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SUBJECT: DETAILED WELD PROCEDURES.

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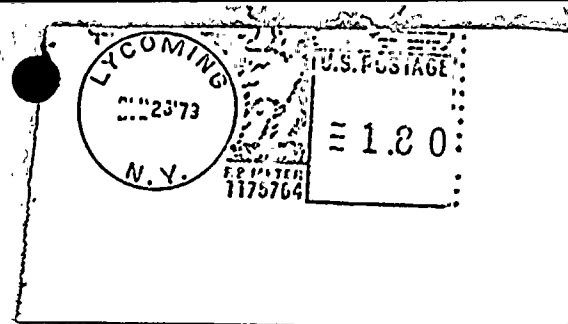
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Director of Nuclear Reactor Regulation
Attn: Mr. Phillip Polk
Operating Reactors/PM NTCC
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

7905020 367

TRAVELER

DESCRIPTION OF WORK Demonstration of N5B Safe End and Elbow Replacement

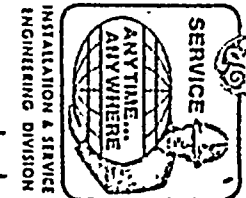
TRAVELER # Supp. to 04/Rev. 1 ITEM LIST # N/A JOINT # RWHWSR - 1 REPAIR N/A

CODE CLASS N/A LAYOUT # N/A PROJECT NMP

DRAWING # N5B-2-79 REV. 0 PROJECT # NMP-2-79 PREPARED BY/DATE A. Sanpere 4/24/79

SITE MANAGER APPROVED BY/DATE _____ Q.C. APPROVED BY/DATE _____ PAGE 1 OF 1

REVIEWED BY _____ DATE _____

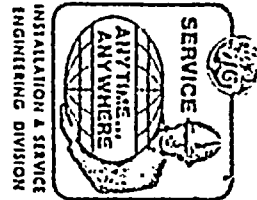


EQ	OPERATION EXAMINATION OR TEST	PROCEDURE OR INSTRUCTION AND REVISION	NON-CONFORMITIES		PRODUCTION OPERATION COMPLETED		QC COMPLIANCE VERIFICATION		AI INSPECTOR	CUSTOMER IF REQUIRED
			RE-REFER TO	COMPLETED BY DATE	BY	DATE	BY	DATE		
1	PT existing nozzle machined area	18 x A9400 Rev. 0						M		M
2	Install heating equipment and verify operation	LATER				M		M		M
	a) Heaters d) Controllers b) Power Supply e) Polarity c) Thermocouples									
2a	Build up ID of nozzle	SUPP to 04 Rev 1 SPCS 2a						M		M
3	Install run-off ring and verify centering alignment					M		M		M
4a	Establish preheat verify equipment operation (60 min)					M		M		M
4b	Verify special weld rod control procedure Supp #1 GWP-N					M		M		M
4c	Verify procedure, welders quals, records and identify					M		M		M
5	Butter weld 0.9" min buildup as welded	ISE-PQ-417 Rev. 0				M				

FOR INFORMATION ONLY

EXHIBIT 15
REVISION 0

TRAVELER

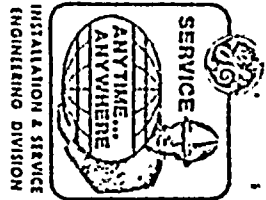


DESCRIPTION OF WORK Demonstration of NSB Safe End and Elbow Replacement
 TRAVELER # Supp. to 04/Rev. 1 ITEM LIST # N/A JOINT # RWHWSR - 1 REPAIR N/A
 CODE CLASS N/A LAYOUT # N/A PROJECT NMP
 DRAWING # NSB-2-79 REV. 0 PROJECT # NMP-2-79 PREPARED BY/DATE A. Sanpere 4/24/79
 SITE MANAGER APPROVED BY/DATE _____ Q.C. APPROVED BY/DATE _____ PAGE ____ OF ____
 REVIEWED BY _____ DATE _____

REQ	OPERATION EXAMINATION OR TEST	PROCEDURE OR INSTRUCTION AND REVISION	NON-CONFORMITIES		PRODUCTION OPERATION COMPLETED		QC COMPLIANCE VERIFICATION		AI INSPECTOR	CUSTOMER IF REQUIRED
			RE-FER TO	COMPLE-TE BY DATE	BY	DATE	BY	DATE		
5a	Record buildup (min)	SUPP to 04 Rev 1 SPCS 5a				M		M		M
6	Machine for inspection, I.D., O.D. and face					M		M		M
6a	Verify Dim-Build Up, EXT. & I.D. and record	SUPP to 04 Rev 1 SPCS 6a				M		M		M
7	U.T. for information while at or above preheat temp.	Later						M		M
8	Install I.D. heater & T.C.					M		M		M
9	Raise to stress relief temp-hold as required	Later				M		M		M
10	Cool at rate specified to pre-heat temp. At preheat temp. start 48 hour delay	SUPP to 04 Rev 1 SPCS 10				M		M		M
	count. Insulation, heaters and T.C. may be removed at this time.									
0a	Burr out & PT T.C. Locations	SUPP to 04 Rev 1 SPCS 10a				M		M		M

EXHIBIT 15
REVISION 0

TRAVELER



DESCRIPTION OF WORK Demonstration of N5B Safe End and Elbow Replacement
 TRAVELER # Supp. to 04/Rev. 1 ITEM LIST # N/A JOINT # RNHWSR - 1 REPAIR N/A
 CODE CLASS N/A LAYOUT # N/A PROJECT NMP
 DRAWING # N5B-2-79 REV. 0 PROJECT # NMP-2-79 PREPARED BY/DATE A. Sanpere 4/24/79
 SITE MANAGER APPROVED BY/DATE _____ Q.C. APPROVED BY/DATE _____ PAGE _____ OF _____
 REVIEWED BY _____ DATE _____

	OPERATION EXAMINATION OR TEST	PROCEDURE OR INSTRUCTION AND REVISION	NON-CONFORMITIES		PRODUCTION OPERATION COMPLETED		QC COMPLIANCE VERIFICATION		AI INSPECTOR	CUSTOMER IF REQUIRED
			RE-REFER TO	COMPLE-TE BY DATE	BY	DATE	BY	DATE		
a	Mandatory 48 hour delay before UT inspection					M				M
1b	R.T. for info after 24 hours	18 x A9600 Rev. 0					M			M
11c	P.T. for info after 24 hours	18 x A9400 Rev. 0					M			M
12	After 48 hour delay U.T.						M			M
13	Machine weld prep					M				
14a	Record weld prep dim. and verify butter thickness	SUPP to 04/Rev 1 SPCS 14a	1			M	M			M
15	P.T. weld prep	18XA9400 Rev. 0					M			M

LATER

EXHIBIT 15
REVISION 0



EXHIBIT 30
REVISION 0

S.P.C.S. No. 2a

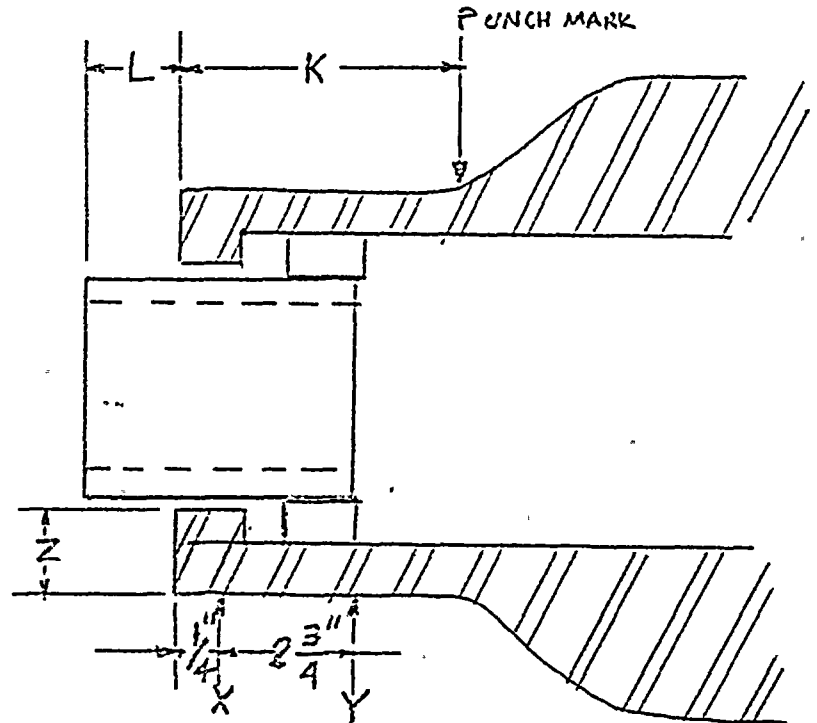
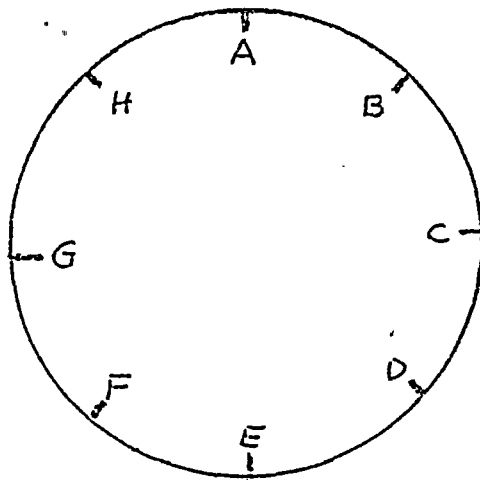
Page 1 of 1

SPECIAL PROCESS CONTROL SHEET

Ref Traveler No. SUPP. TO 04/REV 1 Page 1 of 3 / Sequence No. 7A

Operation:

Procedure of Instruction & Rev.



