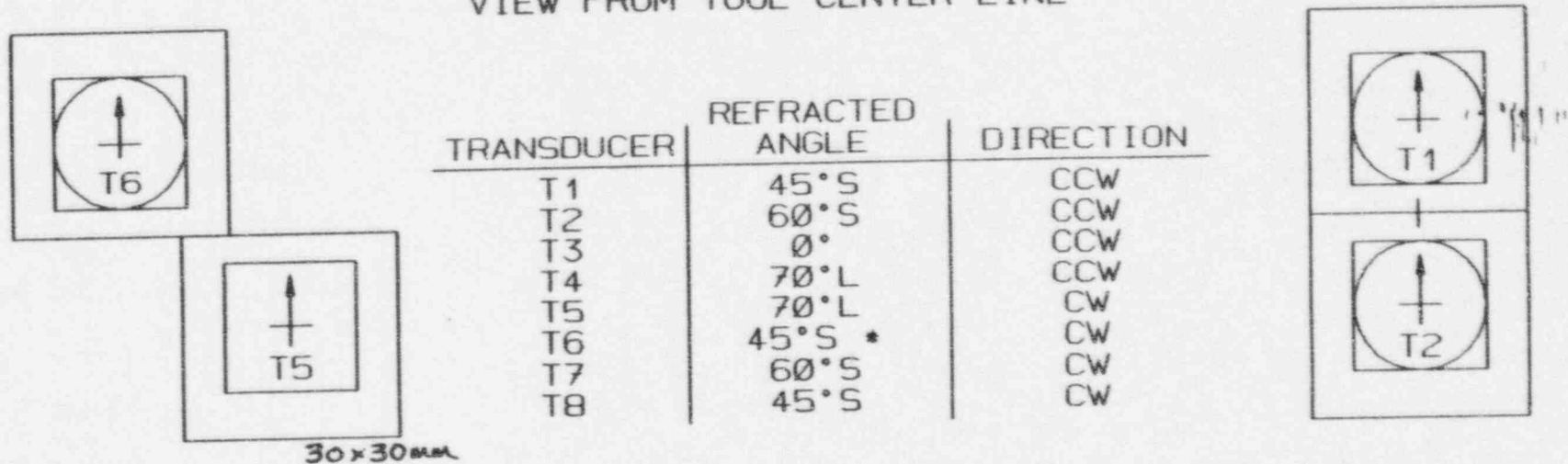


TRANSDUCER	REFRACTED ANGLE	DIRECTION
B12	45°S	AX-OUT (O.D. EQ.)
B11	45°S	AX-IN (O.D. EQ.)
B4	70°L	CW
B5	70°L	CCW
B6	0°	---
B7	70°L	AX-OUT
B8	70°L	AX-IN
B9	45°S	CW (O.D. EQ.)
B10	45°S	CCW (O.D. EQ.)

Palisades - Nozzle Bore Scan Sleds, outer pair



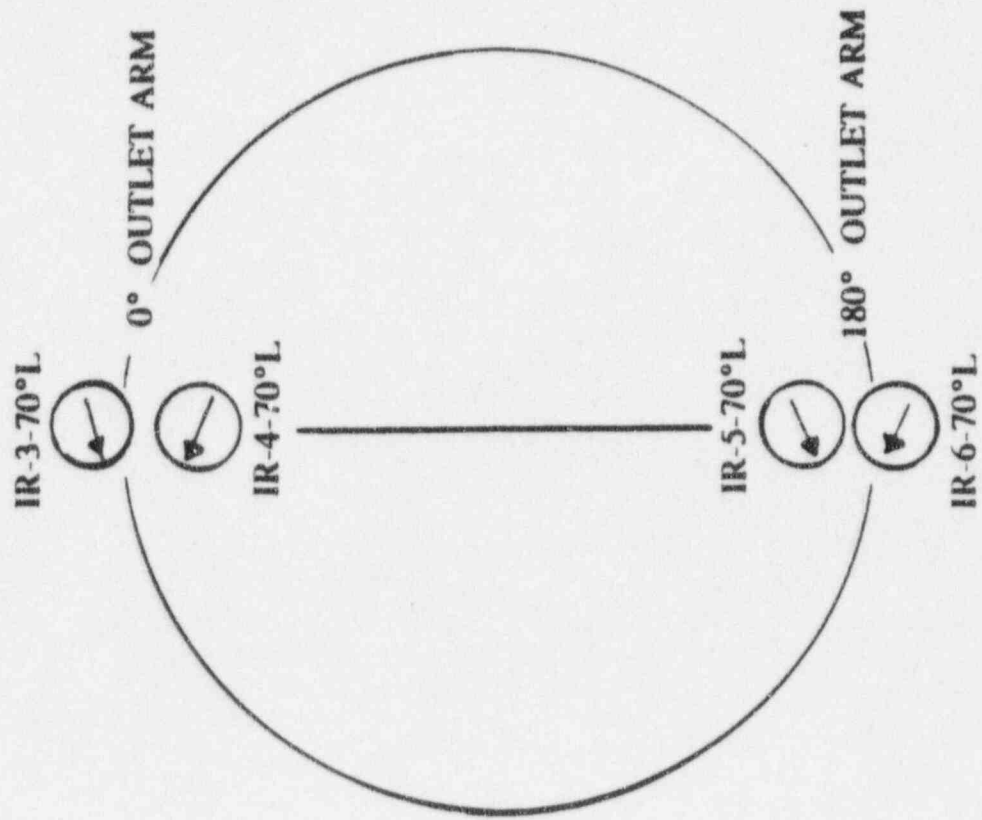
# VIEW FROM TOOL CENTER LINE



NOTE: ALL EXAMINATION HEADS ARE SKEWED 10° TO TRACK THE NOZZLE TO SHELL WELD.

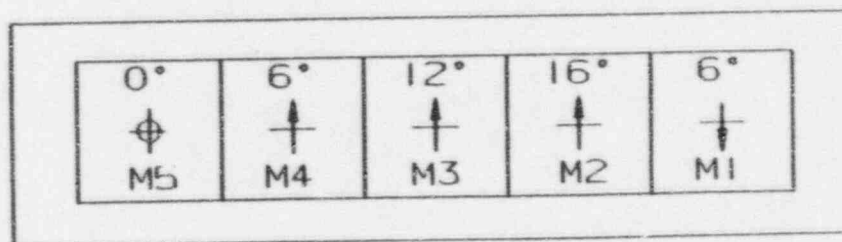
\* TRANSDUCER SKEWED 15° IN.

