

DAIRYLAND POWER COOPERATIVE

La Crosse, Wisconsin

54601

November 27, 1978

In reply, please
refer to LAC-6012

DOCKET NO. 50-409

Mr. James G. Keppler
Region Director
U. S. Nuclear Regulatory Commission
Directorate of Regulatory Operations
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

SUBJECT: DAIRYLAND POWER COOPERATIVE
LA CROSSE BOILING WATER REACTOR (LACBWR)
PROVISIONAL OPERATING LICENSE NO. DPR-45
IE BULLETIN NO. 78-12 - ATYPICAL WELD MATERIAL
IN REACTOR PRESSURE VESSEL WELDS

REFERENCE: (1) NRC Letter, Keppler to Madgett,
dated September 29, 1978

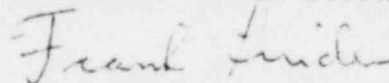
Dear Mr. Keppler:

In response to IE Bulletin No. 78-12 enclosed with Reference (1), we have conducted a record search of all primary reactor pressure vessel weldments and submit the enclosed information. The information enclosed is all that is available on the vessel fabrication.

If there are any questions concerning this response, please contact us.

Very truly yours,

DAIRYLAND POWER COOPERATIVE



Frank Linder, General Manager

FL:HAT:abs

ATTACHMENTS A, B, C, D, E

cc: USNRC
Office of Inspection and Enforcement
Division of Reactor Construction Inspection
Washington, D. C. 20555 (With Attachments)

7812070307 G

NOV 30 1978

ATTACHMENT A

The following information is presented in direct relation to the numbered and lettered system of IE Bulletin No. 78-12.

1. a. The principal manufacturer for the LACBWR reactor vessel was Allis-Chalmers; no others were utilized in weldments.
1. b. c., and d. The following table lists the weld materials used in the vessel construction.

<u>Manufacturer</u>	<u>Lot No. or Heat No.</u>	<u>Size</u>	<u>Form</u>	<u>Type</u>
Linde	R5458	3/16"	150-lb Coils	ACM 1436-Oxweld 40
Linde	S1324T	3/16"	200-lb Coils	ACM 1436-Oxweld 40
Linde	P5480B	3/16"	Rod	ACM 1436-Oxweld 40
Arcos	3C2B	3/16"	Rod	A-316 Cl. E9018-01 Mil 9016A
Arcos	2B19B	1/8"	Rod	A-316 Cl. E9018-01 Mil 9016A
Arcos	4D28B	3/16"	Rod	A-316 Cl. E9018-01 Mil 9016A

The certification papers for each heat or lot number are contained in Attachment B.

2. a. All of the information that is available on weld material tests is contained in Attachment B. We have no documentation that indicates where each lot or batch test sample of weld material was taken; nor have we documentation of test results for any of the flux used in the primary weldments.
2. b. Vessel fabrication welding was done in accordance with Allis-Chalmers Specification 43-101-709 and 43-101-710, which are Automatic Submerged Arc Welding of Manganese-Molybdenum Steel Plates and Forgings for Nuclear Application and Manual Metal Arc Welding of Manganese-Molybdenum Steel Plates and Forgings for Nuclear Application, respectively. Both the procedures and all welders were qualified as evidenced by Attachment C. The original weld procedures were written 10/23/62 and referenced Section IX of ASME Code.

ATTACHMENT A - (Cont'd)

All shell joints and full-penetration attachment welds were subjected to 100% radiographic inspection using a 22-Mev betatron and applying a 2% sensitivity control as determined by penetrometer placement. Radiographic inspection was performed on completion of all base metal welding and repeated after deposition of welded cladding.

There were 171 magnetic particle inspections performed on carbon steel pressure-containing welds during vessel fabrication. Results are documented in Attachment D.

Dye-penetrant inspection was applied to each layer of welded austenitic stainless steel and Inconel cladding. Inconel partial-penetration and pressure-containing welds, which were not amendable to radiography, were dye-penetrant tested on completion of the root pass and every other weld layer until completion of the joint.

All plates designated for pressure-containing components received 100% ultrasonic inspection before the start of fabrication, after forming, and following stress-relieving operations. All forgings received 100% ultrasonic inspection.

2. c. Attachment D, Weld Inspection Reports, documents the weld material by heat or lot number that was used in each weld of the pressure vessel.

3. All weld material purchased meets Allis-Chalmers procurement specifications with the possible exception of heat number 4D28B. The chemical test results indicated a molybdenum content of 0.47%, where the 1961 edition of ASTM specifies the molybdenum content range to be 0.25% to 0.45%. No other out-of-specification value was found. It cannot be found whether or not this out-of-specification value was known to Allis-Chalmers; therefore, no acceptance or rejection determination or other disposition was made for weld material heat number 4D28B.

A portion of one circumferential weld, the weld between the lower head and the center cylinder, was made with this weld material.

No record exists of the effect on fracture toughness of this weld that used the atypical weld material.

ATTACHMENT A - (Cont'd)

Attachment E contains records and disposition of a reheat-treated lower cylinder. The weld (after reheat treating) did not meet the minimum tensile strength requirement and was, therefore, removed and rewelded.

4. Archive material exists for plate NP-1056 only; no weldments or weld materials are available.

ATTACHMENT B

WELD MATERIAL CERTIFICATIONS

ARCOS CORPORATION

1500 South 50th St., Philadelphia 43, Pa.

Technical Department

Date July 22, 1964

CERTIFICATION OF TESTS

Allis Chalmers Mfg. Co.
West Allis Works
Box 512
Milwaukee 1, Wisconsin

Customer's Order No. WA-116124-ED
Arcos S. O. No. C 41909 C
Shipping Date July 23, 1964

Atten: Mr. M. Morath - Main Receiving Dept. 1008

Size 3/16" Grade Ductilend 90
Lot No./Alloy No. 4D285
Lbs./No. Pieces 600#

A-C TEST NO. "NP-1155"

◆ SPECIFICATION ASTM A316-58T
Type 9018D1

TEST RESULTS WELD METAL

Carbon _____
Manganese _____
Sil _____
Su _____
Phosphorus _____
Chromium _____
Nickel _____
Molybdenum _____
Titanium _____
Columbium _____
Tungsten _____
Aluminum _____
Copper _____
Iron _____
Tantalum _____
Cobalt _____
Tin _____
Vanadium _____
Zinc _____
Zir m _____
Ferru _____
X-Ray _____
Clarpys: As Welded Heat Treated

.084
1.38
.40
.009
.016
.07
.01
.17

* Also Military Spec. No. MIL-8816038A
Type MIL-9016A and is marked in
accordance with military specification

.00

As Welded Heat Treated

Tensiles: Yield Tensile Elong. Yield Tensile Elong. Rtd. of Area
As Welded: _____
Heat Treat: _____
Hardness: _____
Bends: _____

We hereby certify that the above material has been tested in accordance with the listed specification and is in conformance with all requirements.

[Handwritten Signature]

ARCOS CORPORATION

[Handwritten Signature]
Technical Department

ALDIS-CHALMERS MANUFACTURING COMPANY
RESEARCH LABORATORIES
MATERIAL TEST REPORT

FORM 1037-4
PRINTED IN U.S.A.

File Code _____

A-C Lab. Code: TT

Part No. _____

Date 6-1-62

Designation of Welding Electrodes

P. O. No. _____

Dimension 3/16 Dia Quantity 2500

Shop Order No. 1-1300-0.1

Mat. or Sect. ASIP AS16 01R 901001 Source Arco Corp.