I.D. (X) AE 9.385" BF 9.385" CG 9.385" DH 9.385"

I.D. (Y) AE 9.937" BF 9.895" CG 9.845" DH 9.871"

Z A .276 B .267 C .255 D .239 E .210 F .220 G .233 H .253

K A 2 1/2" C 2 1/2" E 2 1/2" G 2 1/2"

L A 1.5" C 1.5" E 1.5" G 1.5"

Traveler signed off - [Signature] Date 4/24/79



EXHIBIT 30
REVISION 0

S.P.C.S. No. 5a

Page 1 of 1

SPECIAL PROCESS CONTROL SHEET

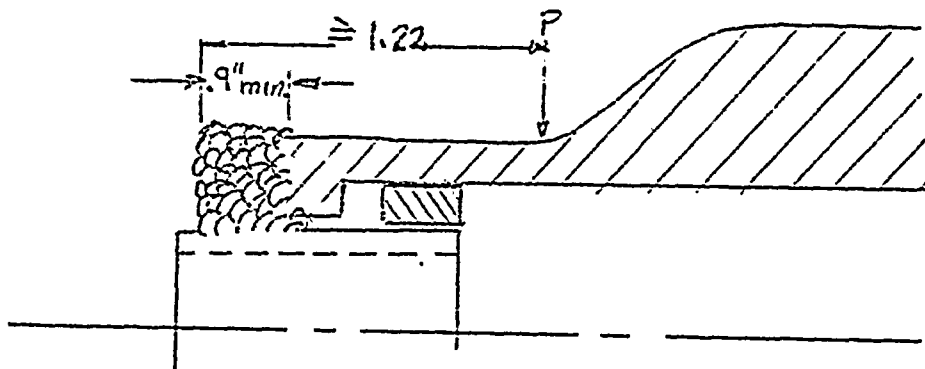
Ref Traveler No. SUPP. TO C4/REV1

Page 1 of 3

Sequence No. 5A

Operation:

Procedure of Instruction & Rev.



VERIFY THAT BUILD-UP IS GREATER THAN 0.9"
PRIOR TO MACHINING 'J' PREP

Traveler signed off - _____
Initial Date



EXHIBIT 30
REVISION 0

S.P.C.S. No. 6A

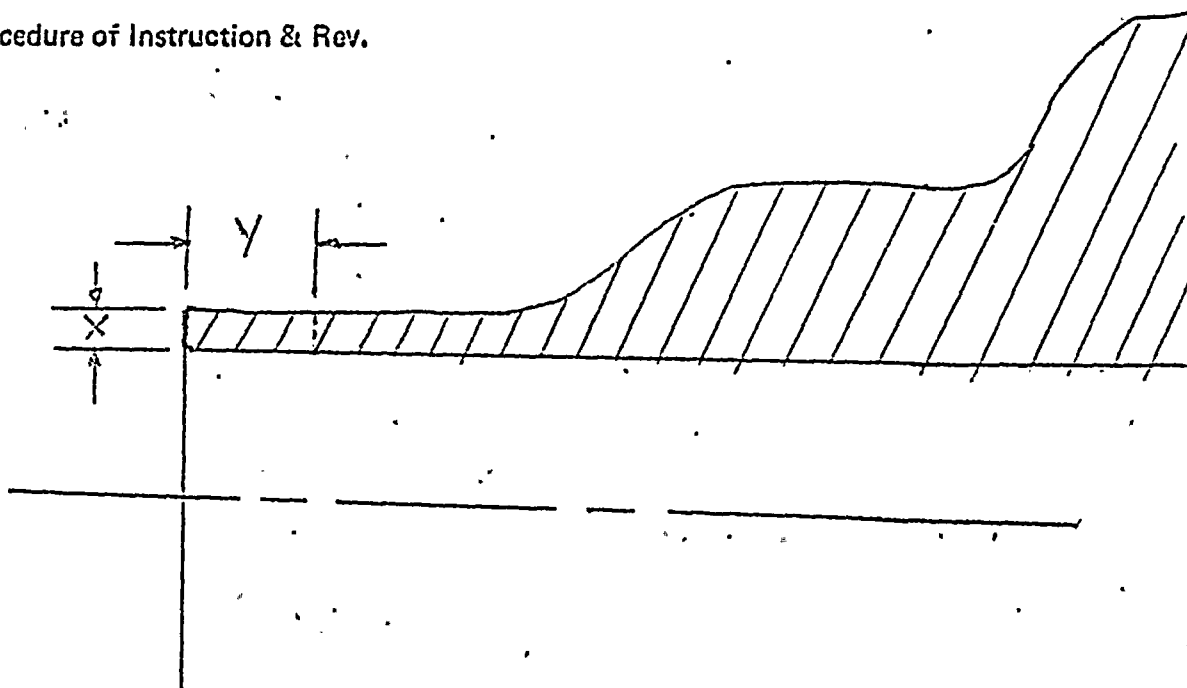
Page 1 of 1

SPECIAL PROCESS CONTROL SHEET

Ref Traveler No. SUPP TO 041REV1 Page 2 of 3 Sequence No. 3A

Operation:

Procedure of Instruction & Rev.



RECORD X & Y

X _____

Y _____

Traveler signed off - _____
Initial Date



EXHIBIT 30
REVISION 0

S.P.C.S. No. 100

Page 2 of 1

SPECIAL PROCESS CONTROL SHEET

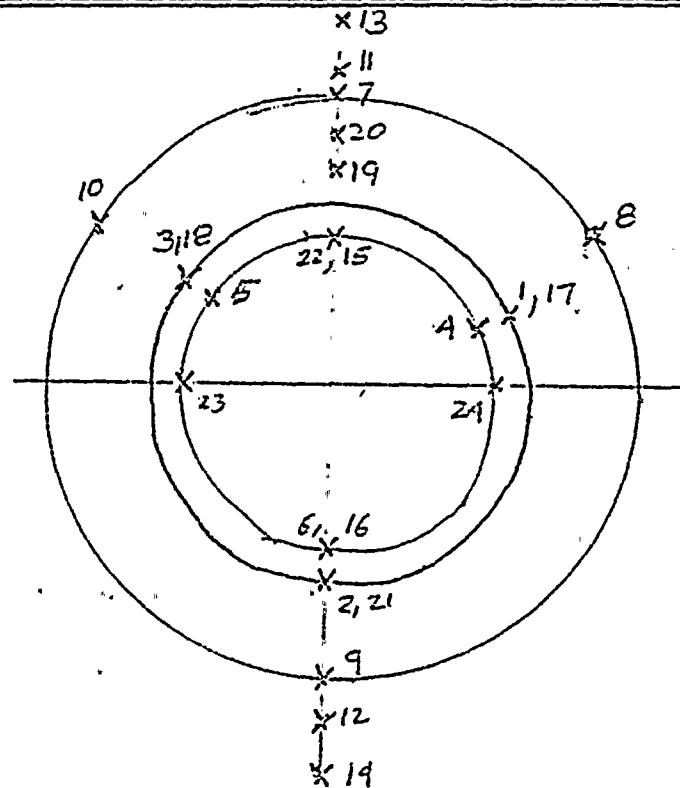
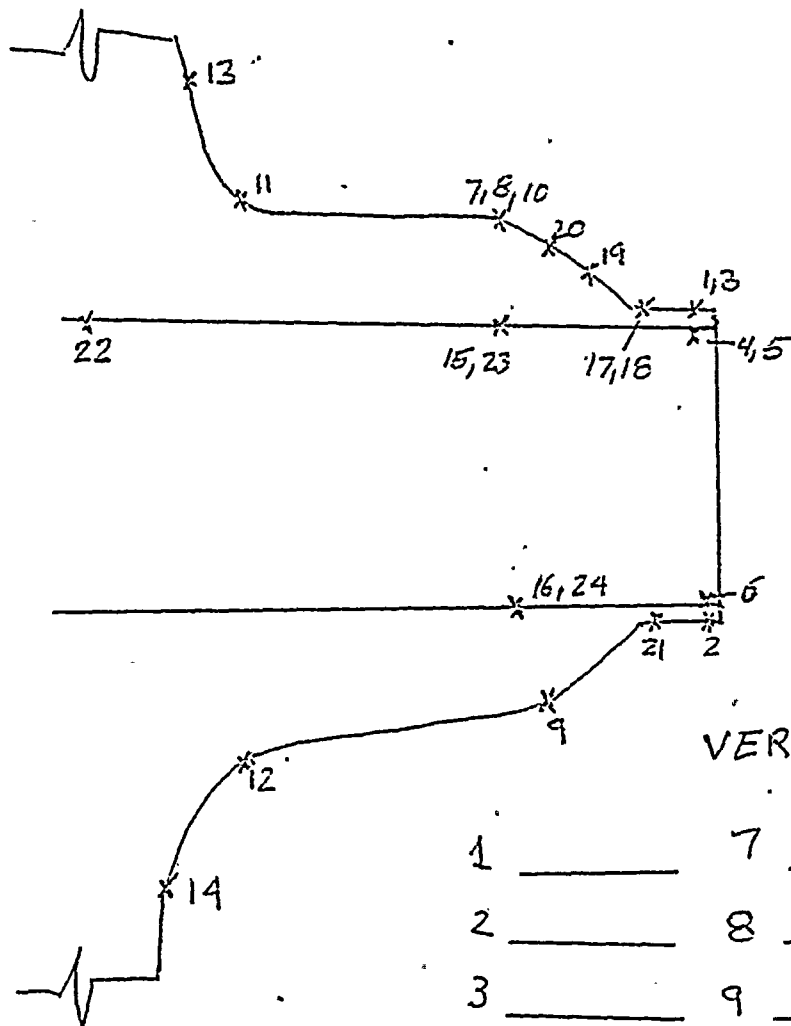
Ref Traveler No. SUPP TO 02/REV 1

Page 2 of 3

Sequence No. 100

Operation:

Procedure of Instruction & Rev.