VIEW FROM TOOL CENTER LINE

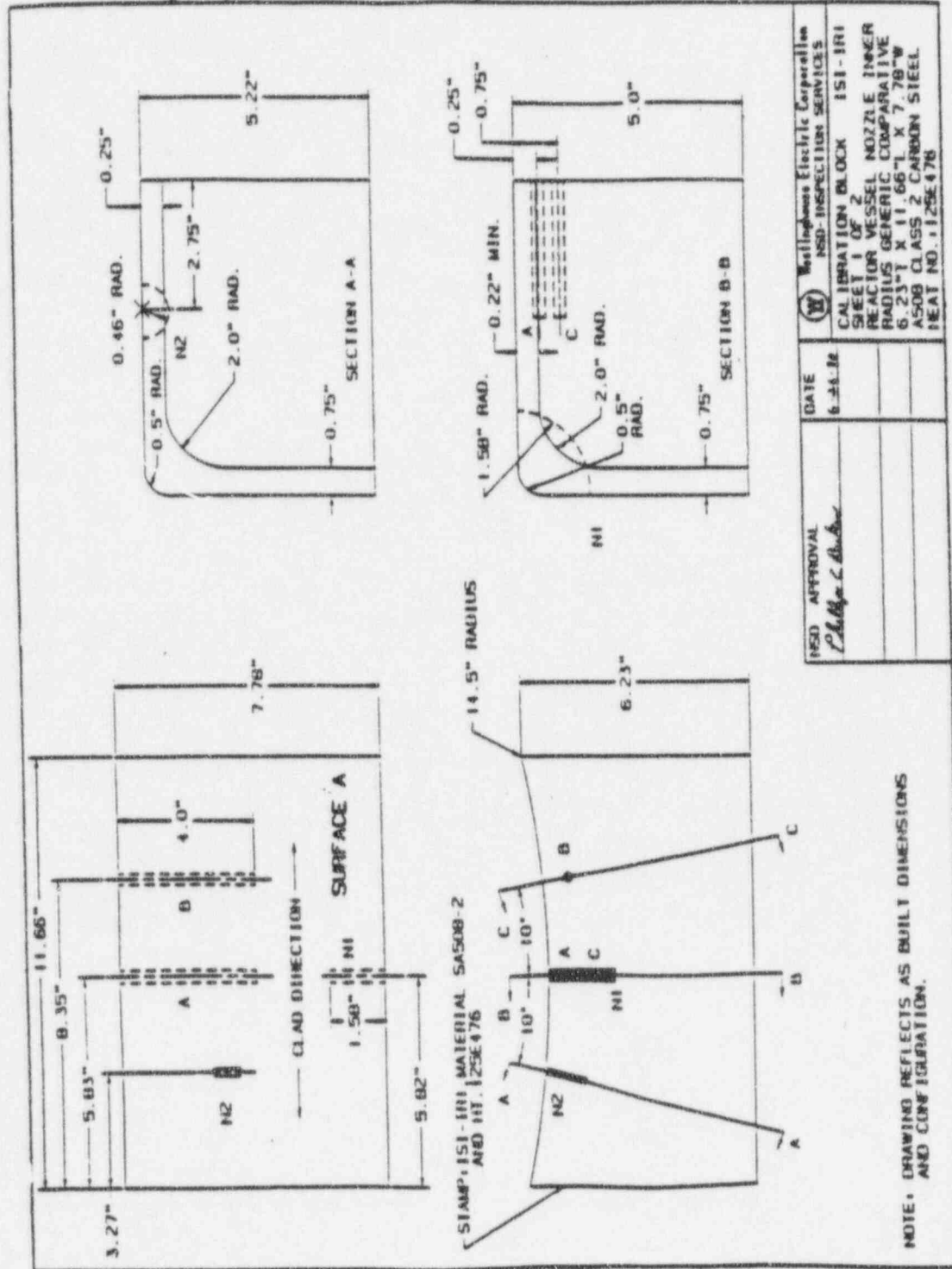


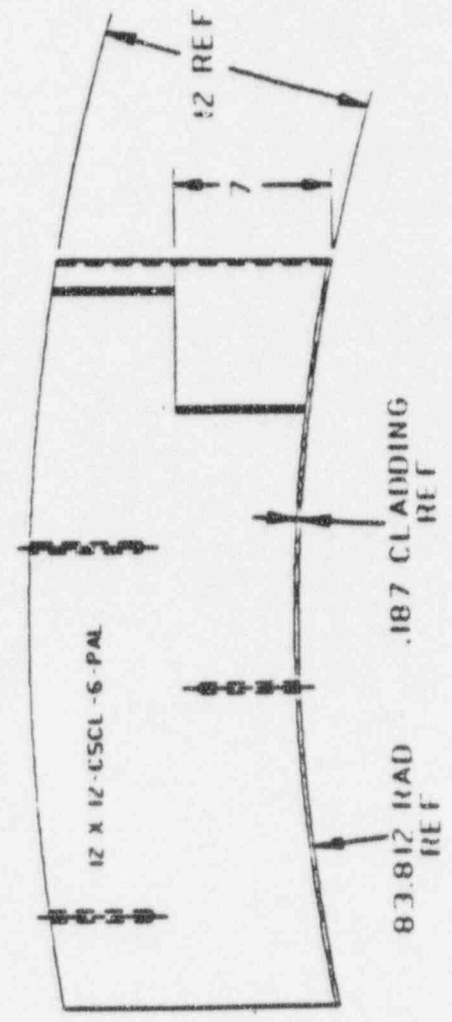
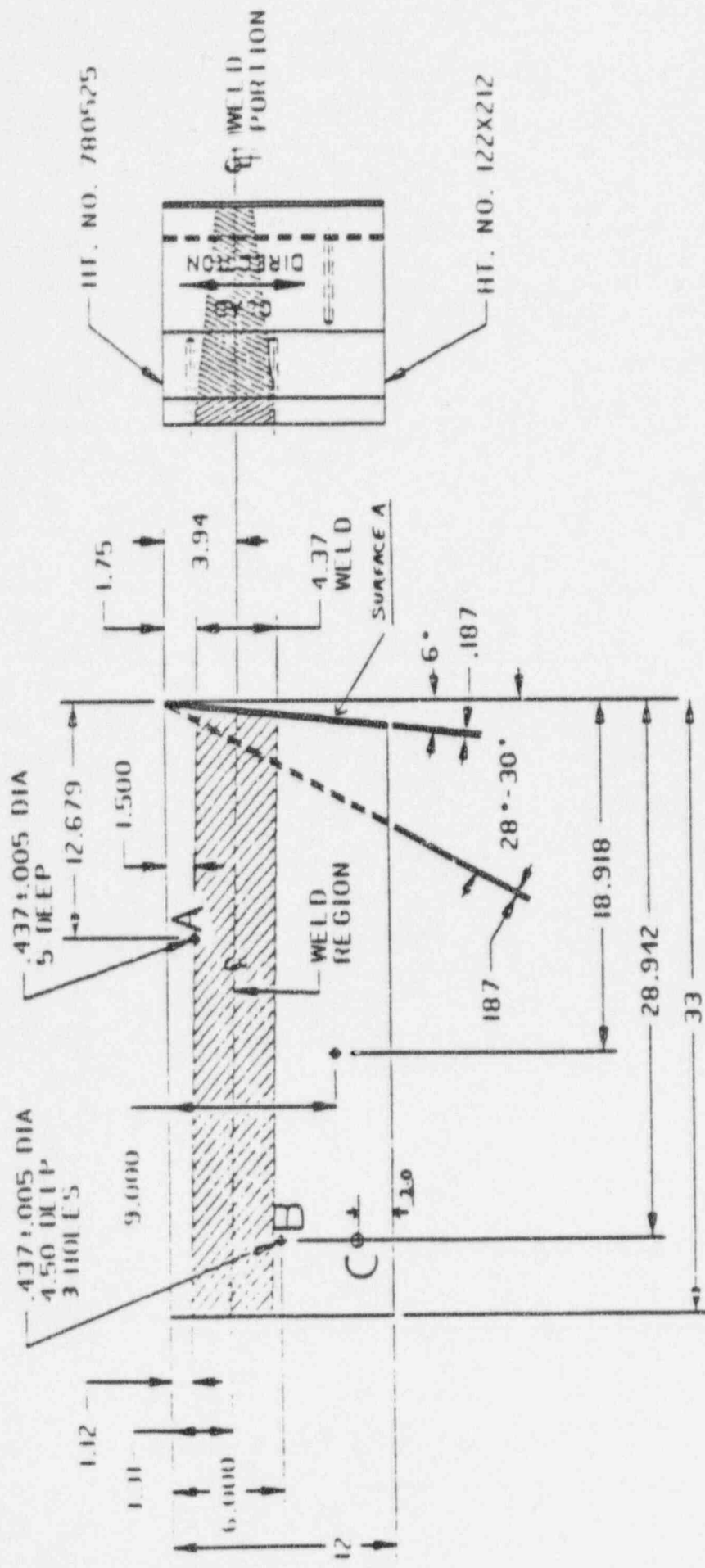