Heat No. 300

Made On _____ Part-Patt. _____

Dwg. No. _____

PHYSICAL PROPERTIES

Part No.						
Tensile Strength Lbs./Sq. In.						
Yield Str. Lbs./Sq. In.						
Elongation %						
Reduction in Area %						
Impact (Charpy - Izod)						
Hardness ()						

SPECTRO or CHEMICAL ANALYSIS

Bar No. <u>256</u>					Bar No.				
C <u>0.07</u>					Al				
Mn <u>1.61</u>					Cu				
P					Fe				
S <u>0.010</u>					Pb				
Si <u>.74</u>					Ag				
Ni <u>.00</u>					Sn				
Cr <u>0.05</u>					Zn				
Mo <u>.42</u>									

Fe _____ Visual Photo _____ Visual Ph _____
Macro _____ Micro _____

HARDENABILITY RESULTS

Rockwell-Inch	Nor. T. °F.				Quench T. °F.				S-	A-	C-					
Jominy	Mill		A-C		Mill		A-C									
Dist. in 1/16 in.	1	2	3	4	5	6	7	8	10	12	14	16	18	20	24	30
Mill																
A-C																

Grain Size _____ Type Released _____
Paint All Bar Ends _____
Forging Code _____

Sworn to before me this _____ Day of _____

Signed: Ann Collins
My Commission Expires _____ Public State of Wisconsin

Notary Public Milwaukee County, Wisconsin

Recommended for Acceptance or Rejection.
Date 6-1-62 Distribution Group _____
Signature _____

August 20, 1963

Arcos Corporation
P.O. Box 127
Broadview, Illinois

Attention of Mr. P. Provencher

Subject: Purchase Order WA-946742-ED

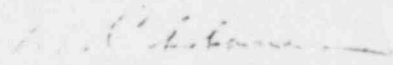
Gentlemen:

Attached is a copy of the above requisition which specified "Item A and B" must be from the same heat of material. The revised certification indicates that the material was furnished in two lot numbers. Please advise whether the material was furnished all of one heat, or in two separate heats or in more than two heats. This information must be obtained in order to comply with our customer's contract requirements.

This is an urgent matter and we must delay using this material until we receive an answer.

Very truly yours,

ALLIS-CHALMERS MFG. COMPANY


Purchasing Agent
Electrical Power Products

HChobanian/md
cc: R. J. Rynders
J. F. Patterson
W. Easton
R. N. Hafemeister

August 21, 1963

Allis Chalmers Mfg. Co.
Box 512
Milwaukee, Wisconsin
Attn: Mr. E. ^{Schmick} ~~Bertolt~~
Purchasing Dept.

WA 946792-ED

[Handwritten signature]
8-27-63

YOUR PURCHASE ORDER NO. WA-94672-ED

We hereby certify that 3/16" Ductilend 90, lot no. 3C2B was made from one heat of wire and 1/8" Ductilend 90, lot no. 2B19B was made from one heat of wire but not from the same heat used for lot no. 3C2B.

[Handwritten signature]
Quality Control Department

[Handwritten signature]
[Handwritten signature]



LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION

80 TWENTY SIXTH STREET PITTSBURGH 22 PENNSYLVANIA

CERTIFICATE OF ANALYSIS

MAY 27, 1963

Allis Chalmers
West Allis Works
Box 512
Milwaukee 1, Wisconsin

Your Order No. <u>WA 946743 I.</u>	Welding wire - <u>OXWELD #40</u>
LINDE Shipper's Order <u>32-000</u>	wire Size <u>3/16"</u>
Quantity Shipped <u>8,832 Lbs.</u>	Package <u>150# Coil</u>
Date Shipped <u>May 22, 1963</u>	Heat or Lot No. <u>R-5458</u>

This is to certify that our records show that the material in the aforementioned shipment conforms to our standard specifications for this grade of OXWELD welding wire and has the following analysis:

Heat No. R-5458

Carbon	.13
Manganese	1.89
Phosphorus	.010
Sulphur	.003
Silicon	.03
Niobium	.52
Aluminum	.006

O. R. Holloway

Control Office - Electric Welding
Linde Company, Div. of Union Carbide Corp.

*lit
KMP
C-1*

ARCOS CORPORATION

1000 PENNSYLVANIA AVENUE
PHILADELPHIA 41, PA.



Research and Engineering Department

Date

CHEMICAL ANALYSIS CERTIFICATE

Allen Chalmers Mfg. Co.
West Allis Works
West Allis, Wisconsin

HIIR

2-3509-00017

LAC BAR

Attent No. 19433

Customer Order No. *11-007716*
Patel 11-11

Arco S. O. No. *C 120072*

Shipping Date *1-23-62*

ARCOS MFG. CO. *401-707*

Size *3/16"*

Grade *VERSILAR 80*

HEAT NO. *P51808*

YOUR MATERIAL SPECIFICATION NO. *ASME-1936*

Weight *1495#*

Chemical Analysis

Carbon *.18*

Manganese *1.92*

Silicon *.040*

Sulfur *.014*

Phosphorus *.019*

orium

Nickel

Molybdenum *.50*

Columbium

Tungsten

7-Holmister

3-16-62

Specimen No. *11-007716*
Material *VERSILAR 80*

ARCOS CORPORATION

[Signature]



LINDE COMPANY

DIVISION OF UNION CARBIDE CORPORATION
P. O. BOX 110, PITTSBURGH, OHIO

Lin

CERTIFICATE OF ANALYSIS

2/28/64

ALLIS-CHALMERS MFG. CO.
WEST ALLIS WORKS
BOX 512
MILWAUKEE 1, WISCONSIN

LACBWR
2-4300-00461

Your Order No. WA-116106-ED
LINDE Shipper's Order 19-841
Quantity Shipped 5216
Date Shipped 2/28/64

welding wire - OXWELD 40
Wire Size 3/16 AEM1436
Package 200 lb coils
Heat or Lot No. 1324 T NP1130

This is to certify that our records show that the material in the
sforementioned shipment conforms to our standard specifications for this grade
of OXWELD welding wire and has the following analysis:

C .14
Mn 1.93
P .010
S .010
Si .04
Mo .52
Al .08

Jim J. Lakerty

Control Office - Electric Welding
Linde Company, Div. of Union Carbide Corp.

ATTACHMENT C

WELDER AND PROCEDURE QUALIFICATIONS

ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

629009

FORM 8497-3
LITHO IN U.S.A.-A.C.

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

WELDER _____ CLOCK NO. _____ STAMP NO. _____ DATE 1-15-63

DESCRIPTION OF BASE MATERIAL _____ SIZE _____ BASE MATERIAL SPEC. A 302 1/4

FILLER METAL SPEC. _____ SIZE _____

DESCRIPTION OF WELD JOINT _____

POSITION OF WELDING _____

PROCEDURE SPEC. OR CODE _____ PERFORMANCE SPEC. OR CODE _____

PREHEAT 11 100 MIN POST HEAT 11 100 - 3117

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB.	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				
1						
2						
3						
4						

GUIDED BEND TESTS

SAMPLE NO.	TYPE OF BEND	RESULTS

*Qualified 9/4/63
J. R. Bester*

SWORN TO BEFORE ME THIS _____ DAY OF _____ 1963

SIGNED _____

MY COMMISSION EXPIRES _____

NOTARY PUBLIC MILWAUKEE COUNTY, WISCONSIN
Notary Public Wisconsin

WITNESSED BY _____

THE UNDERSIGNED CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE _____

SIGNATURE _____

GR 9011

ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

FORM 8497-2
LITHO IN U.S.A. - A-C

WELDER _____ CLOCK NO. _____ STAMP NO. _____ DATE 9-12-63

DESCRIPTION OF BASE MATERIAL _____ SIZE _____ BASE MATERIAL SPEC. 304 S.S. 1/2"

FILLER METAL SPEC. _____ SIZE _____

DESCRIPTION OF WELD JOINT _____

POSITION OF WELDING _____

PROCEDURE SPEC. OR CODE ASME B31.1 PERFORMANCE SPEC. OR CODE _____

PREHEAT 300° POST HEAT 100°-110°

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				
1	1.25	0.125	0.156	14,000	112,000	1 - 15 Outside of weld
2	1.25	0.125	0.156	14,000	112,000	1 - 15 Inside of weld
3	1.25	0.125	0.156	14,000	112,000	1 - 25 In old metal
4	1.25	0.125	0.156	14,000	112,000	1 - 17 Outside of weld