VERIFY BURRING OUT, (INITIAL)

1	7	13	19
2	8	14	20
3	9	15	21
4	10	16	22
5	11	17	23
6	12	18	24

Traveler signed off - _____

Initial

Date



EXHIBIT 30
REVISION 0

S.P.C.S. No. 14A

Page 1 of 1

SPECIAL PROCESS CONTROL SHEET

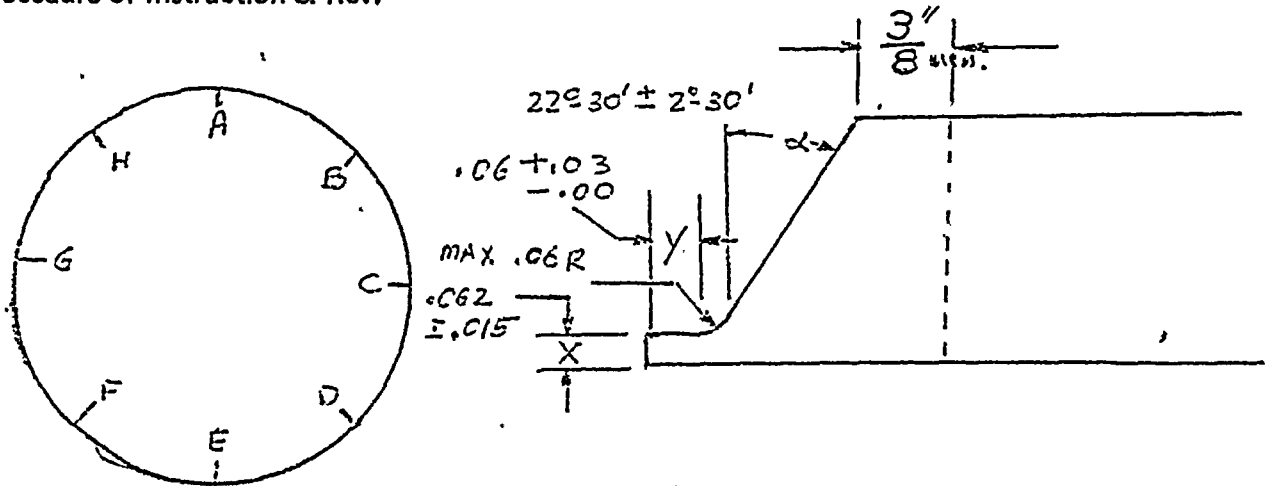
Ref Traveler No. SUPR TO 04/REV1

Page 3 of 3

Sequence No. 13A

Operation:

Procedure of Instruction & Rev.

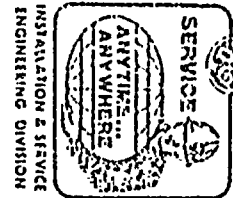


X,	A	_____	E	_____	C	_____	G	_____
Y,	A	_____	E	_____	C	_____	G	_____
R,	A	_____	E	_____	C	_____	G	_____
α,	A	_____	E	_____	C	_____	G	_____
ID,	AE	_____	BF	_____	CG	_____	DH	_____

Traveler signed off - _____
Initial Date

JOINT PROCESS CONTROL SHEET

GE/I&SE M&N NORTHEAST REGION



Traveler/Seq. #/Dwg. # 04 REV1	System & Line Desig. EMERGENCY CONDENSER	It No. 15B to It No. 15A-01	Weld No. 2a
Prepared By/Date A. SANPERE 1/24/79	Checked by QC/Date	Welding Procedure 160A 1091	Rev. 0
Base Metal Spec & Grade P8 to P8	Pipe or Comp. Size NOZZLE Material Thickness* 1.13 *If pipe nominal wall thickness	Joint Type CI OB F SKT (BR) Groove OTHER:	PT 18XA 9400 Rev 0
Welder's Identification			

Check/Hold Point	Action Required By			Construction Release		Quality Control Release		A.I.	
	Cont.	QC	AI	By	Date	By	Date	By	Date
Fit up and Cleanliness	C								
Pre-Heat	C	M							
Purge Gas									
M.T. or L.P. or R.T. Root	W	M							
Root Visual I.D. O.D.*									
M.T. or L.P. Final									
R.T. Before Stress									
Stress Relief									
M.T./P.T. After Stress									
Final Visual Inspection	M								
R.T. Final									
Weld Reinforcement									
Welder's Symbol									

Weld Reinforcement in Inches _____ U.T. Thickness Measurement _____

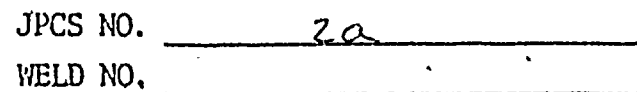
REMARKS: *IF I.D. BUS NOT CHECKED ROOT WAS NOT ACCESSIBLE

Major Defects or Rejection Description	Initial /Date
Recommended Method of Repair	Weld Supervisor/Date
Repair Approval	Initial/Date
JPCS signed off	Initial/Date

JPCS No. _____

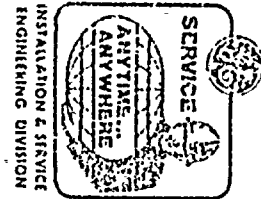
EXHIBIT 16
REVISION 0
(Side 1)

GENERAL ELECTRIC

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JOINT PROCESS CONTROL SHEET

GE/J&SE M&N NORTHEAST REGION



Traveler/Seq. #/Dwg. # 01 REV 1	System & Line Desig. EMERGENCY CONDENSER	Pc No. N5B to Pc No. NM-01 Ht No. _____ to Ht No. _____	Weld No. 5
Prepared By/Date A. SANPERE 4/24/79	Checked by QC/Date _____	Welding Procedure _____	Rev _____
Base Metal Spec & Grade _____ to P8	Pipe or Comp. Size N022LG Material Thickness* 1/1 *If pipe nominal wall thickness	Joint Type CI OD F SKT ☒ Groove OTHER: _____	

PT 18 X A 9400 REV 0

Welder's Identification _____	Heat Treatment: Yes ☒ No _____	Procedure No. NMP-2-79
-------------------------------	--	-------------------------------

Check/Hold Point	Action Required By			Construction Release		Quality Control Release		A.I.	
	Cont.	QC	AI	By	Date	By	Date	By	Date
Fit up and Cleanliness									
Pre-Heat	C								
Purge Gas									
M.T. or L.P. or R.T. Root									
Root Visual I.D. O.D.*									
M.T. or L.P. Final									
R.T. Before Stress									
Stress Relief									
M.T./P.T. After Stress									
Final Visual Inspection	C								
R.T. Final									
Weld Reinforcement									
Welder's Symbol									

Weld Reinforcement in Inches _____ U.T. Thickness Measurement _____

REMARKS: *IF I.D. BOS NOT CHECKED ROOT WAS NOT ACCESSIBLE

Major Defects or Rejection Description	Initial /Date
Recommended Method of Repair	Weld Supervisor/Date
Repair Approval	Initial/Date
JPCS signed off	Initial/Date

JPCS No. _____

EXHIBIT 16
REVISION 0
(Side 1)



Nine Mile Point

Unit #1

Safe End And Piping

DETAILED WELD PROCEDURE

No. 16012000

REV. 1

PAGE 1 OF 2

PREPARED BY/DATE *J.H. 4/6/79*

APPROVED BY/DATE *R.W. 4/6/79*

QUALITY ASSURANCE
DOCUMENT REVIEW
RELEASE FOR PRODUCTION

RL *4/6/79*
REVIEWER DATE

DETAILED WELD PROCEDURE

INCONEL TO INCONEL

ASME P-43 TO P-43

16012000

NMF-2-79

REV. 1



INCONEL WELD PROCEDURE

Specification No. 150A2000

Revision No. 1

Date 4-6-79

Page 2 of 2

BASE MATERIAL: INCONEL WELD METAL.

Welded to: Buttered with inconel
ASME Section IX: P# 43 to P# 43

Butt Weld Thickness: NA Min. Max.

Pipe Outer Diameter: NA Min. Max.

WELDING PROCESS:

Weld Position: 3G

Weld Direction: N/A

Shielding Gas: N/A

WELDING MATERIAL: ASME SPA 5.11

ASME Section IX: P# 43 A# N/A

Type: E6010-3

Consumable Insert: N/A

Backing Strip: Integral

HEAT TREATMENT:

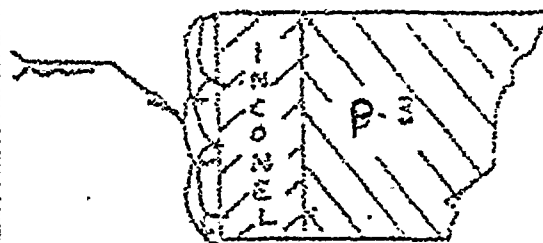
Preheat Temp: 500°F

Interpass Temp: 350°F

Post-Weld Holding Temp: N/A

Post-Weld Holding Time: N/A

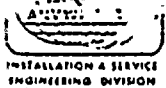
Butt Weld Joint:



ADDITIONAL REQUIREMENTS: General Welding Procedures GWP-2

1. E.T. Each Layer: 2. All weld passes within one half inch of exposed base metal shall be limited to no higher than 25,000 joules/inch heat input, as determined by the following formula: $\text{Volts}^{(1)} \times \text{Amps}^{(2)} = 50$
Heat Input (J/in) = $\frac{\text{Travel Speed (Inch/Min)}}{\text{Travel Speed (Inch/Min)}}$

WELDING PROCESS:	SHAW				APPLICABLE PROJECT:
PORTION OF JOINT	Overlay				
Pass Number	1-C				Nina Mills Unit #1
Current (Amps.)	100-145*				
Current Type/Polarity	DCRP				PROCEDURE QUALIFICATION: ISZ-7Q-415
Torch Gas (C.F.H.)	N/A				
Backing Gas (C.F.H.)	N/A				
Cup Size	N/A				
Bare Rod Diameter (in.)	N/A				
Electrode/Wire Diam. (in.)	3/32, 1/8				
Tungsten Elect. Ext. (in.)	N/A				
Peak Voltage (Volts)	N/A				
Background Voltage (Volts)	N/A				
Pulse Rate (CPS)	N/A				
APPLICATION: The SHAW buttering of inconel with inconel weld metal within the limits of the ASME code section IX					WELDER QUALIFICATION: ISZ WQ-1095



NINE MILE POINT UNIT #1
SAFE END REPLACEMENT

No. 160A1098

REV. 0 PAGE 1 OF 2

PREPARED BY/DATE

J. N. R. R. R. 3/29/79

APPROVED BY/DATE

F. R. R. R. 3/30/79

QUALITY ASSURANCE DOCUMENT REVIEW RELEASE FOR PRODUCTION	
<i>DR</i>	4/6/79
REGION QA	DATE

WELDER QUALIFICATION

NINE MILE POINT

UNIT #1

GTAW WITH F-43

160A1098

Rev. 0

NMP-2-79

GENERAL  ELECTRIC



WELDER QUALIFICATION

Specification No. 160A1093
 Revision No. 0
 Date 3-24-79
 Page 2 of 2

BASE MATERIAL: Carbon Steel Pipe
 Welded to: Carbon Steel Pipe
 ASME Section IX: P# 8 to P# 43
 Butt Weld Thickness: 1/16" Min. 3/4" Max.
 Pipe Outer Diameter: 2.875" Min. No Max.