Palisades - Outlet Nozzle IR Scan Heads  
Palisades - Inlet Nozzle IR Scan Heads

VIEW FROM TOOL CENTER LINE

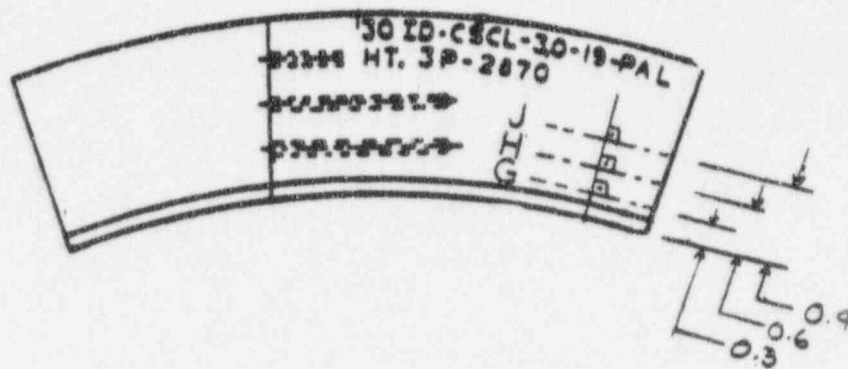
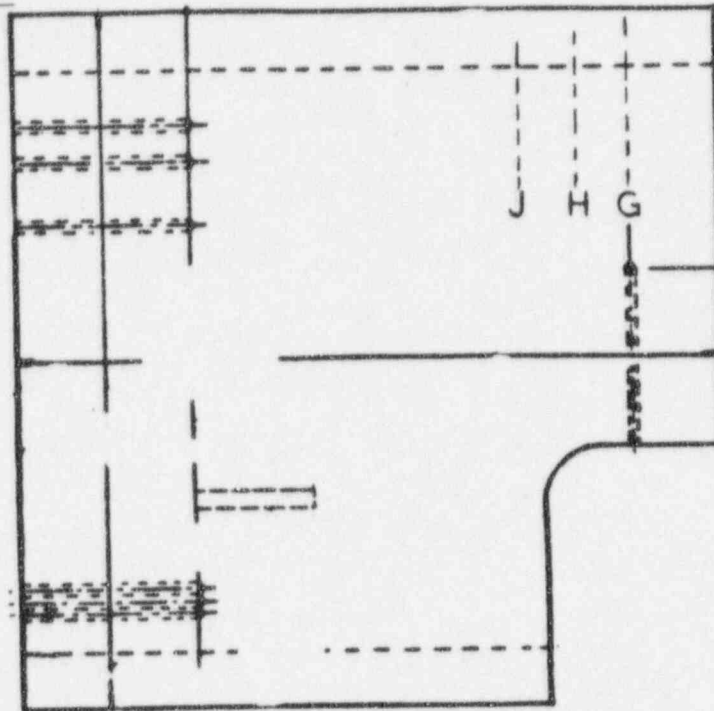