GUIDED BEND TESTS

SAMPLE NO.	TYPE OF BEND	RESULTS	
		(1)	(2)
1	180°	Pass	Pass
2	180°	Pass	Pass
3	180°	Pass	Pass
4	180°	Pass	Pass

Qualified
R. J. [Signature]
9/17/63

Notary Public
SWORN TO BEFORE ME THIS _____ DAY OF _____ 1963

SIGNED Anne Cullen

MY COMMISSION EXPIRES _____
NOTARY PUBLIC MILWAUKEE COUNTY, WISCONSIN

WITNESSED BY _____
My Commission Expires January 25, 1964
Notary Public, State of Wisconsin

THE UNDERSIGNED CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE 9-13-63

SIGNATURE [Signature]

ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

FORM 6427-2
LITHO IN U.S.A.-A-C

WELDER _____ CLOCK NO. _____ STAMP NO. _____ DATE _____

DESCRIPTION OF BASE MATERIAL _____ SIZE _____ BASE MATERIAL SPEC. _____

FILLER METAL SPEC. _____ SIZE _____

DESCRIPTION OF WELD JOINT _____

POSITION OF WELDING _____

PROCEDURE SPEC. OR CODE _____ PERFORMANCE SPEC. OR CODE _____

PREHEAT _____ POST HEAT _____

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB.	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				
1						
2						
3						
4						
5						

V-notch change at +10°
in weld
1-12 2-12 3-12

GUIDED BEND TESTS

V-notch change at +10°
in heat affected zone
1-2 2-2 3-2

SAMPLE NO.	TYPE OF BEND	RESULTS
1	Top	
2	Bottom	
3	Top	
4	Bottom	
5	Top	
6	Bottom	
7	Top	
8	Bottom	
9	Top	
10	Bottom	

*Qualified
R. J. [Signature]
2/14/63*

SWORN TO BEFORE ME THIS _____ DAY OF _____ 1963

SIGNED _____

MY COMMISSION EXPIRES _____ My Commission Expires March 24, 1963
NOTARY PUBLIC MILWAUKEE COUNTY, WISCONSIN

WITNESSED BY _____

THE UNDERSIGNED CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE _____
SIGNATURE _____

ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

GR9015

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

FORM 8497-2
LITHO IN U.S.A.-A.C.

WELDER _____ CLOCK NO. _____ STAMP NO. _____ DATE _____

DESCRIPTION OF BASE MATERIAL _____ SIZE _____ BASE MATERIAL SPEC. _____

FILLER METAL SPEC. _____ SIZE _____

DESCRIPTION OF WELD JOINT _____

POSITION OF WELDING _____

PROCEDURE SPEC. OR CODE _____ PERFORMANCE SPEC. OR CODE _____

PREHEAT _____ POST HEAT _____

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB.	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				

GUIDED BEND TESTS

SAMPLE NO.	TYPE OF BEND	RESULTS

Qualified
R. Holmquist
9/24/63

SWORN TO BEFORE ME THIS _____ DAY OF _____ 1963

SIGNED _____
MY COMMISSION EXPIRES _____
NOTARY PUBLIC MILWAUKEE COUNTY, WISCONSIN

WITNESSED BY _____

THE UNDERSIGNED CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE 9-23-63
SIGNATURE [Signature]

ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

Group 9010

JLMB FORM 5497-1
LITHO IN U.S.A.-A-C

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

Macy, E.
Hull, Ray

WELDER Dessant, J. CLOCK NO. _____ STAMP NO. 347 DATE 10-23-63

DESCRIPTION OF BASE MATERIAL A212 to A336 SIZE 3 BASE MATERIAL SPEC. Code Cand 123

FILLER METAL SPEC. E7018-1 SIZE 3/16" wire dia.

DESCRIPTION OF WELD JOINT 43-101-710

POSITION OF WELDING Flat

PROCEDURE SPEC. OR CODE 43-101-247-02-201 PERFORMANCE SPEC. OR CODE _____
43-101-710 IK 405

200°F Min- 1st Side

PREHEAT 300°F Min-500°F Max and 512 POST HEAT 1150°F - 4 hrs

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				
Bl		.505	.2	TS 15420 MP 11700	62100 58000	11 & 12.5 Outside of weld
Top-2		.505	.2	TS 16000 MP 12300	60000 57800	11 & 13.0 Outside of weld
Top-3		.505	.2	TS 15710 MP 11750	59900 57300	11 & 12.5 Outside of weld
Bot-4		.505	.2	TS 16080 MP 11400	60400 57000	11 & 13.5 Outside of weld

Charpy Tests at +10°F

A-336

GUIDED BEND TESTS

A-212

#1 HAS 25-110-111

#2 HAS 25-110-22

#3 HAS 28-42-53

SAMPLE NO.	TYPE OF BEND	RESULTS
Top-1	Side	No visible defects
Bot-2	Side	No visible defects
Top-3	Side	No visible defects
Bot-4	Side	No visible defects
Top-5	Side	No visible defects
Bot-6	Side	No visible defects
Top-7	Side	No visible defects
Bot-8	Side	No visible defects

*Qualified per change
Solid
(see A. 10/18/63)*

SWORN TO BEFORE ME THIS 30th DAY OF October 1963

SIGNED Ann Cullen

MY COMMISSION EXPIRES _____

NOTARY PUBLIC MILWAUKEE COUNTY, WISCONSIN

WITNESSED BY _____

*My Commission Expires January 25, 1964
Notary Public, State of Wisconsin*

THE UNDERSIGNED CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE 10-3-63
SIGNATURE H. Schubert

PROCEDURE SPECIFICATION
FOR AUTOMATIC SUBMERGED-ARC
WELDING MANGANESE-MOLYBDENUM
STEEL PLATES AND FORGINGS FOR
NUCLEAR APPLICATION

DRAWING NUMBER 43-101-700 MK. 401

1.0 General:

1.1 Scope:

This specification covers the techniques and procedures for the application of submerged arc welding of manganese-molybdenum steel for nuclear application.

1.2 Reference Specifications and Codes:

- 1.2.1 Section VIII, ASME Boiler and Pressure Vessel Code.
- 1.2.2 Section IX, ASME Boiler and Pressure Vessel Code.
- 1.2.3 ASTM A-302 Grade B, Mn-Mo Steel Plate.
- 1.2.4 ASTM A-336, Modified by Code Case 1236 Alloy Steel Forgings.
- 1.2.5 43-101-710 Procedure Specification for Manual Welding of Mn-Mo Steel.
- 1.2.6 ASTM A-316, Low Alloy Steel Arc Welding Electrodes.
- 1.2.7 ACM-1436, A-C Welding Wire Specification.
- 1.2.8 43-101-766, Procedure Specification for Magnetic Particle Inspection by the Dry Powder Method.
- 1.2.9 43-101-764, Procedure Specification for Radiographic Inspection.
- 1.2.10 ACP 2-110, General Precautions for Welding.

1.3 Precautions for Welding shall be in accordance with Reference 1.2.10.

2.0 Welding Process:

2.1 Automatic submerged-arc machine welding shall be used.

3.0 Procedure and Performance Qualifications:

3.1 Qualification of welding procedure and welder performance shall be in accordance with reference 1.2.1 and 1.2.2.

3.2 In addition to the requirements of 3.1 above, the weld metal and heat affected zone shall be impact-tested using the standard V-notch type specimen in accordance with Paragraph UG-84 of reference 1.2.1.