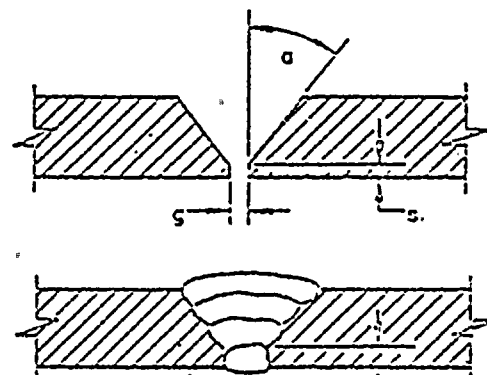
WELDING PROCESS: GTAW
 Weld Position: 6G
 Weld Direction: Up
 Shielding Gas: 100% Argon

WELDING MATERIAL: ASME SFA 5.14
 ASME Section IX: F# 43 A# N/A
 Type: ERNiCr-3
 Consumable Insert: None
 Backing Strip: None

HEAT TREATMENT:
 Preheat Temp: 32° F Min.
 Interpass Temp: 350° F Max.
 Post-Weld Holding Temp: None
 Post-Weld Holding Time: None.

Butt Weld Joint: Recommended Test
 Coupon: 6" Ø x .375" Wall

$$\alpha = 37\frac{1}{2}^{\circ} \pm 2^{\circ} \quad s = \frac{1}{16}'' \pm \frac{1}{32}'' \quad g = \frac{7}{32}'' \pm \frac{1}{32}''$$



ADDITIONAL REQUIREMENTS: General Welding Procedure: ISE-GWP-N

1. V.T. Root
2. R.T. Final

WELDING PROCESS:	GTAW	GTAW			APPLICABLE PROJECT:
PORTION OF JOINT	Root	Fill			
Pass Number	1-2	3			Nine Mile Point Unit #1
Current, (Amps.)	90-115	90-115			
Current Type/Polarity	DCSP	DCSP			PROCEDURE QUALIFICATION: ISE-PQ-404
Torch Gas (C.F.H.)	15	15			
Backing Gas (C.F.H.)	5	Optional			
Cup Size	6-8	6-8			
Bare Rod Diameter (in.)	3/32	3/32			
Electrode/Wire Diam. (in.)	3/32	3/32			
Tungsten Elect. Ext. (in.)	1/4	1/4			
Peak Voltage, (Volts)	N/A	N/A			
Background Voltage (Volts)	N/A	N/A			
Pulse Rate, (CPS)	N/A	N/A			
APPLICATION: The GTA Welding of Base Alloy within the limits of ASME Section IX.					WELDER QUALIFICATION: Contained Herein



Weld Procedure Specification

No. 1 ATER

REV. 0

PAGE 1 OF 5

PREPARED BY/DATE

APPROVED BY/DATE

INFO
ONLY

WPS 417

WELD PROCEDURE SPECIFICATION

CARBON STEEL BUTTERED WITH

INCONEL TO STAINLESS STEEL

ASME P-3 BUTTERED WITH F43 TO P-8 WITH INSERT

USING F43 FILLER

REV.0

GENERAL  ELECTRIC

INSTALLATION
AND SERVICE
ENGINEERING
DEPARTMENT

WELDING PROCEDURE SPECIFICATION

Specification No. _____

Revision No. 0 _____

This page covers the buttering of
the P-3 material using SMAW

Date _____

Page 2 of 5

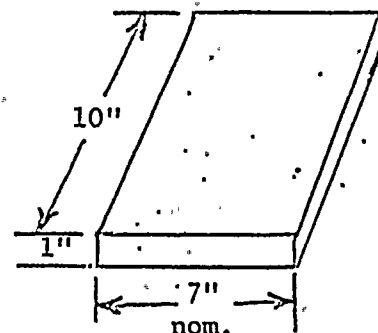
BASE MATERIAL: P-3 Buttered with Inconel
Welded to: N/A
ASME Section IX: P# 3 Buttered with F-43
Buttering Thickness: See Sketch #1
Pipe Outer Diameter: 6" Min. No Max.
Minimum Part Thickness: 1/2"

WELDING PROCESS:
Weld Position: All
Weld Direction: Vertical Up
Shielding Gas: N/A

WELDING MATERIAL: ASME SFA 5.11
ASME Section IX: F# 43 A#
Type: ENiCrFe-3
Consumable Insert: N/A
Backing Strip: Runoff ring per Sketch 1

HEAT TREATMENT:
Preheat Temp: 250° F Min. as measured 1" T from the weld (maintain until PWHT).
Interpass Temp: 350° F Max. as measured on the weld surface prior to the deposition.
* Post-Weld Holding Temp: 1125° ± 25° F of additional passes.
Post-Weld Holding Time: 1 hour per inch of thickness

Butt Weld Joint:
Recommended Test Coupon
SA 533 GR "B" CL 1



ADDITIONAL REQUIREMENTS: General Welding Procedure: GWP-N-SUPPLEMENT #1

See Page 3 of 5

*Heat up and cool down for PWHT not to exceed 300° F/hr. Part may be air cooled from 600° F.

WELDING PROCESS:	SMAW				APPLICABLE PROJECT:
PORTION OF JOINT	Buttering				
Pass Number	All				All
Current, (Amps.)	65-90				
Current Type/Polarity	DCRP				
Torch Gas (C.F.H.)	N/A				
Backing Gas (C.F.H.)	N/A				
Cup Size	N/A				
Bare Rod Diameter (in.)	N/A				
Electrode/Wire Diam. (in.)	1/8				
Tungsten Elct. Ext. (in.)	N/A				
Peak Voltage, (Volts)	N/A				
Background Voltage (Volts)	N/A				PROCEDURE QUALIFICATION:
Pulse Rate, (CPS)	N/A				
Volts	20-23				Contained Herein
APPLICATION:	SMAW Weld Buttering of P-3 materials for safe end attachment within the limits of the ASME Code, Section IX and III.				WELDER QUALIFICATION:
					Later

PREPARED BY/DATE

APPROVED BY/DATE

Buttering of P-3 material using SMAW

ADDITIONAL REQUIREMENTS: General Welding Procedure: GWP-N-SUPPL. #1

MT base material to $\frac{1}{2}$ " back on plate

PT & RT after PWHT and preliminary machining

UT after PWHT and preliminary machining

Cleaning: Wipe joint prior to welding and preheating with acetone. Flapper wheel clean surfaces to be welded and adjacent surfaces to 1" to bare shiny metal. During welding, grind stops and starts and remove all slag with aluminum oxide wheels and stainless steel wire brushes.

INSTALLATION
AND SERVICE
ENGINEERING
DEPARTMENT

WELD PROCEDURE SPECIFICATION

This page covers butt of Inconel
buttered P-3 to P-8

Specification No. _____
Revision No. 0
Date _____
Page 4 of 5

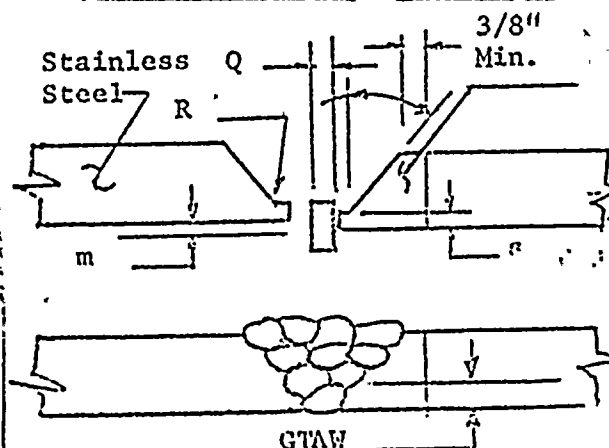
BASE MATERIAL: P-8 Stainless Steel
Welded to: P43 (Inconel Buttered P-3)
ASME Section IX: P# 8 to P# 43 (F-43)
*Butt Weld Thickness: 3/16" Min. 2" Max.
Pipe Outer Diameter: N/A Min. N/A Max.

WELDING PROCESS: GTAW/SMAW
Weld Position: All Positions
Weld Direction: Vertical Up
Shielding Gas: Argon Welding Gr.