VESSEL CENTER

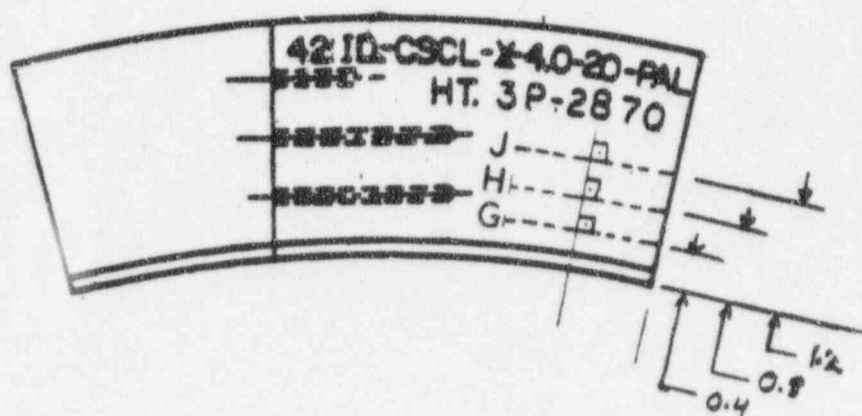
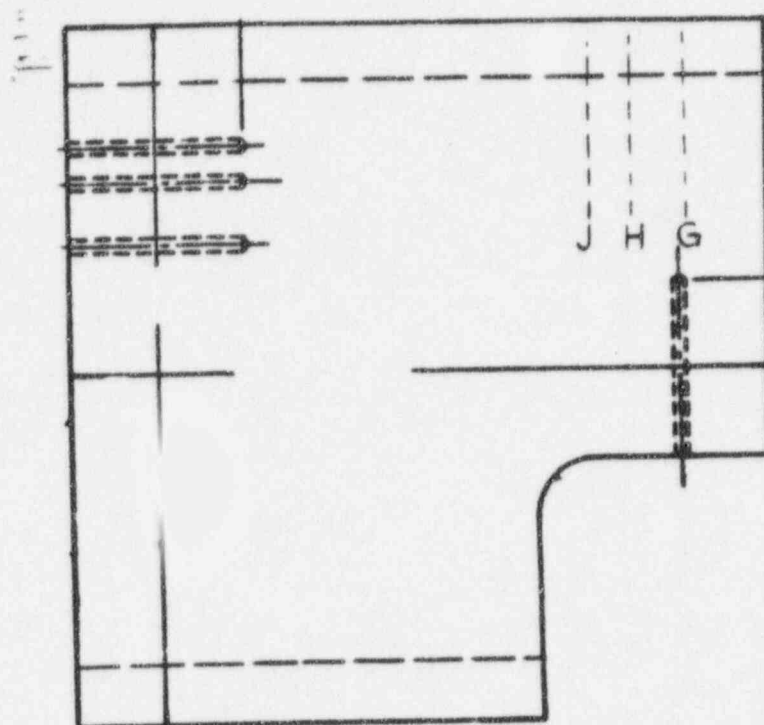




Palisades - Calibration Block 6-PAL

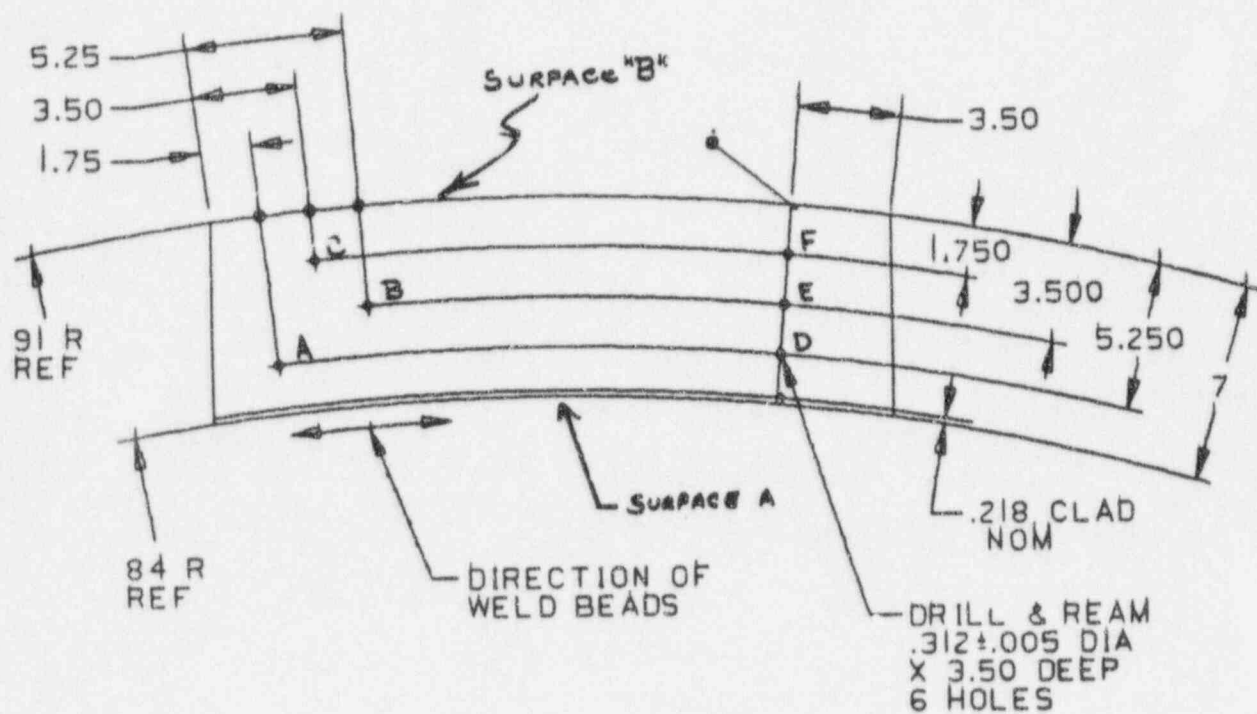
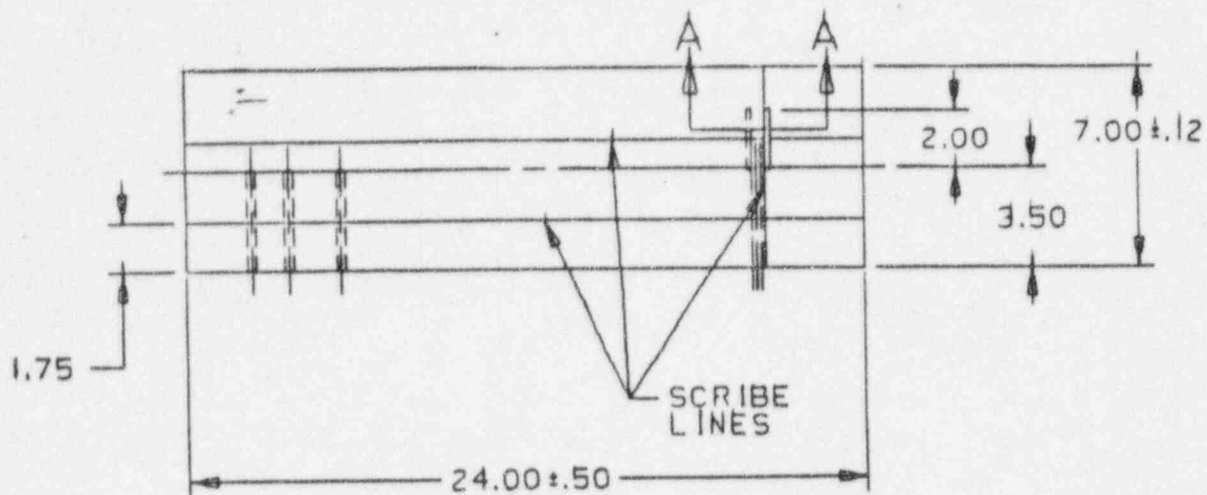