* REVISION ISSUE 10

FOR MARK NUMBER SEE TABLE
ON SHEET NUMBER 1

01 10-23-62 REVISED	02 11-19-62 REVISED	03 12-19-62 REVISED	04 1-10-63 JFP COMPLETE REVISION	05 2-7-63 REVISED	06 4-25-63 REVISED	07 5-20-63 REVISED	08 7-1-63 REVISED	09 7-26-63 REVISED	10 8-24-64 REVISED	PROC. SPEC. FOR AUTO. SUB-ARC WELD. MANGANESE-MOLY. STEEL PLATES AND FORGINGS FOR NUCLEAR APPLICATION SIMILAR TO SHEET 1 OF 3 43-101-700
DRN JFP 2-11-62 CH'D			APP'D JFP 10-23-62			SCALE = 12				ISSUED
Confidential—Property of ALLIS-CHALMERS MFG. CO. DEPT. 3043										1

- 3.2.1 The average Charpy impact value shall be tested at +10°F.
- 3.2.2 No specimen shall break at an average level less than 20 ft.-lb.
- 3.2.3 The average Charpy impact value shall not be less than 20 ft.-lb.
- 3.2.4 For dissimilar weld qualifications, P-1 Group base metals shall have a min. impact value of 10 ft.-lbs. and an average of 15 ft.-lb.

3.3 Testin:

- 3.3.1 The non-exposed area shall have no more than three cracks or other open defects visible on the convex surface of the specimen. The maximum dimension of any crack or other open defect shall not exceed 1/8 inch, except that larger cracks occurring on the convex of the specimen during testing are acceptable if the organization shows that these cracks do not result from weld defects.

4.0 Materials:

- 4.1 Base metal to be welded will be noted on the applicable engineering drawing and shall conform in all respects to the requirements of references 1.2.3 and 1.2.4.
- 4.2 Filler metal shall be as follows:
 - 4.2.1 A5M-M30, Manganese-Molybdenum filler wire, Grade "01-1" 40 (or equivalent) wire with Grade 80 (standard size 20 or 30) weld "Uniweld" (or equivalent) composition.
 - 4.2.2 ASTM-A315, Class E-7010-01, electrodes for low alloy steel base plate manual welding and tapping.
 - 4.2.3 ASTM-A316, Class E-7010-A1 electrodes for joining low alloy steel to carbon steel.

5.0 Preparation of Base Metal:

- 5.1 Oxygen or arc-cutting may be used provided that not less than 1/8 inch of stock be removed by machining or grinding from the flame cut edge from such cutting.
- 5.2 For a distance of at least two inches on both sides of the weld groove, the surfaces shall be cleaned to remove all oxide, scale, paint or other impurities. The surfaces to be welded shall be free of oil, grease, cutting fluid, suspended particles and other impurities.

6.0 Approval for Fabrication:

				PROC. SPEC. FOR AUTO. SUBMERGED-ARC WELDING MANGANESE-MOLYBDENUM STEEL PLATES AND FITTINGS FOR NUCLEAR APPLICATION SIMILAR TO AS-101-701			
DR'N	CH'D	APP'D	SCALE	= 12	SHEET	OF	1583
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- 6.1 Jigs, fixtures, and clamps shall be employed to the maximum extent possible in an effort to maintain alignment of the parts to fit the specified groove dimensions.
- 6.2 Tack welds shall be made by welders qualified to this specification and held to a minimum consistent with good fabrication practice and shall be completely removed in advance of joint welding. Tack welds shall be deposited with electrodes conforming to the metal being welded in accordance with this specification. Tack welding on the cladding side of clad plate is not permitted.
- 6.3 Temporary braces shall not under any circumstances be welded to the cladding side of clad plate. Only stainless steel shall be permitted to contact stainless steel surfaces.
- 6.4 Unless otherwise stated on the applicable drawing, the maximum permissible offset of abutting edges of plates after welding shall be no greater than 1/8 inch on longitudinal seams and 1/8 inch on circumferential seams. Consideration should also be given to matching clad surfaces as accurately as possible.

7.0 Position of Welding:

The welding shall be done in the flat position only.

8.0 Preheating (For Material 1 inch thick and greater):

- 8.1 Prior to any welding an area including 6 inches on both sides of the groove shall be uniformly and slowly preheated to the temperature ranges as indicated on the applicable figure for the respective mark number.
- 8.2 The interpass temperature shall be 500°F maximum.

9.0 Welding Procedures:

- 9.1 Welding parameters shall be as shown on the detailed welding procedure.
- 9.2 Undercutting of a groove face on the base metal at the edge of a weld bead shall be held to a minimum. Undercutting in excess of 1/32 inch at the edge of a weld shall be corrected with a cover pass of weld metal. Continuous undercutting in no case shall be acceptable.

PROC. SPEC. FOR AUTO.
SUBMERGED-ARC WELDING
MANGANESE-MOLYBDENUM STEEL
PLATES AND FORGINGS FOR
SIMILAR TO NUCLEAR APPLIC.

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9.3 The depth of the weld deposit shall be built up uniformly over the entire length of the groove except where skip or block welding is used to control distortion.

9.4 Peening shall not used.

9.5 On full penetration welds when the first side of the Mn-Mo steel weld is complete, the reverse side shall be prepared by grinding or chipping so as to secure sound metal.

* 9.6 Weld metal of the same analysis, and heat number in the case of axial joint welds, shall be deposited on the reverse side of the full penetration weld to fill the groove after which the weld shall be ground flush with the inner contour of the manganese-molybdenum base material.

10.0 Inspection:

10.1 Visual Examination:

10.1.1 Visual inspection shall be 100% and shall be performed only by approved inspectors properly instructed in these techniques and familiar with the applicable specification.

10.1.2 Any visible slag, weld spatter or discontinuity, shall be removed by grinding with aluminum oxide wheels. Care must be taken that no material is ground over the discontinuity. The ground surface shall be suitable for fluid penetrant examination inspection methods.

10.2 Magnetic particle inspection:

The surfaces of the welding layers and the adjacent base metal shall be suitably prepared and examined in accordance with the requirements of Reference 1.2.8 at the following stages of welding or machining of the weldment:

- 10.2.1 After completion of the first weld layer.
- 10.2.2 After completion of 1/2 of the weld.
- 10.2.3 After back gouging on full penetration welds.
- 10.2.4 On completion of the last weld layer.
- 10.2.5 In the final surface and final stress relieved condition.

10.3 Radiographic Inspection:

10.3.1 Radiographic inspection after stress relief shall be the final step prior to acceptance of pressure containing welds and other welds if so specified on the Engineering Drawing.

10.3.2 Radiographic inspection shall be accomplished in accordance with Reference 1.2.8.

PROC. SPEC. FOR AUTO.
SUBMERGED-ARC WELDING
MANGANESE-MOLYBDENUM STEEL
FLATES AND FORGINGS FOR
NUCLEAR APPLICATION
SIMILAR TO

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10.3.3 All radiographs shall be subject to the examination and approval of the Allis-Chalmers Nuclear Power Department.

11.0 Post Weld Heat Treatment:

- 11.1 General requirements concerning heating and cooling rates, furnace conditions, etc. shall be in conformance to Reference 1.2.1.
- 11.2 After welding material of thickness 1 inch and heavier, maintain preheat until stress relief is initiated.
- 11.3 Intermediate stress relief is any stress relief other than final stress relief and shall be accomplished at 1100°- 1175°F for a minimum of 1/2 hour, furnace cooled to 500°F then air cooled.
- 11.4 Unless otherwise specified on the applicable engineering drawing, individual vessel components or assemblies which are fabricated by welding, shall be final stress relieved at 1100°- 1175°F for one hour per inch of maximum thickness, furnace cooled to 500°F, then air cooled.

12.0 Welder Identification:

- 12.1 When required, each weld shall be identified by stamping the welding operators identification on a steel band adjacent to his weld. No stamping on any metal surface of any component will be allowed.
- 12.2 Each welder shall be assigned a number for purposes of identifying welds made by him. A permanent record shall be made of the welders employed on each joint; and where more than one welder is employed. The record shall indicate the portion welded by each welder.