WELDING MATERIAL: ASME SFA 5.14/5.11
ASME Section IX: F# 43 A#
Type: ERNiCr-3/ENiCrFe-3
Consumable Insert: Yes ERNiCr-3
Backing Strip: N/A

HEAT TREATMENT:
Preheat Temp: 50° F
Interpass Temp: 350° F Max.
Post-Weld Holding Temp: None
Post-Weld Holding Time: None

Butt Weld Joint:
Joint Cleaning: See Page 1
 $c = .250^{+20}_{-0}$ $s = .045^{+.010}_{-.010}$
 $Q = 1/16" \text{ Max.}$ $R = 3/16"$ $m = 1/32" \text{ Max.}$



ADDITIONAL REQUIREMENTS: General Welding Procedure:

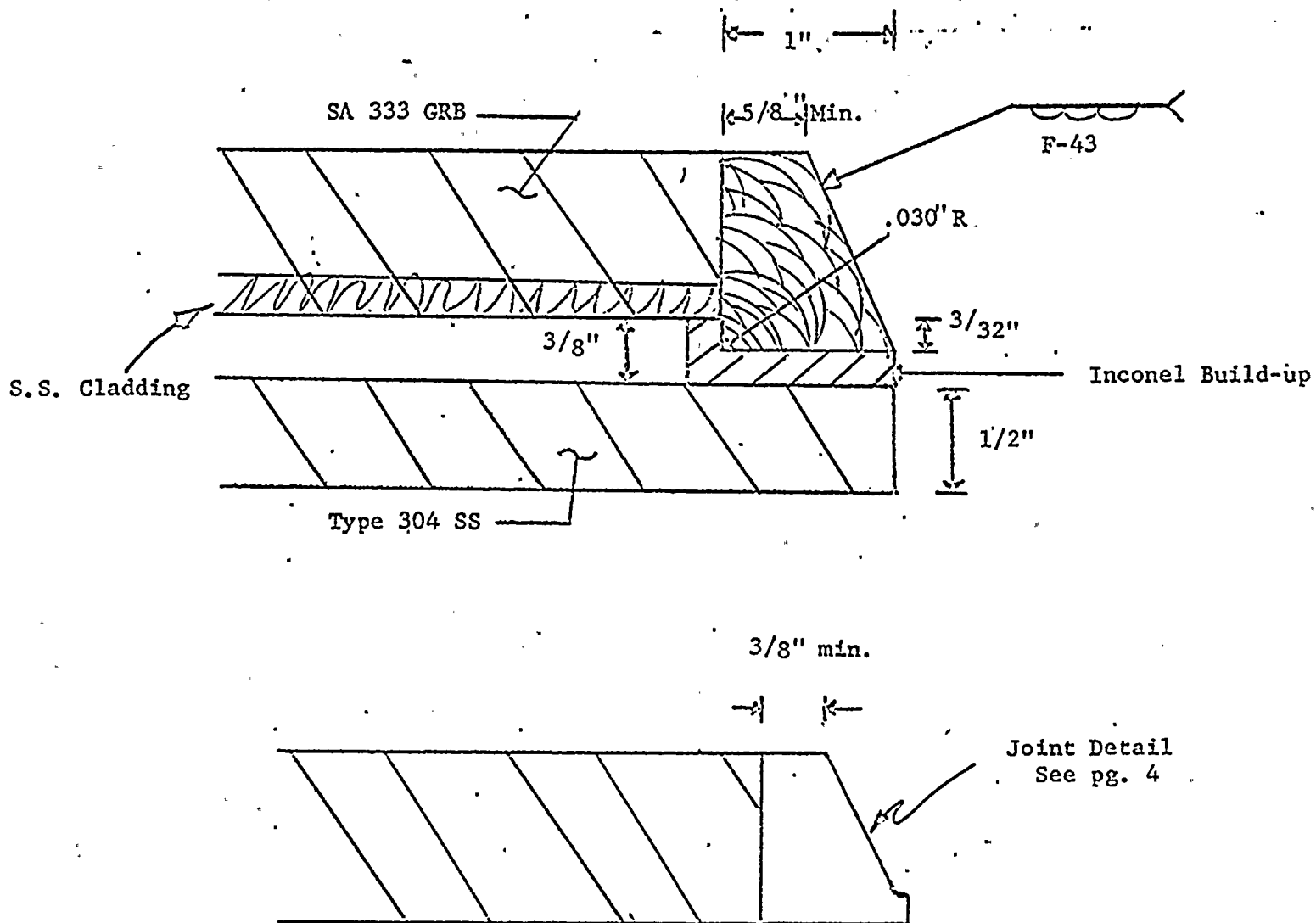
1. PT Root (Welder side)
2. PT Final (Both sides)
3. RT Final

WELDING PROCESS:	GTAW	GTAW	SMAW	APPLICABLE PROJECT:
PORTION OF JOINT	Fill	Root/Fill	Fill	
Pass Number	Fusion-1	2-3	4-C	Nine Mile Point Unit #1
Current, (Amps.)	65-90	70-180	80-110	
Current Type/Polarity	DCSP	DCSP	DCRP	
Torch Gas (C.F.H.)	15-30	15-30	N/A	
Backing Gas (C.F.H.)	25-35	25-35	N/A	PROCEDURE QUALIFICATION:
Cup Size	4-8	4-8	N/A	
Bare Rod Diameter (in.)	Insert	3/32	N/A	
Electrode/Wire Diam. (in.)	1/16	3/32 Tung.	1/8	
**Tungsten Elect. Ext. (in.)	1/2 Max.	1/2 Max.	N/A	
Peak Voltage, (Volts)	N/A	N/A	N/A	
Background Voltage (Volts)	N/A	N/A	N/A	
Pulse Rate, (CPS)	N/A	N/A	N/A	
Technique	N/A	N/A	Stringer	
APPLICATION:				WELDER QUALIFICATION:
Qualification of GTA/SMAW Welding of Inconel within the limits of the ASME Code Section IX.				
*GTAW 1/16" - 1/4"				
SMAW 3/16" - 2"				
**2% Thoriated				



TECH #1

Specification No. _____
Revision No. _____
Date _____
Page 5 of 5



NOTE: Butter thickness to be $\frac{3}{8}$ " min. after machining.



Nine Mile Point
Unit #1

Safe End and Piping

Procedure Qualification

No. ISE-PQ-417

REV. 0

PAGE 1 OF 4

PREPARED BY/DATE

APPROVED BY/DATE

INFO
ONLY

PROCEDURE QUALIFICATION
CARBON STEEL BUTTERED WITH
INCONEL TO STAINLESS STEEL
ASME P3 BUTTERED WITH F43 TO P8 WITH INSERT
USING F43 FILLER
ISE-PQ-417
REV. 0

GENERAL  ELECTRIC

PROCEDURE QUALIFICATION

Specification No. ISE PQ-417

Revision No. 0

Date 4/26/79

Page 2 of 4

BASE MATERIAL: P-3 Buttered with Inconel

Welded to: N/A

ASME Section IX: P-3 Buttered with F-43

Butt Weld Thickness: N/A Min. N/A Max.

Pipe Outer Diameter: N/A Min. N/A Max.

WELDING PROCESS:

Weld Position: 2G Plate

Weld Direction: Horizontal

Shielding Gas: N/A

WELDING MATERIAL: ASME SFA 5.11

ASME Section IX: F-43

Type: ENiCrFe-3

Consumable Insert: N/A

Backing Strip: N/A

HEAT TREATMENT:

Preheat Temp: 250° F Min. (maintain until PWHT)

* Interpass Temp: 350° F Max.

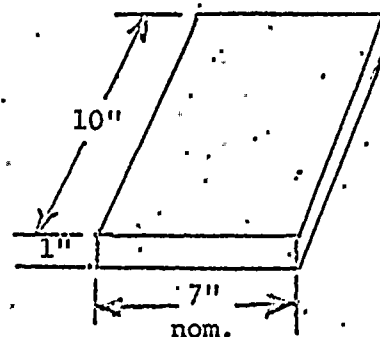
Post-Weld Holding Temp: 1125° ± 25° F

Post-Weld Holding Time: 6 hrs. (Heat up rate not to exceed 300° F/hr.)

Butt Weld Joint:

Recommended Test Coupon

SA 533 GR "B" CL 1



See Page 3

ADDITIONAL REQUIREMENTS: General Welding Procedure: GWP-N-SUPPL. #1

MT base material to 1/2" back on plate

PT & RT after PWHT and prelim. machining

UT after PWHT and prelim. machining

Heat up for PWHT not to exceed 300° F/hr, cool down to 600° F before removing insulation.

*As measured on the weld surface prior to the deposition of each pass.

WELDING PROCESS:	SMAW				APPLICABLE PROJECT:
PORTION OF JOINT	Buttering				
Pass Number	1 thru C				
Current (Amps.)	80-110				
Current Type/Polarity	DCRP				
Torch Gas (C.F.H.)	N/A				
Backing Gas (C.F.H.)	N/A				
Cup Size	N/A				
Base Rod Diameter (in.)	N/A				
Electrode/Wire Diam. (in.)	1/8				
Tungsten Elect. Ext. (in.)	N/A				
Peak Voltage (Volts)	N/A				
Background Voltage (Volts)	N/A				
Pulse Rate (CPS)	N/A				
Stringer beads only					
					PROCEDURE QUALIFICATION:
					Contained Herein
					WELDER QUALIFICATION:
					Later

APPLICATION:

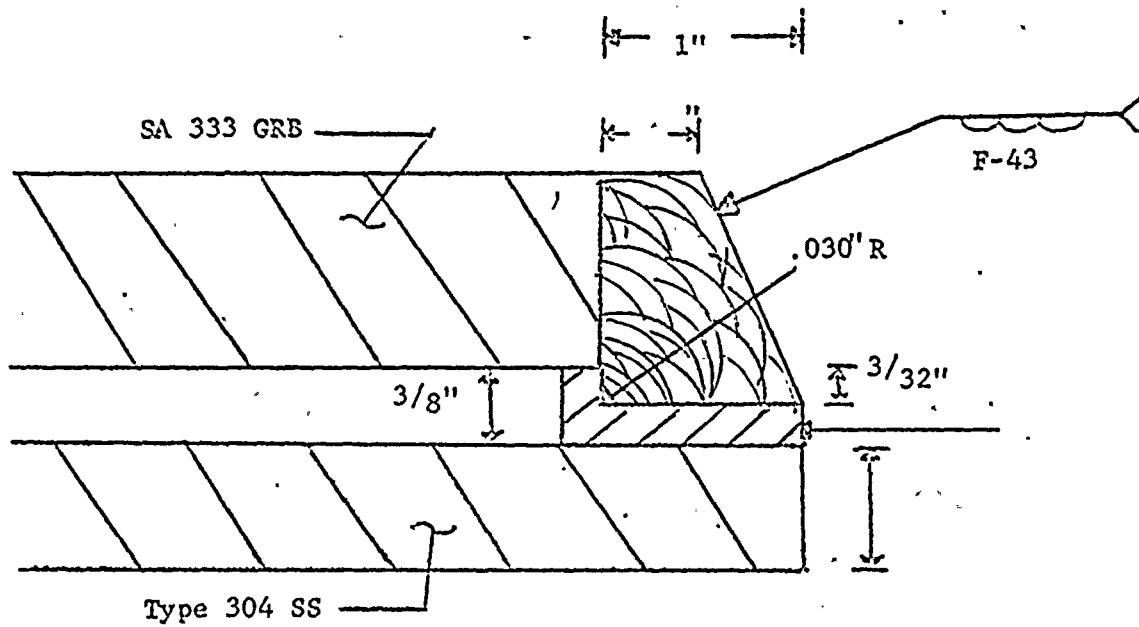
SMAW Weld Buttering of P-3 materials for safe end attachment within the limits of the ASME Code, Section IX and III.