Palisades - Calibration Block 19-PAL

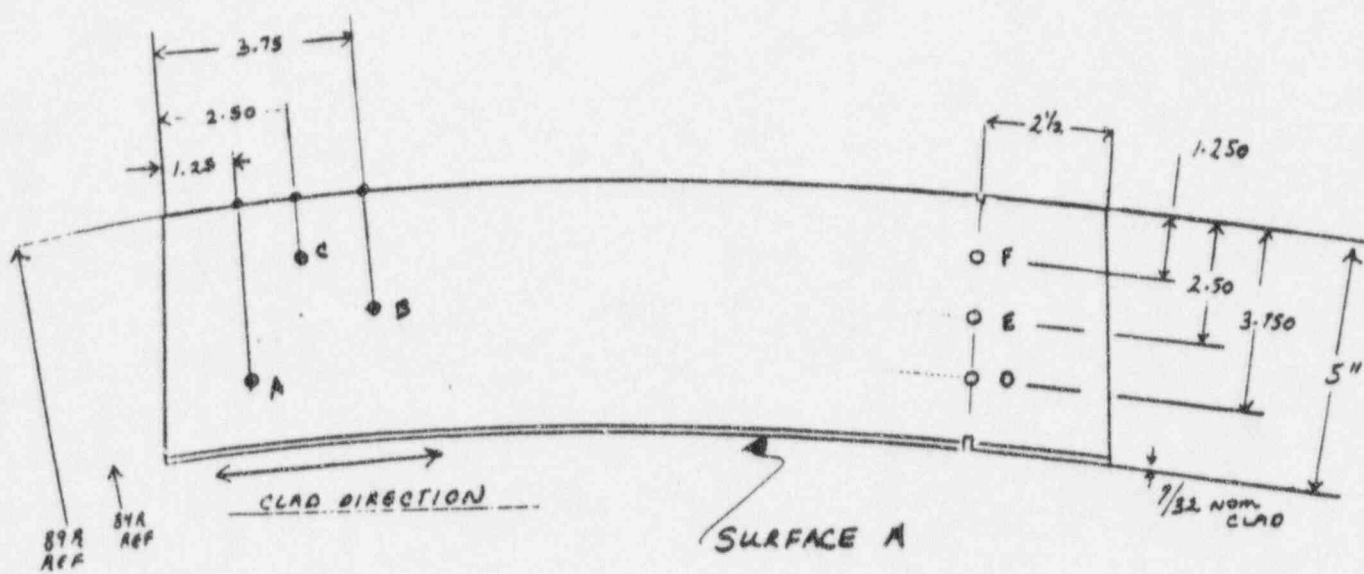
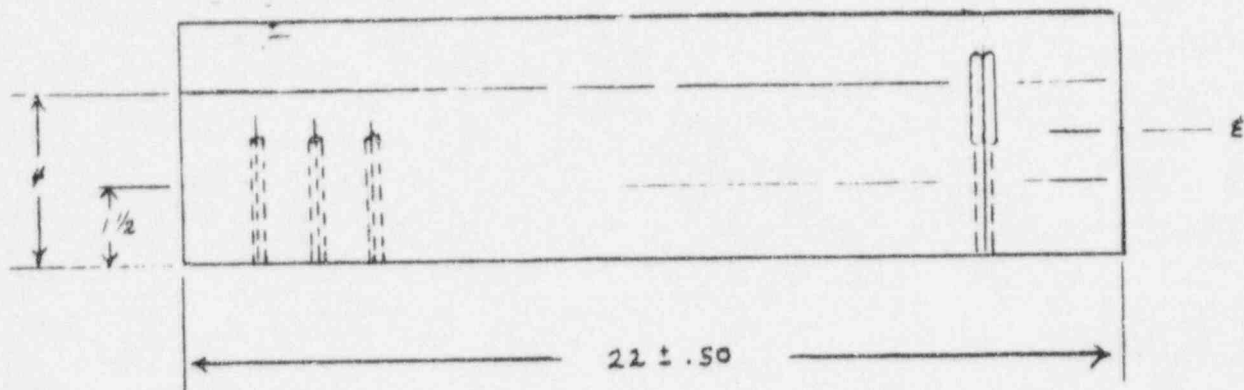