13.0 Reports:

Reports shall be made of all tests and inspections, etc. and three copies shall be sent to the Nuclear Power Department of the Allis-Chalmers Manufacturing Company. These are to include:

				PROC. SPEC. FOR AUTO. SUBMERGED-ARC WELDING MANGANESE-MOLYBDENUM STEEL PLATES AND FORGINGS FOR NUCLEAR APPLICATION				
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- 13.1 Welding Procedure Qualification Tests.
- 13.2 Welder Performance Qualification Tests.
- 13.3 Magnetic Particle Inspections.
- 13.4 Radiographic Inspections.

NOTE: ANY DEVIATION OR EXCEPTION TO ANY PORTION OF THIS SPECIFICATION MUST BE REFERRED TO THE NUCLEAR POWER DEPARTMENT FOR APPROVAL.

TABLE

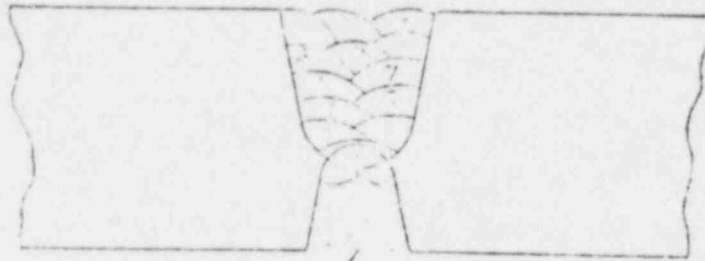
MARK NUMBER	JOINING	TO	SEQUENCE AND TECHNIQUE PER
401	ASTM-A302 GR. B (ASME P3)	ASTM-A302 GR. B (ASME P3)	Figure I
402	ASTM-A302 GR. B (ASME P3)	ASTM-A336 Modified per code Case 1236-1	Figure I
403	(ASME P1 Group)	ASTM-A336 Modified per code Case 1236-1	Figure I
404	ASTM-A302 GR. B (ASME P3)	ASTM-A302 B (ASME P3)	Figure IA
405	ASTM-A302 GR. E (ASME P3)	ASTM-A336 Modified per Code Case 1236-1	Figure IA
406	(ASME P1 Group)	ASTM-A336 Modified per Code Case 1236-1	Figure IA

PROC. SPEC. FOR AUTO.
SUBMERGED-ARC WELDING
MANGANESE-MOLYBDENUM
STEEL PLATES FOR FORGING
FOR NUCLEAR APPLICATION
SIMILAR TO

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FIGURE 1 (Mark 401, 402 and 403)

Detail Welding Procedure



Step #1 Preheat: 300°F to 500°F and maintain into Stress Relief.

Step #2	Pass Number	Process	Filler Wire	Welding Conditions
	1, 2 & 3	Manual	3/16 Dia. E-9018-D1	190-260 Amps.
		Metal-Arc	(E-7018-A1 for Mark 406 Only)	25-26 Volts

Step #3	Pass No.	Process	Filler Wire	Welding Conditions
	4, 5 & 6	Automatic	3/16 Dia.	600-610 Amps. AC
	Etc. as needed to Complete Weld	Submerged Arc	AGM 1436	36-38 Volts 12-14 IPM

Step #4 Backchip through pass no. 1, grind to sound metal and magnetic particle inspect ground out area.

Step #5 Complete weld per Step #3.

Grind weld flush with Inner and Outer contour of component.

- NOTES:
1. Welding shall be done with dry electrodes filler wire, and fluxes.
 2. Interbeed cleaning shall be done with suitable grinding wheels, slagging picks and pneumatic hammers.
 3. Magnetic particle inspection shall be used after the completion of the root pass, after completion of 1/2 of the weld and after completion of the final layer of weld metal.
 4. Defects shall be removed and repaired in accordance with the requirements of this specification.

PROC. SPEC. FOR AUTO.
SUBMERGED-ARC WELDING
MANGANESE-MOLYBDENUM STEEL
PLATES AND FORGINGS FOR
NUCLEAR APPLICATION

SIMILAR TO

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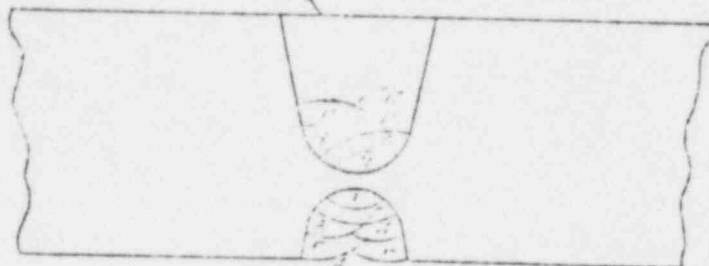
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FIGURE 1A (Mark 404, 405 and 406)

Detail Welding Procedure

Second Side: Backchip and grind, Preheat: 300°F to 500°F and maintain into stress relief.



First Side: Preheat: 200°F to 300°F and maintain until temperature is raised for welding second side.

First Side:	Pass Number	Process	Filler Wire	Welding Conditions
	1-2-3-4-5-6	Manual Metal-Arc	3/16 Dia. E-9018-D1 (E-7018-A1 for Mark 403 Only)	190-260 Amps. 25-26 Volts

Second Side: Backchip and grind to sound metal and magnetic particle inspect ground out area.

Pass Number	Process	Filler Wire	Welding Conditions
7-8-9-10-11-12 Etc. as needed to Complete Weld	Automatic Submerged Arc	3/16" Dia. ACM-1436	600-610 Amps. AC 36-38 Volts 12-14 IPM

Grind weld flush with Inner and Outer contour of component.

- NOTES:
1. Welding shall be done with dry electrodes and fluxes.
 2. Interboard cleaning shall be done with suitable grinding wheels, slagging picks and pneumatic hammers.
 3. Magnetic particle inspection shall be used after the completion of the root pass, after completion of 1/2 of the weld and after completion of the final layer of weld metal.
 4. Defects shall be removed and repaired in accordance with the requirements of this specification.