WELDER QUALIFICATION:

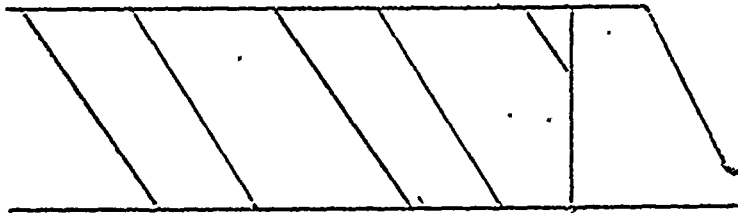
Later



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3/8" min.



PROCEDURE QUALIFICATION

Specification No. ISE-PQ-417

Revision No. 0

Date 4/26/79

Page 4 of 4

WELDING MATERIAL: Stainless Steel PL.

Welded to: Inconel Buttered P-3

ASME Section IX: P# 8 to P# 43

* Butt Weld Thickness: 3/16" Min. 2" Max.

Pipe Outer Diameter: N/A Min. N/A Max.

WELDING PROCESS: GTAW/SAW

Weld Position: Flat (IG) Plate

Weld Direction: N/A

Shielding Gas: Argon Welding Gr.

WELDING MATERIAL: ASME SFA 5.14/5.11

ASME Section IX: F# 43 A#

Type: ERNiCr-3/ENiCrFe-3

Consumable Insert: Yes ERNiCr-3

Backing Strip: N/A

POST TREATMENT:

Preheat Temp: 500° F

Interpass Temp: 350° F

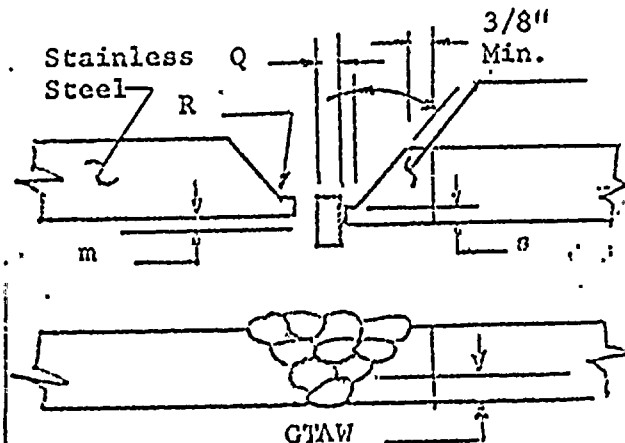
Post-Weld Holding Temp: None

Post-Weld Holding Time: None

Butt Weld Joint: Suggested Coupon

$$c = \frac{+2}{-0} \text{ } \frac{0}{-0} \text{ } \frac{2}{-0} \text{ } s = .045" \pm .010$$

Q = 1/16" Max. R = 3/16" m = 1/32" Max.



ADDITIONAL REQUIREMENTS: General Welding Procedure:

GWP-N

1. PT Final
2. RT Final
3. Destructive Test Per Code

WELDING PROCESS:	GTAW	GTAW	SAW	APPLICABLE PROJECT:
SECTION OF JOINT	Root	Root/Fill	Fill	
Weld Number	Fusion-1	2-3	4-C	Nine Mile Point Unit #1
Current (Amps.)	70-110	70-150	80-110	
Current Type/Polarity	DCSP	DCSP	DCRP	
Shielding Gas (C.F.H.)	15-30	15-30	N/A	
Backing Gas (C.F.H.)	5-10	5-10	N/A	PROCEDURE QUALIFICATION: Contained Herein
Weld Size	4-8	4-8	N/A	
Weld Rod Diameter (in.)	Insert	3/32 1/8	N/A	
Electrode/Wire Diam. (in.)	1/16	3/32	1/8	
Tungsten Elect. Ext. (in.)	1/2 Max.	1/2 Max.	N/A	
Peak Voltage (Volts)	N/A	N/A	N/A	
Background Voltage (Volts)	N/A	N/A	N/A	
Pulse Rate (CPG)	N/A	N/A	N/A	

APPLICATION: Qualification of GTA/SAW Welding of Inconel within the limits of the ASME Code Section IX.

*GTAW 1/16"-1/4"

WELDER QUALIFICATION:

SPECIFICATION GWP-N -SUPP.#1 REV 1
PREPARED BY/DATE _____
APPROVED BY/DATE _____
Page 1 of 2

GWP-N-SUPPLEMENT #1

REV. 1

GWP-N-SUPPLEMENT #1

1.0 SCOPE

- 1.1 This specification defines the special instructions for treating coated electrodes in compliance with ASME Section XI Division I.

2.0 CODES AND STANDARDS

- 2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code.

a. Section III and IX Summer 1978 Addenda

3.0 RESPONSIBILITIES

- 3.1 All covered electrodes shall be baked before use at a temperature of $550\text{ F} \pm 50\text{ F}$ ($288\text{ C} \pm 28\text{ C}$) for 2 hrs. The temperature of the oven shall not exceed 300 F (149 C) when the electrodes are placed in the oven. After baking and before the electrodes are allowed to cool below 225 F (107 C), they shall be transferred to a holding or drying oven operating at a temperature between 225 F and 350 F (107 C to 177 C).
- 3.2 During the repair, the electrodes may be maintained in heated ovens in the repair area. The oven temperature shall be maintained between 225 F and 350 F (107 C and 177 C). Electrodes exposed to the atmosphere for more than 20 min. shall be dried at a temperature between 225 F and 350 F (107 C and 177 C) for at least 8 hrs before re-issued for use. Electrodes exposed to the atmosphere for more than 4 hrs shall be rebaked at $550\text{ F} \pm 50\text{ F}$ ($288\text{ C} \pm 28\text{ C}$) for 2 hrs. Electrodes shall not be rebaked more than once. Welding materials shall be controlled during repair so that they are identified as acceptable material until consumed per ref. Q.C. Manual using the JPCS as a signoff.

4.0 APPLICABILITY

- 4.1 This supplement shall be applicable to the Inconel weld repair of nozzle (steam outlet emergency condenser nozzle No. NSB) at Nine Mile Point No. 1.

POST WELD HEAT TREATMENT PROCEDURE
FOR STEAM ISOLATION CONDENSATE NOZZLE TO SAFE END WELD
WORKSHOP/NOCK UP

DIRECTION

General Electric Nuclear Energy Division
Specification 22A-6904 REV. 1

METHOD

Heat Treatment to be carried out by means of the application of Flexible Ceramic Electric Resistance Heating Elements of varying configurations. Heating elements will be powered from power converter units having a secondary voltage output of either 65 volts or 80 volts. Control of heater circuitry will be by means of thermocouple activated semi-automatic temperature contactor/controller units. Heating elements will be judiciously positioned as to give equal and controlled heat throughout the work area in conformance with the above G.E. Specification. Heating elements will be positioned externally around the safe end, around the shoulder and main body of the forging. Additional heating elements, as required for compliance with specifications, will be positioned into a rolled insert which will be placed within the nozzle bore. All heating element connections will be via quick disconnect male and female conlok connections (60 amp rating).

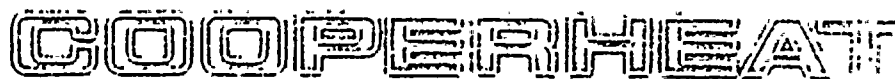
THERMOCOUPLES

Positioned as per G.E. Specification 22A-6904, Figure 2. Further thermocouples will be positioned as required by the Heat Treatment contractor for purposes of heater circuitry control. All thermocouples will be attached by means of a Cooperheat Thermocouple Attachment unit (capacitor discharge method). Thermocouples will be Glass on Glass Insulated, Type K, Chromel Alumel. There will be two (2) thermocouples positioned at each location shown in Figure 2, one of these being used in each case as a spare. Heat Sensing circuitry will be Type K, Chromel Alumel throughout with any cold junctions being by means of polarized bi pin plugs and sockets.

PREHEAT

Heating elements positioned for the carrying out of Pre & Concurrent Heating shall be so positioned to enable the rapid transition from a Preheat condition to a Post Weld Heat Treatment condition, without loss of temperature. Preheat temperature will be maintained as per G.E. Specification 22A-6904 throughout the course of the welding and tempering program.

Upon completion of testing and the clearance of the weld area for PWHT, the additional required heaters and thermocouples will be positioned on the workshop/nock up. All thermocouple to metal surface connections will be insulated from heating element radiation effects by means of Cooperheat Hi Temperature Ceramic Putty.



1421-29 PINWOOD ST., P.O. BOX A.B., RAHWAY, NEW JERSEY 07065
Phone: 201-388-4500 Telex: 138148

Client G.E. Client's O/No. 22A-6904.

Work carried out at SMILE PT. OJUEGO. Work commenced _____

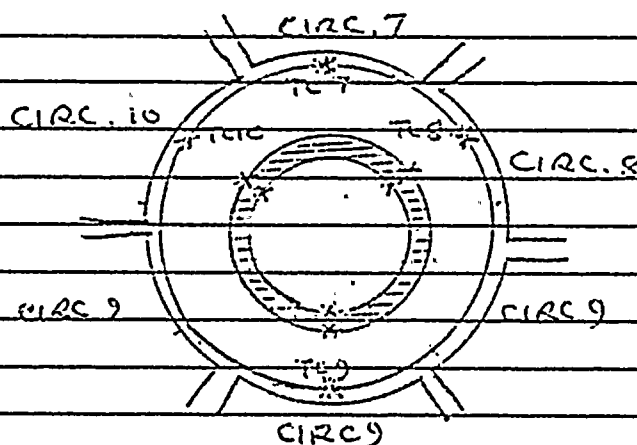
Completed _____ (Indicate also work carried out daily)

RHY 5805

HEATER PLACEMENT.