Palisades - Calibration Block 20-PAL

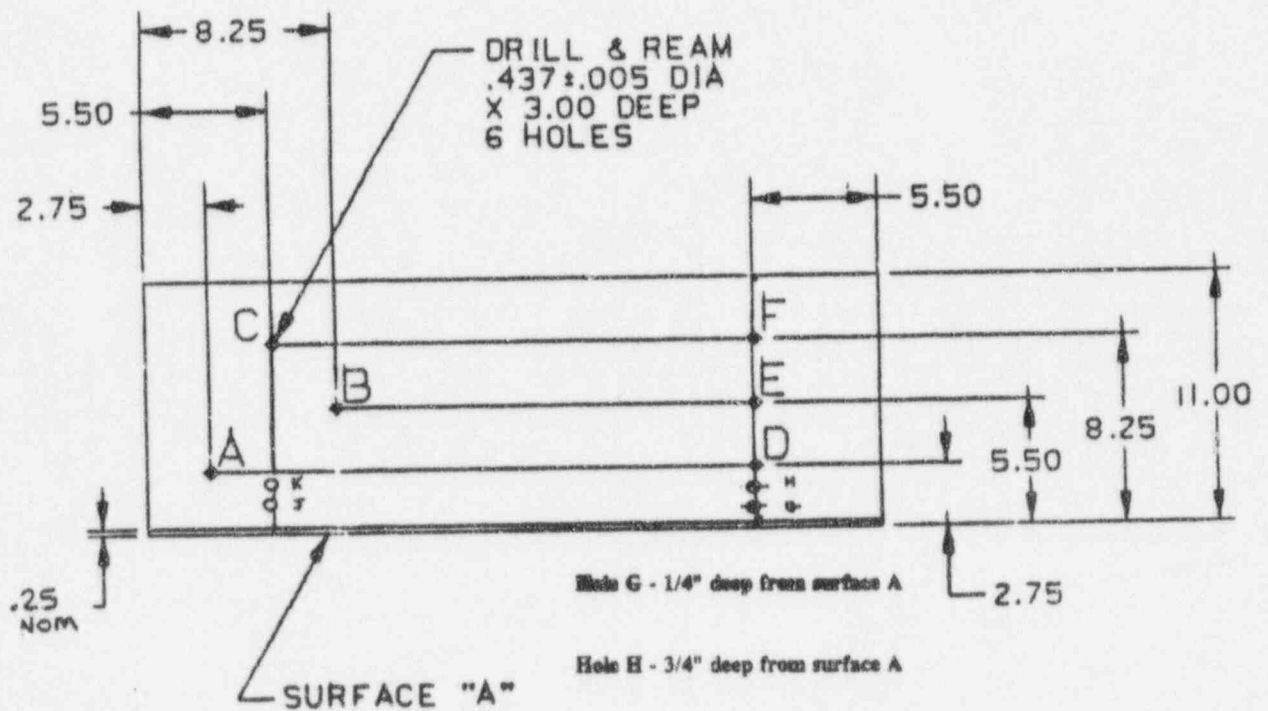
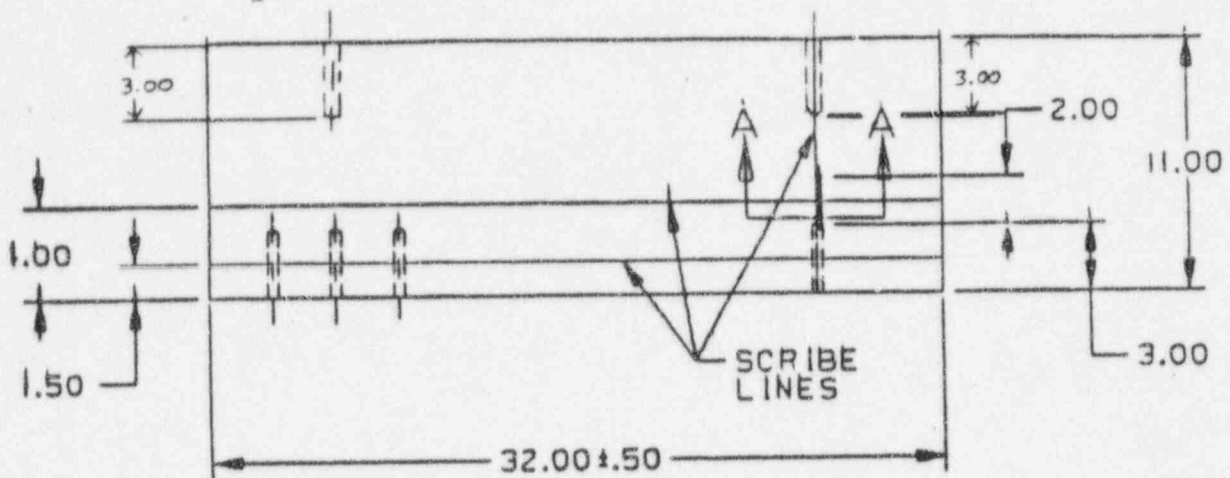