PROC. SPEC. FOR AUTO.
SUBMERGED-ARC WELDING
MANGANESE-MOLYBDENUM STEEL
PLATES AND FORGINGS FOR
NUCLEAR APPLICATION

SIMILAR TO

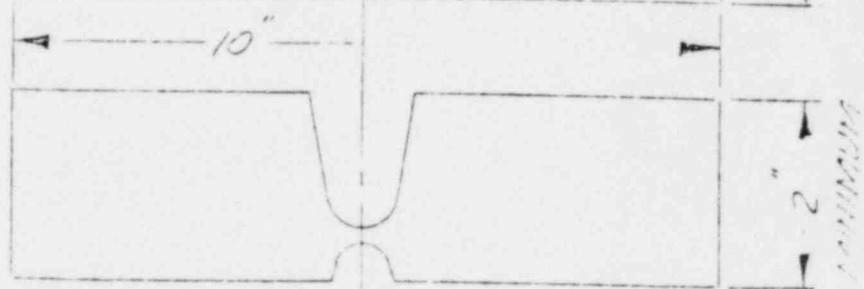
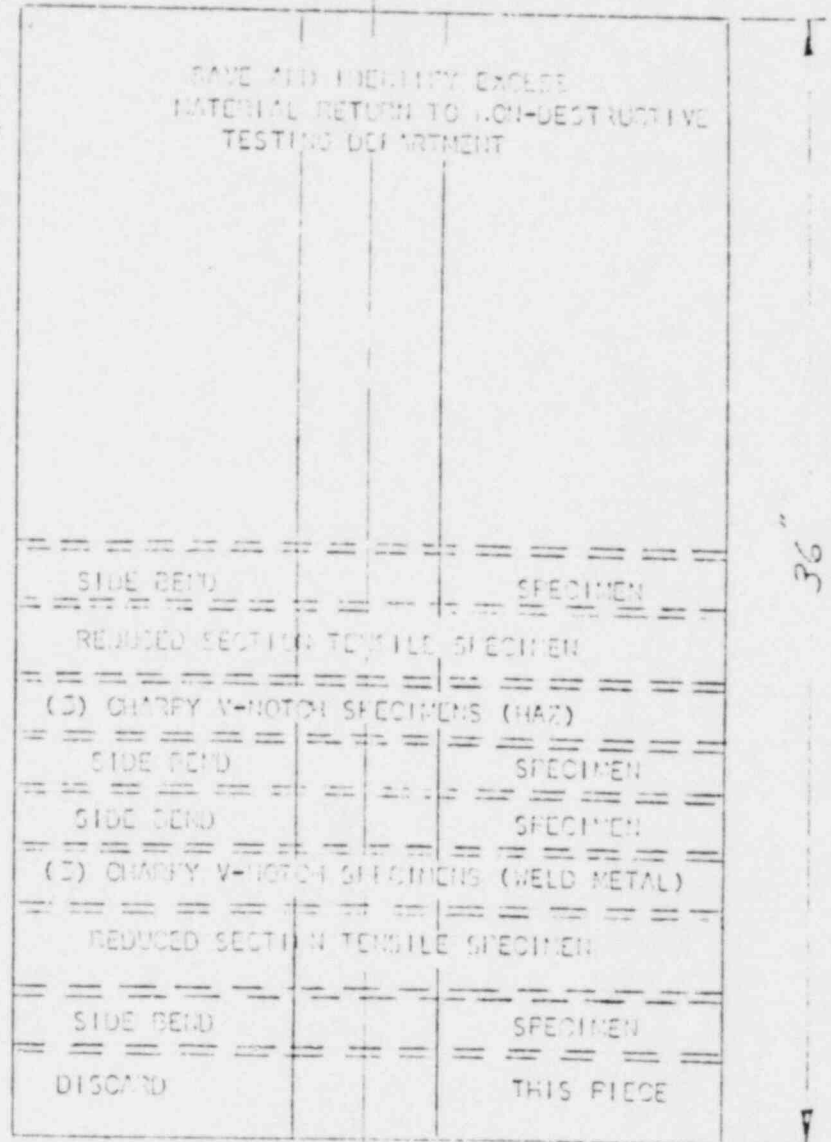
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ORDER OF REMOVAL OF TEST SPECIMENS FROM WELDED TEST PLATES

FIGURE 2

NOTE: A MINIMUM OF TWO (2) SETS OF THREE (3) CHARPY IMPACT SPECIMENS SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION IV.C OF THIS SPECIFICATION AND MEET A MINIMUM AVERAGE OF 30 FT.-LBS. AT +10 F. (P-I Group Base Mat'l. to meet a minimum average of 15 Ft.-Lb. at +10 F.)

SAVE AND IDENTIFY EXCESS MATERIAL RETURN TO NON-DESTRUCTIVE TESTING DEPARTMENT



PROC. SPEC. FOR AUTO. SUBMERGED-ARC WELDING MANGANESE-MOLYBDENUM STEEL PLATES AND FORGINGS FOR NUCLEAR APPLICATIONS SIMILAR TO

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PROCEDURE SPECIFICATION FOR MANUAL
METAL-ARC WELDING OF MANGANESE
POLYMERIZED STEEL

DRAWING NUMBER 43-101-710

1.0 General:

1.1 Scope:

This specification applies to the manual metal arc welding of manganese polymerized steel for nuclear application.

1.2 Reference Specifications and Codes:

- 1.2.1 Section VIII, ASME Boiler and Pressure Vessel Code.
- 1.2.2 Section IX, ASME Boiler and Pressure Vessel Code.
- 1.2.3 ASTM A302 Grade B, Mn-Mo Steel Plate.
- 1.2.4 ASTM A336 - Modified by Code Case 1236-1, Alloy Steel Forging.
- 1.2.5 ASTM A316, Low Alloy Steel Arc Welding Electrodes.
- 1.2.6 43-101-766, Procedure Specification for Magnetic Particle Inspection by the Dry Powder Method.
- 1.2.7 43-101-764, Procedure Specification for Radiographic Inspection.
- 1.2.8 ACP 2-110, General Precautions for Welding.

1.3 Precautions for Welding shall be in accordance with Reference 1.2.8.

2.0 Welding Process:

Welding shall be done using the manual metal-arc process with coated electrodes.

3.0 Procedure and Performance Qualifications:

3.1 Qualification of Welding procedure and welder performance shall be in accordance with Reference 1.2.1 and 1.2.2 of this specification.

3.2 In addition to the requirements of 3.1 above, the weld metal and heat affected zone shall be impact-tested using the standard V-notch type specimen in accordance with the requirements of Paragraph UG-84 of reference 1.2.1.

- 3.2.1 The Charpy impact specimens shall be tested at +10°F.
- 3.2.2 No specimen shall break at an energy level less than 20 ft. lbs.
- 3.2.3 The average Charpy impact value shall not be less than 30 ft. lbs.

FOR MARK NUMBER SEE
TITLE OF SHEET NUMBER

01 10-23-62	REVISED	02 11-19-62	JFP	03 12-19-62	JFP	04 1-10-63	JFP	05 3-12-63	JFP	06 4-25-63	JFP	07 4-30-63	JFP	08 5-10-63	JFP	09 6-17-63	JFP	10 7-31-64	JFP	
DRN JFP 9-14-62										CH'D	APP'D JFP 10-23-62					SCALE	1:1	SIMILAR TO		
Confidential—Property of ALLIS-CHALMERS MFG. CO.										DEPT. 3043					SHEET 1 OF 7			13-101-710		

PROC. SPEC. FOR MANUAL
METAL-ARC WELDING OF
MANGANESE-POLYMERIZED
STEEL

3.3.1 For dissimilar weld qualifications, H1 group base metal and weld metal shall have a minimum impact value of 10 ft.-lb. and an average of 15 ft.-lb.

3.4 Penetration

3.4.1 Test Specimens:

The test specimens shall have no more than three cracks or other defects visible on the convex surface of the specimen. The maximum diameter of any crack or other defect shall not exceed 1/16 inch, and all such defects shall be oriented parallel to the longitudinal axis of the specimen. The maximum length of any crack shall not exceed 1/4 inch.

4.0 Materials

4.1 Base metal to be welded shall be listed in the schedule of materials and shall conform to the requirements of references 1.2.3 and 1.7.1.

4.2 Filler Metals shall be as follows:

4.2.1 ASTM-A310, Class E 7018-D1 Electrodes, for low alloy steel base plate manual welding and tacking.

4.2.2 ASTM-A310, Class E 7018-A1 electrodes for joining low alloy steel to carbon steel.

5.0 Preparation of Surfaces:

5.1 For all surfaces to be welded, at least 1/8 inch on each side of the weld groove the surfaces shall be cleaned to remove all oxide, scale, paint or other impurities. The surfaces to be welded shall be free of oil, grease, cutting fluid, embedded particles and other impurities.

5.2 Oxygen or arc-cutting may be used provided that no less than 1/4 inch of stock be removed by machining or grinding from the flame cut edge after such cutting.

6.0 Assembly for Welding:

6.1 Jigs, fixtures and clamps shall be employed to the maximum extent possible in an effort to maintain alignment of the parts to fit the specified groove dimensions.

6.2 Tack welds shall be made by welders qualified to this specification and held to a minimum consistent with good fabrication practice and shall be displaced removed in advance of joint welding. Tack welds shall be displaced with care when considering the metal being welded in order to avoid cracking in dissimilar alloys. Tack welding on the cladding side of clad plate is not permitted.

PROC. SPEC. FOR
MANUAL METAL-ARC WELDING
OF MANGANESE-NICKEL
STEEL

SIMILAR TO

SHEET 7 OF 7

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5.3 Temporary braces shall not, under any circumstances, be welded to the cladding side of clad plate. Only stainless steel shall be permitted to contact stainless steel surfaces.