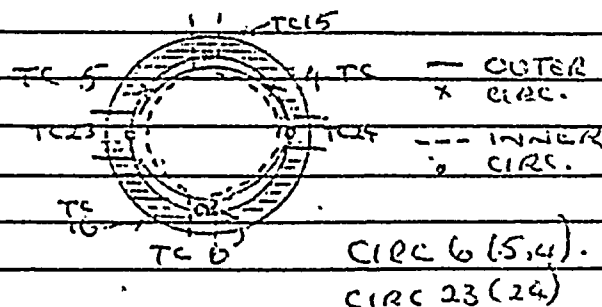
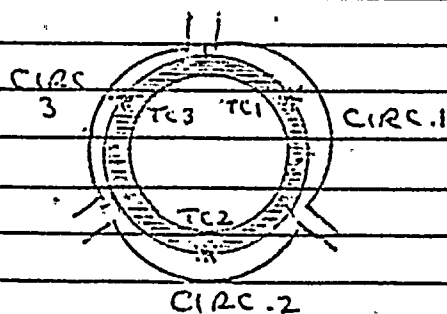
Mock up #2

22A - 6904



OUTER NOZZLE
CIRCUMFERENCE
(750°F).

4 CIRCUITS
(6 FCP 3's)



OUTER NOZZLE (3 CIRC'S, ~3 FCP's - SPEC.) INNER NOZZLE (4 FCP 4's
2 CIRC'S)

Signed H. J. Homan Technician _____ Customer _____

RECORDING EQUIPMENT

Hewlett Class 15 Electronic, Type K, Chromel Altmel, 24 point (channel) indicative with a ten (10) inch view screen. Recorders are of a continuous strip chart showing time v temperature. Full scale scan is of a six (6) minute ratio. Recorder gearing will be set to give a chart ratio speed of two (2) inches per hour. Prior to operations, recording and control equipment will be checked by means of a constant voltage potentiometer. Equipment will be checked in a similar manner prior to commencement of any other heat treatment cycle.

POTENTIOMETER

Constant voltage injection type, unit having been classified within a sixty (60) day period of an outside agency, having calibrating equipment the accuracy of which is traceable to the National Bureau of Standards.

INSULATION

Ceramic fiber six (6) lb. density, one (1) inch thick, having the chemical analysis classifications as attached.

DOCUMENTATION

G.E. Specification 22A-6904

Thermocouple Location Figure 2

Table 1 - G.E. PWT Requirements

Thermocouple Conformance Certificates

Potentiometer Calibration Certificates

On Site Calibration Certificates for - Recorders
Controllers

Visual Logging Sheets to be completed at thirty (30) minute increments during heat treatment operations.

Temperature Recording Charts

Insulation Chemical Analysis

Chart Acceptance Sheets

ROCKFORD TATION

(Continued)

- Step 1 Position all thermocouples (duplicated) as per Figure 2 (when applicable).
- Step 2 Position internal heating elements.
- Step 3 Position external heating elements.
- Step 4 Insulate area with two layers, 1" thick ceramic fiber.
- Step 5 Block nozzle aperture with ceramic fiber insulation.
- Step 6 Connect and verify thermocouple connections.
- Step 7 Connect and verify electrical connections.
- Step 8 Rectify any TC reversals or open circuits.
- Step 9 Notify Plant electricians of readiness for power availability.
- Step 10 Switch on, commence H.T. operations.
- Step 11 Pursue to successful conclusion with visual readings taken at thirty (30) minute increments.
- Step 12 Upon completion and cooling to 100°F, remove all material and equipment.

Any further requirements should be identified and transmitted via Cooperheat Senior Personnel at Site level to:

A. Cochran
Cooperheat, Inc.
Rahway, NJ 07065

(201) 388-4500

NUCLEAR ENERGY DIVISION

dd11 41
CONT ON SHEET 2
Rev-1

DOCUMENT TITLE Preheat and Postweld Heat Treatment Requirements for Steam Outlet
Safe End Replacement

CLASSIFICATION ☐ DRAWING ☐ OTHER _____ TYPE _____

FILE _____

END OR DESCRIPTION OF GROUPS

REF. No. _____

REVISIONS

PRINTS TO

BY

APPROVALS

DEPT

LOCATION

GENERAL ELECTRIC
NUCLEAR ENERGY DIVISION

22A - 6904^e

SN. NO. 2

REV.
REV.

Rev - 1
Rev - 1

1.0 SCOPE

- 1.1 This specification defines the requirements for local preheating and postweld heat treatment of the steam isolation condensing (nozzle N53) nozzle to safe end weld in the Nine Mile Point 1 Plant.

2.0 APPLICABLE DOCUMENTS

- 2.1 General Electric Company Documents. The following documents, of the latest issue or specified issue, shall form a part of this specification to the extent specified herein.

2.1.1 None

- 2.2 Codes and Standards. The following codes and standards of the latest issue or specified issue, form a part of this specification to the extent specified herein.

American
2.2.1 ~~Pressure~~ Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code.

a. Section XI Rules for In-service Inspection

b. Section III, Subsection NB, Nuclear Power Plant Components, Class 1.

1.0 INTRODUCTION

- 3.1 The configuration of the steam outlet isolation condenser nozzle is shown in Figure 1. Proposed safe end replacement procedure is summarized below for information.

3.1.1 Original construction weld has been cut-off, perpendicular to nozzle centerline, leaving approximately 0.312 inch of austenitic (nuber-chrome-iron) weld metal on the nozzle O.D.

nickel
3.1.2 New Nickel-chrome-iron weld butter/buildup will be applied to cut-off face to the minimum thickness specified by the installation specification. A welding preheat of 250°F minimum will be used.

3.1.3 After the required weld butter thickness is deposited the weld butter and adjacent area will be preheated to 250°F minimum.

3.1.4 The completed weld butter will then be machined for attachment of the replacement safe end using standard welding techniques (without preheat or PWHT).

4.0 REQUIREMENTS

4.1 General Requirements

4.1.1 Preheating and postweld heat treatment (PWHT) shall be performed in accordance with the requirements of ASME Section XI, Winter 1978 Addenda, and the requirements of this specification.

4.1.2 Preheating and PWHT shall be performed using written procedures that specify heater type, size and position, thermocouple monitoring locations, heating/cooling/temperature gradient limits and other requirements of this specification.

4.1.3 A preheating and PWHT mockup demonstration test shall be performed in accordance with Paragraph 4.5 of this specification, prior to the application of heat to the vessel nozzle.

4.2 Equipment Requirements

4.2.1 All preheating and PWHT shall be performed using electrical resistance heating methods. The application of oxy-fuel or other heating devices shall not be used.

4.2.2 Power supplies and controllers for resistance heaters shall be connected to the uninterruptable plant circuits to prevent loss of heating due to power outage.

4.2.3 Spare heaters, power supplies, and similar backup equipment shall be available at the job site to minimize the chance of extended, uncontrolled cooldown of the nozzle due to equipment malfunction or failure.

4.3 Thermocouple Monitoring Requirements

4.3.1 Thermocouples shall be positioned at the locations shown in Figure 2, as a minimum, and at other locations if required to properly control heater power/nozzle temperature distributions. In addition, a spare thermocouple lead shall be attached at each location within two inches of the weld. These spares need not be monitored or recorded unless the main thermocouple fails, is

broken loose, ^{or} appears to provide incorrect readings.

4.3.2 Thermocouples shall be Chromel-Alumel, and shall be attached to the nozzle by capacitor discharge spot welding. All thermocouple junctions shall be covered by refractory insulating material.

4.3.3 Temperature Recording. Thermocouple temperatures shall be recorded on a multi-channel chart recorder. In addition, the ~~thermocouple~~ temperature of each thermocouple shall be read and recorded on a temperature log sheet at intervals not to exceed 1/2 hour.

4.3.4 After the PWHT is complete, all thermocouple welds shall be lightly ground flush and liquid penetrant or magnetic particle examined per ASME Section III, NB5300.

4.4 Preheating and PWHT Requirements

4.4.1 Prior to the start of welding the weld zone and adjacent 1 T (T is the nominal thickness of the nozzle at the weld) shall be heated to the preheat temperature specified below. Preheating temperature shall be monitored for one hour prior to the start of welding. Heater sizes, locations, power settings and other procedure details shall be developed by mockup testing as specified in Paragraph 4.5.

a. Preheat temperatures: 250-275°F

b. Maximum heating rate: 100°F/hour
(ambient to preheat)

c. Maximum welding interpass: 350°F

~~c. Temperature~~

d. *Preheat shall be maintained until the start of PWHT.*

4.4.2 Preheating temperature shall be monitored as specified in 4.4.1 during all welding and until the start of the PWHT cycle.

4.4.3 PWHT shall be performed as specified below. Heater sizes, locations, power settings and other procedure details shall be developed by mockup testing as specified in paragraph 4.5.

4.4.4 PWHT requirements are shown on Table 1. The weld zone and

adjacent 1 T of base metal shall be heated to the temperature shown in Table 1, for the holding time specified. Circumferential gradients and heating and cooldown rates shall comply with Table 1 requirements.

- a. Cooldown of the nozzle and weld zone shall be controlled by the application of heater power until the temperature of all thermocouples is below 250°F. The heaters may then be removed, but the nozzle shall be wrapped in insulation and allowed to cool until the maximum temperature at any location is 100°F.

4.4.5 Insulation. Thermal insulation shall be used as required to obtain the required temperature distributions. Where required, thermal insulation shall be placed uniformly around the nozzle circumference and uniformly along the nozzle axial profile. Insulation shall not be placed locally around thermocouples, or intermittently around or along the nozzle to compensate for improper heater position power control, or incorrect thermocouple readings.

4.4.6 Temperature Distribution Requirements Heating procedures shall be developed to meet the temperature distribution requirements of Table 2. These requirements have been developed by finite element analyses methods, and are intended to minimize thermally induced stresses during the PWHT.