Palisades - Calibration Block 35-PAL



Palisades - Calibration Block 36-PAL



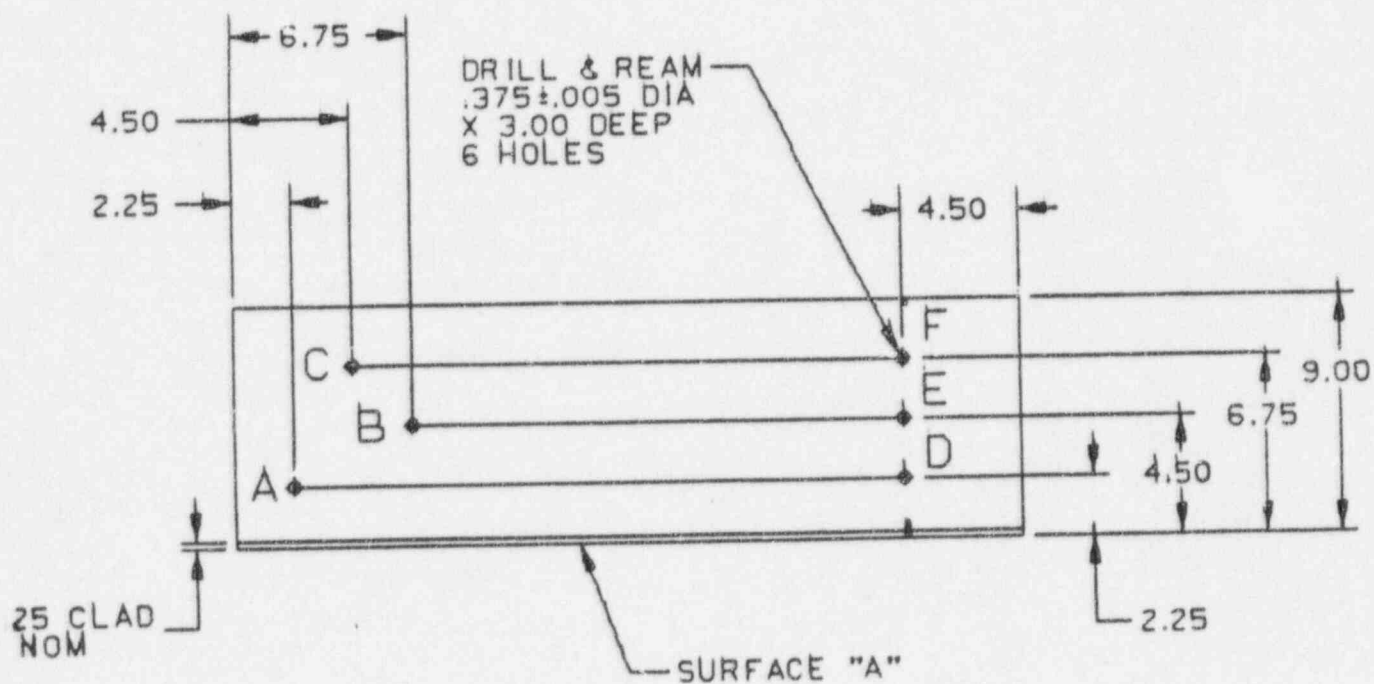
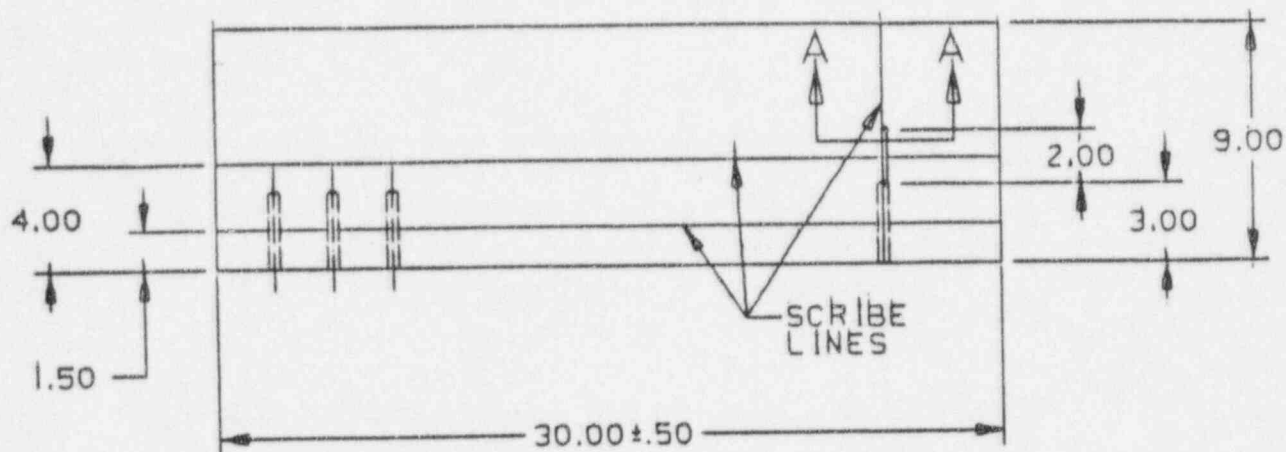
Hole G - 1/4" deep from surface A