6.4 Unless otherwise stated on the applicable drawing, the maximum permissible offset of abutting edges of plates after welding shall be no greater than 1/8 inch on longitudinal seams and 1/8 inch on circumferential seams. Consideration should also be given to matching clad surfaces as accurately as possible.

7.0 Position of Welding:

7.1 The welding shall be done in the flat position wherever possible. Welding in other positions is permissible when the procedures and welders have been properly qualified.

8.0 Preheating (For Material 1 inch thick and greater):

8.1 Prior to any welding - an area including 6 inches on both sides of the groove shall be uniformly and slowly preheated as follows:

8.1.1 Inside - 300°F to 300°F, preheat temperature, maintain into stress relief or until increased to 300°F - 500°F to weld outside.

8.1.2 Outside - 300°F to 500°F preheat temperature, Maintain into stress relief.

8.2 The interpass temperature shall be 500°F maximum.

9.0 Welding Procedure:

9.1 Welding Parameters shall be as shown on detailed welding procedure (Figure 1).

9.2 Weld metal shall be deposited by a stringer bead or by weaving technique. The width of a weld pass of metal deposited by weaving shall not exceed 2-1/2 times the diameter of the electrodes.

9.3 Undercutting of a groove face or the base metal at the edge of a weld bead shall be held to a minimum. Undercutting in excess of 1/32 inch at the edge of a weld shall be corrected with a cover pass of weld metal. Continuous undercutting in no case shall be acceptable.

9.4 The depth of the weld deposit shall be built-up uniformly over the entire length of the groove except where skip or block welding is used to control distortion.

9.5 Flaming shall not be used unless specific prior approval

is obtained from the Nuclear Power Dept.

PROC. SPEC. FOR MANUAL METAL-ARC WELDING OF MANGANESE-MOLYBDENUM STEEL

SIMILAR TO

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- 9.6 On full penetration welds when the first side of the Manganese-Molybdenum steel weld is complete, the reverse side shall be prepared by grinding or chipping so as to centre round metal.
- 9.7 Weld metal of the same analysis shall be deposited on the reverse side of the full penetration joint to fill the groove; after which the weld shall be ground flush with the inner contour of the Manganese-Molybdenum base material.

10.0 Inspection:

10.1 Visual Examination:

- 10.1.1 Visual inspection shall be 100% and shall be performed only by approved inspectors properly instructed in these technique and familiar with the applicable specifications.
- 10.1.2 Any visible slag, weld spatter or discontinuity, shall be removed by grinding with aluminum oxide wheels. Care must be taken that no material is ground over the discontinuity. The ground surface shall be suitable for fluid penetrant.

10.2 Magnetic Particle Inspection:

The surfaces of the welding layers and adjacent base metal shall be suitably prepared and examined in accordance with the requirements of Reference 1.2.6 at the following stages of welding or machining of the weldment:

- 10.2.1 After completion of the first weld layer.
- 10.2.2 After completion of 1/2 of the weld.
- 10.2.3 After back gouging on full penetration joints.
- 10.2.4 On completion of the last weld layer.
- 10.2.5 In the final surface and final stress relieved condition.

10.3 Radiographic Inspection:

- 10.3.1 Radiographic inspection after stress relieving shall be the final step prior to acceptance of pressure containing welds and other weld if so specified on the Engineering Drawing.
- 10.3.2 Radiographic inspection shall be accomplished in accordance with Reference 1.2.7.
- 10.3.3 All radiographs shall be subject to the examination and approval of the Allis-Chalmers Nuclear Power Department.

PROC. SPEC. FOR MANUAL METAL-ARC WELDING OF MANGANESE-MOLYBDENUM STEEL

SIMILAR TO

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11.0 Post Weld Heat Treatment:

- 11.1 General requirements concerning heating and cooling rates, furnace conditions, etc. shall be in conformance to reference 1.2.1.
- 11.2 After welding material of thickness 1 inch and heavier, maintain preheat until stress relief is initiated.
- 11.3 Intermediate stress relief is any stress relief other than final stress relief and shall be accomplished at 1100°- 1175°F for a minimum of 1/2 hour, furnace cooled to 500°F, then air cooled.
- 11.4 Unless otherwise specified on the applicable engineering drawing individual vessel components or assemblies which are fabricated by welding, shall be final stress relieved at 1100°- 1175°F for one hour per inch of maximum thickness, furnace cooled to 500°F, then air cooled.
- 11.5 Components which have a total maximum weld joint thickness of over 4-1/2 inches shall be subject to an intermediate stress relief (1100-1175°F for one half hour, furnace cooled to 500°F, then air cooled) after approximately half the total thickness of the joint groove is welded.

12.0 Welder Identification:

- 12.1 When required, each weld shall be identified by stamping the welding operator's identification on a steel bend adjacent to his weld. No stamping on any metal surface of any component will be allowed.
- 12.2 Each welder shall be assigned a number for purposes of identifying welds made by him. A permanent record shall be made of the welders employed on each joint; and where more than one welder is employed, the record shall indicate the portion welded by each welder.

13.0 Reports:

Reports shall be made of all tests and inspections, etc., and three copies shall be sent to the Nuclear Power Department of the Allis-Chalmers Manufacturing Company. These are to include:

- 13.1 Welding Procedure Qualification Tests.
- 13.2 Welder Performance Qualification Tests.
- 13.3 Magnetic particle inspections.
- 13.4 Radiographic Inspections.

NOTE: ANY DEVIATION OR EXCEPTION TO ANY PORTION OF THIS SPECIFICATION MUST BE REFERRED TO THE NUCLEAR POWER DEPARTMENT FOR APPROVAL.

PROC. SPEC. FOR MANUAL METAL-ARC WELDING OF MANGANESE-MOLYBDENUM STEEL

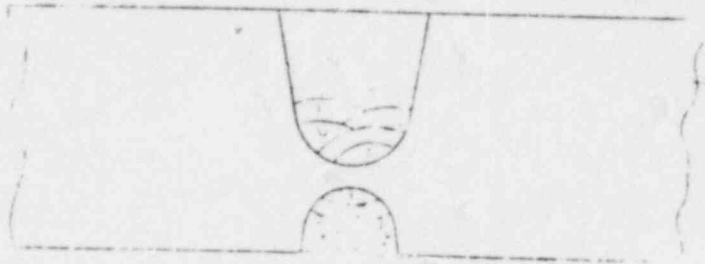
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Confidential—Property of ALLIS-CHALMERS MFG. CO. DEPT. 3043					AD-101-710	11

DUCT JOINT WELDING PRACTICES AND TECHNIQUES

FIGURE 1

FIGURE 1. Welding of 200 F + 300 F and related materials using the procedure.



1. Materials: 200 F + 300 F and related materials using the procedure.

Welding: Electrode: E 7018-01 Filler wire: 3/16" dia. E 7018-01
Shielding gas: Argon
Welding process: Gas metal arc welding (GMAW) (MIG)

2. Welding: In this case, pipe is prepared and welded in the same manner as above.

Welding: Electrode: E 7018-01 Filler wire: 3/16" dia. E 7018-01
Shielding gas: Argon
Welding process: Gas metal arc welding (GMAW) (MIG)

3. Welding: In this case, pipe is prepared and welded in the same manner as above.
1. The pipe shall be prepared with the following:
 2. The inner and outer surface shall be free from scale, dirt, oil, and other contaminants.
 3. The nozzle shall be inspected and used after completion of every weld; clean the nozzle at the end of each weld and after each change of electrode.
 4. The nozzle shall be replaced and repaired in accordance with the manufacturer's instructions.