Mockup tests shall be performed, prior to the start of heating on the actual nozzle, to determine the heater positionings and power requirements to comply with the requirements specified below. Temperatures shall also be recorded during the actual repair as outlined in paragraph 4.4.3, and shall be submitted to General Electric NEBG for a verification analysis, as specified in paragraph 4.6.

4.5 Mockup Requirements

- 4.5.1 A nozzle-vessel wall mockup shall be used to develop preheating and PWHT procedures. The mockup shall duplicate the actual component geometry to the extent possible, or GE NEBG approved alternate. The minimum length of the vessel wall extending radially outward from the vessel to nozzle weld shall be 8 inches.

5.2.1 Time/temperature log records (recorded at 1/2 hour intervals maximum) for all thermocouples during the preheat, PWH, and cooldown.

5.2.2 Records of any changes in heating procedure, such as heater position or insulation, if changes were made on the actual nozzle.

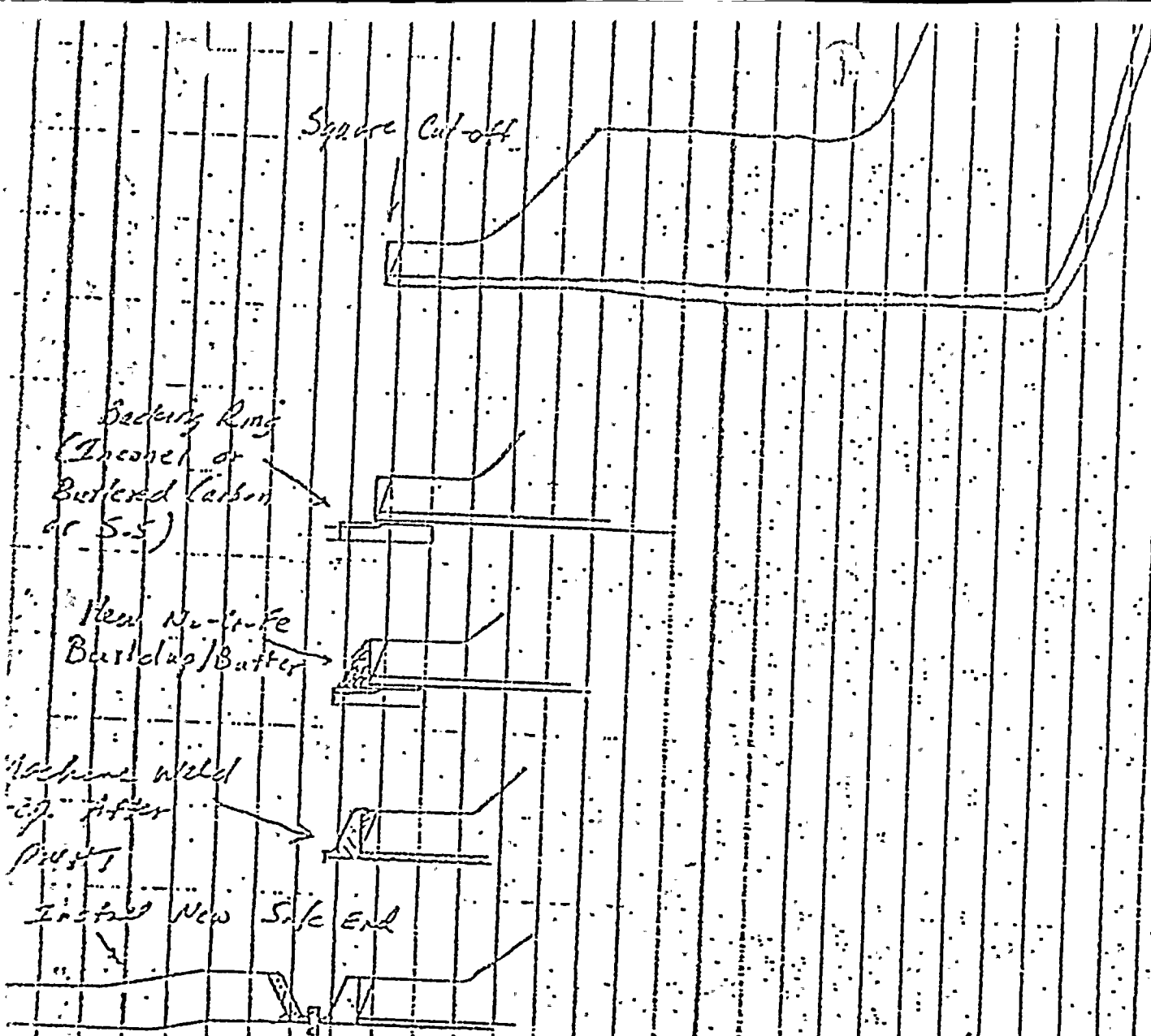


Figure 7. Proposed replacement
weld procedure

Rev 1

4-20-64
 S. H. No. 7
 Rev. 1

TABLE 1

PWHT Requirements

Description	Thermocouple (TC) Numbers (Figure 2)	Required Temperature or Rate	Other
Maximum Heating Rate (preheat to PWHT)	ALL	100°F/hour ^{***}	-
Maximum Circumferential Gradient (heating, hold and cooldown)	ALL	75°F	-
<u>GROUP A*</u>			
PWHT HOLD TEMPERATURE	TC-7, TC-8, TC-9, TC-10, TC-15, TC-16, TC-23, TC-24	750 ± 50°F	-
<u>GROUP B*</u>			
HOLD PWHT Temperature	TC-1, TC-2, TC-3, TC-4, TC-5, TC-6, TC-17, TC-18, TC-21	7125 ± 25°F	-
PWHT Holding Time	-	-	1.2-1.5 hours
Maximum Cooldown Rate (PWHT to 250°F)	ALL	100°F/hour ^{***}	-

THE TEMPERATURE OF ANY GROUP A THERMOCOUPLES SHALL NOT DIFFER FROM THE TEMPERATURE OF ANY GROUP B THERMOCOUPLES BY MORE THAN 500 °F DURING HEATING & COOLDOWN.

HEATING AND COOLDOWN RATES SHALL BE LOWER THAN THE 100°F/H

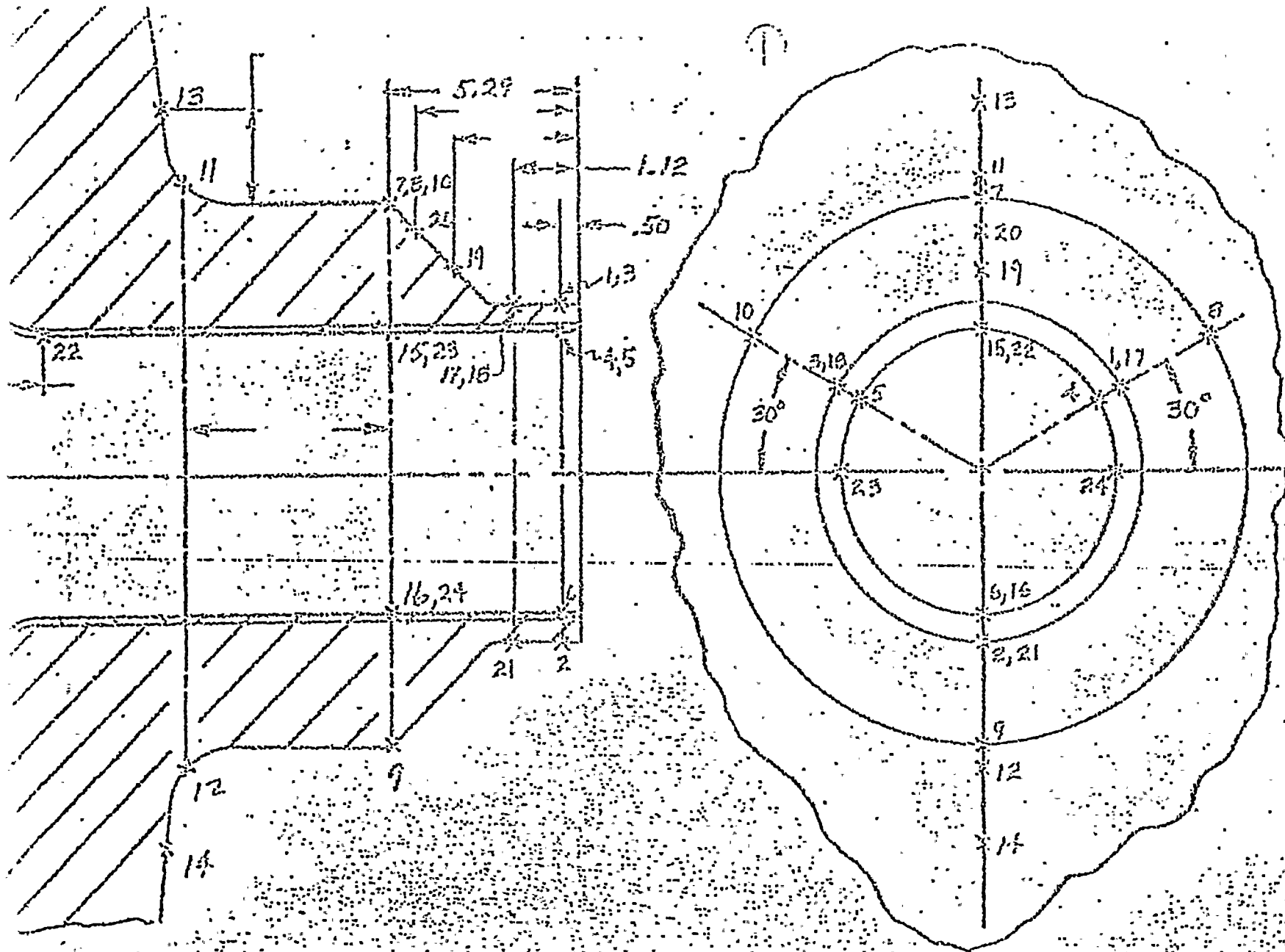


FIGURE 2