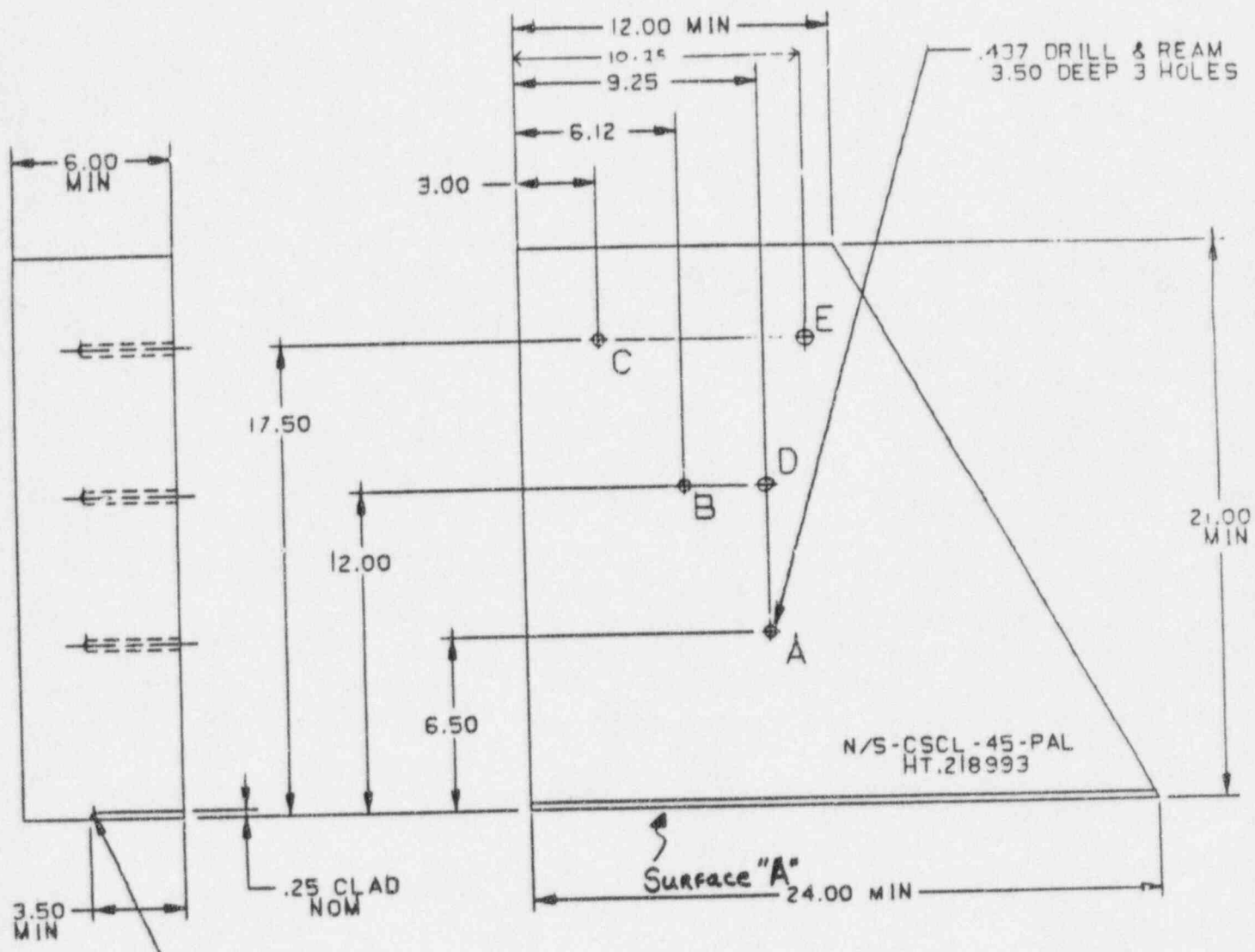
Hole H - 3/4" deep from surface A

Hole J - 1/2" deep from surface A

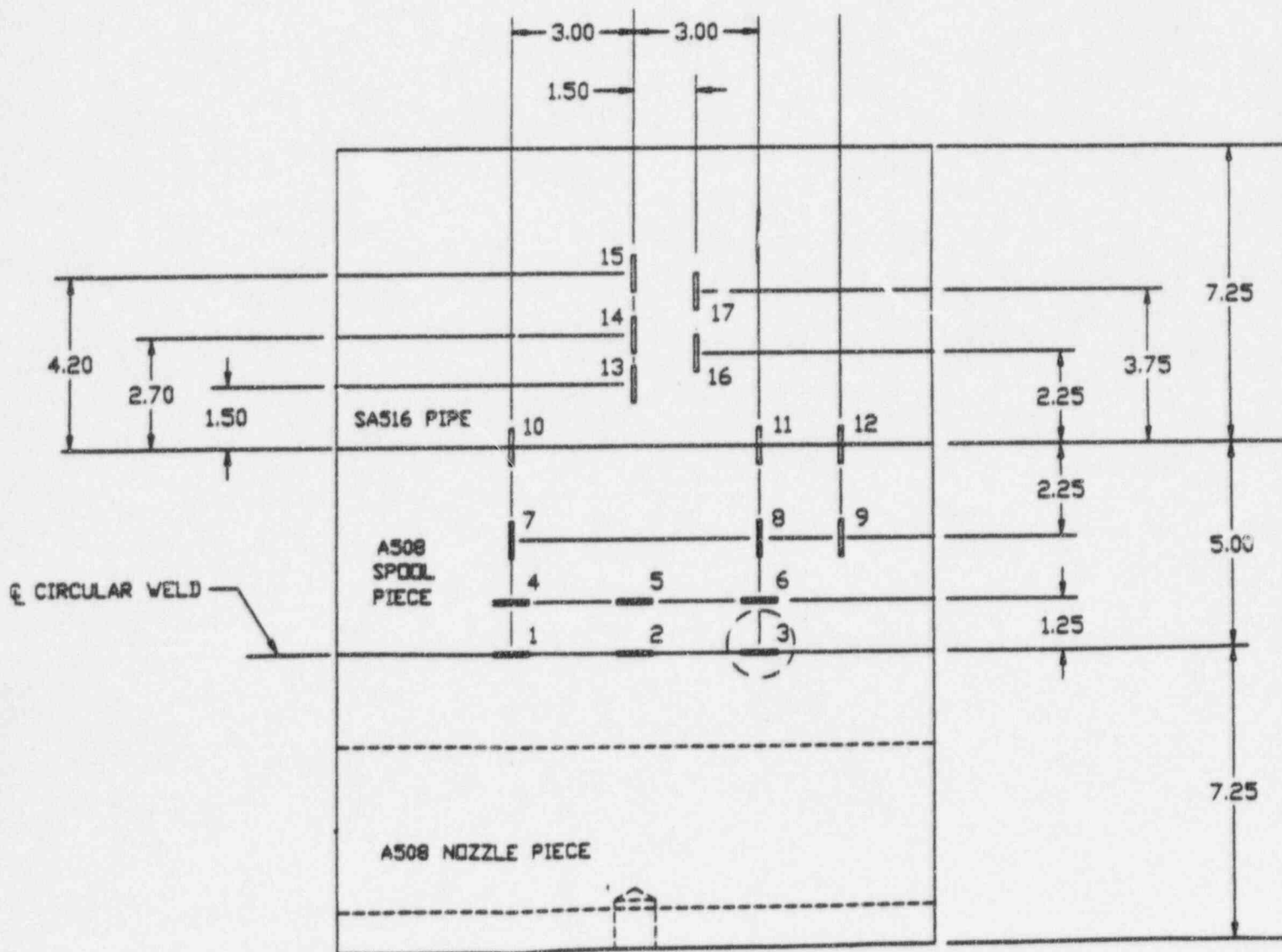
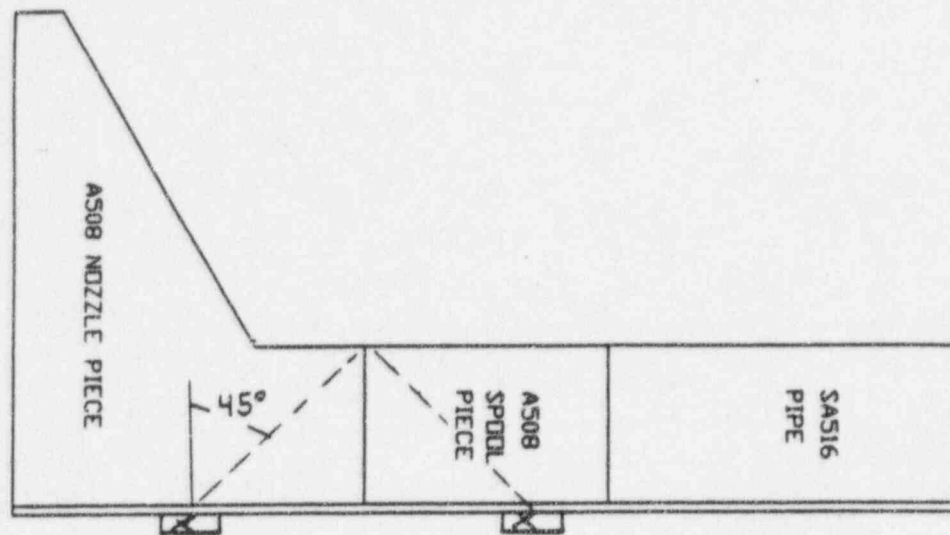
Hole K - 2" deep from surface A

Hole G, H, J and K are 0.125" dia





Palisades - Calibration Block 45-PAL



Palisades - Calibration Block NZL-MKP-52

**ATTACHMENT 4**

**CONSUMERS POWER COMPANY  
PALISADES PLANT  
DOCKET 50-255**

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION  
INSERVICE INSPECTION PROGRAM**

**BASIS DOCUMENT - ASME CODE BOUNDARIES**