TABLE

WELDING	J. 111111	J. 111111
1	ASTM A307 GR. B (10" E PD)	ASTM A307 GR. B (10" E PD)
2	ASTM A307 GR. B (10" E PD)	ASTM A307 GR. B (10" E PD)
3	(SAME AS 10" E PD)	(SAME AS 10" E PD)
4	(SAME AS 10" E PD)	(SAME AS 10" E PD)

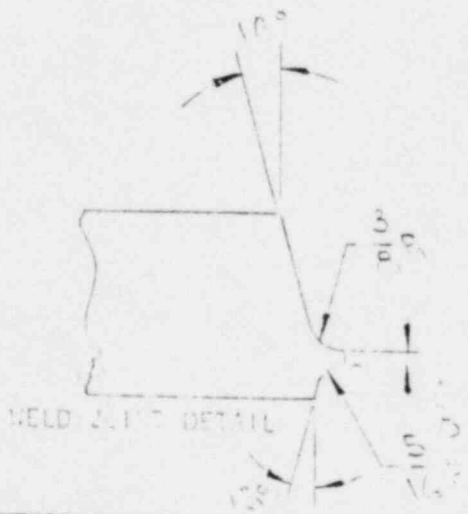
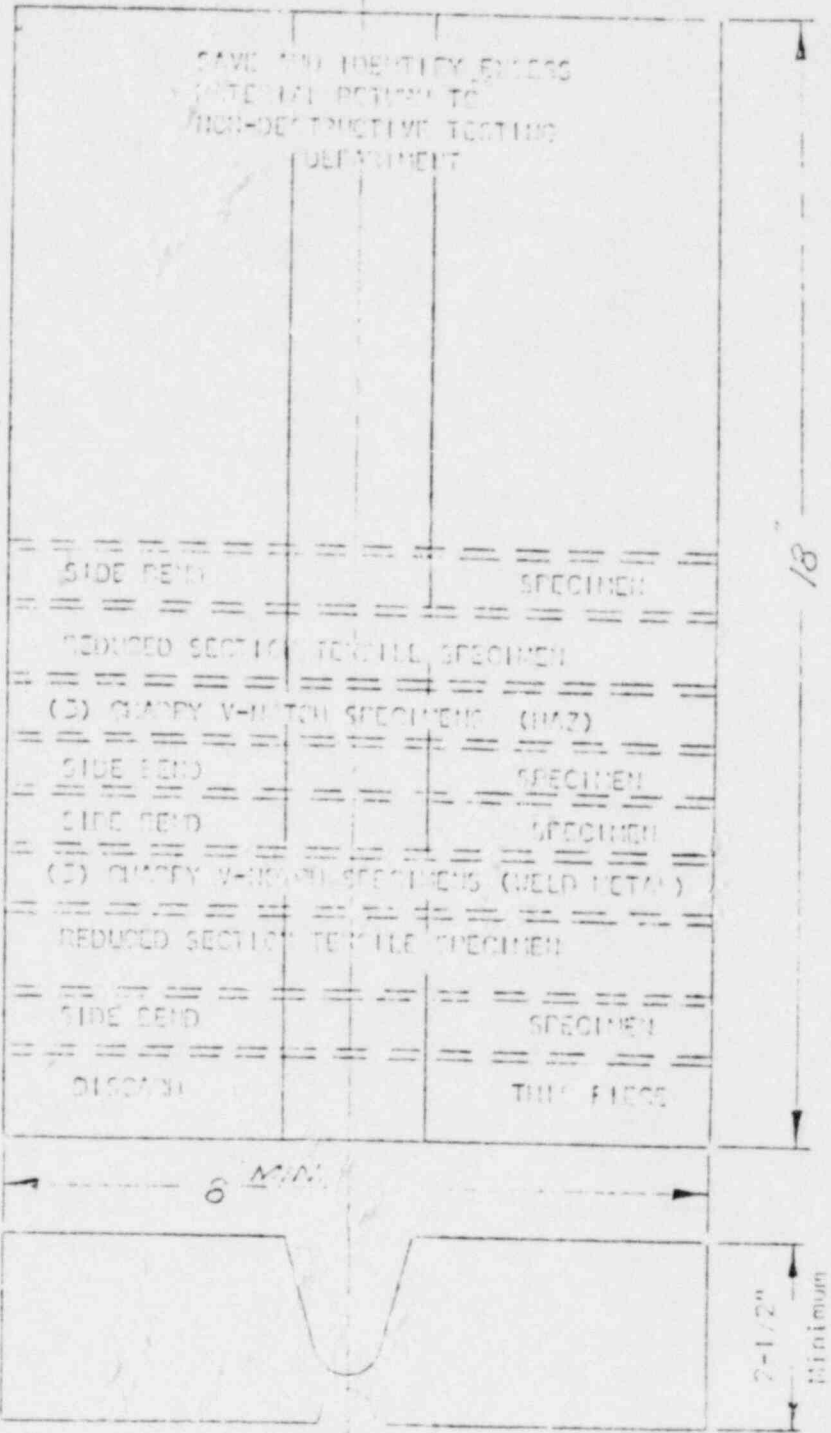
PROCEDURE FOR WELDING OF MANUFACTURED METAL AND WELDING OF MANUFACTURED POLYETHYLENE TUBES SIMILAR TO

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Confidential—Property of ALLIS CHALMERS MFG. CO.			DEPT. <u>EDGE</u>	10-101-713		11

ORDER OF REMOVAL OF TEST SPECIMENS FROM WELDED TEST PLATES
FIGURE 2

NOTE:

A MINIMUM OF TWO SETS OF THREE (3) CHARPY IMPACT SPECIMENS SHALL BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION IV-D OF THIS SPECIFICATION AND SHALL MEET A MINIMUM AVERAGE OF 30 FT.-LRG. AT +10°C. (PI 68-11-1) Material shall meet a minimum average of 15 ft.-lb. at +10°C.



PROCEDURE SPECIFICATION FOR MANUAL METAL ARC WELDING OF MANGANESE-POLYMERUM STEEL

SIMILAR TO SHEET 7 OF 7

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ATTACHMENT D

WELD INSPECTION REPORTS

PAGE # 1

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 0216	SHOP ORDER NO. 2-4300-00961
PART NAME UPPER HEAD ASSEMBLY		DRAWING NO. 43-501-197-03-501	
WELD LOCATION IT. #2-3 c/s.	WELDING PROCESS 43-101-710 MANUAL 43-101-709 AUTOMATIC	SHIELDING GAS —	
GROOVE TYPE "U"	PREHEAT 300°-500° F	INTERPASS TEMPERATURE 300°-500° F	

ELECTRODE OR FILLER WIRE

SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16"	MIL 9016-A	3C2 B	190-270	
3/16"	ACM-1436	R-545B	590-600	37V
80x20x200 Flux			12 I.P.M.	

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
HOLL, R	12-12-63	2	324	MANUAL PASSES "A+B"
CIESIELCZYK, C	12-12-63	3	179	MANUAL PASSES "C+D"
ZALE, P	12-13-63	1	2	MANUAL PASSES "E+F"
ADAMS, L	12-13-63	1	347	AUTO. PASSES #1-2-3
SCIPPINI, M	12-13-63	2	350	AUTO PASSES #4 THRU #11
PARSONS, M	12-13-63	3	447	AUTO. PASSES #12 THRU #17
FAMLEY, C	12-13-63	3	148	

PROCEDURE and INSPECTION SEQUENCE

LAYER	RESULTS	DISPOSITION	APPROVAL
"A" Pass	M.P.I.	OK	HACKL
"B" Pass	M.P.I.	OK	BRUNETTE
"C" Pass	M.P.I.	OK	BRUNETTE
#2 Pass	M.P.I.	OK	COSTA - H.
#7 Pass	M.P.I.	OK	HACKL - H.
#11 Pass	M.P.I.	OK	HACKL - YOF
#14 Pass	M.P.I.	OK	BRUNETTE
#17 Pass	M.P.I.	OK	BRUNETTE - I
#22 Pass	M.P.I.	OK	HUSS

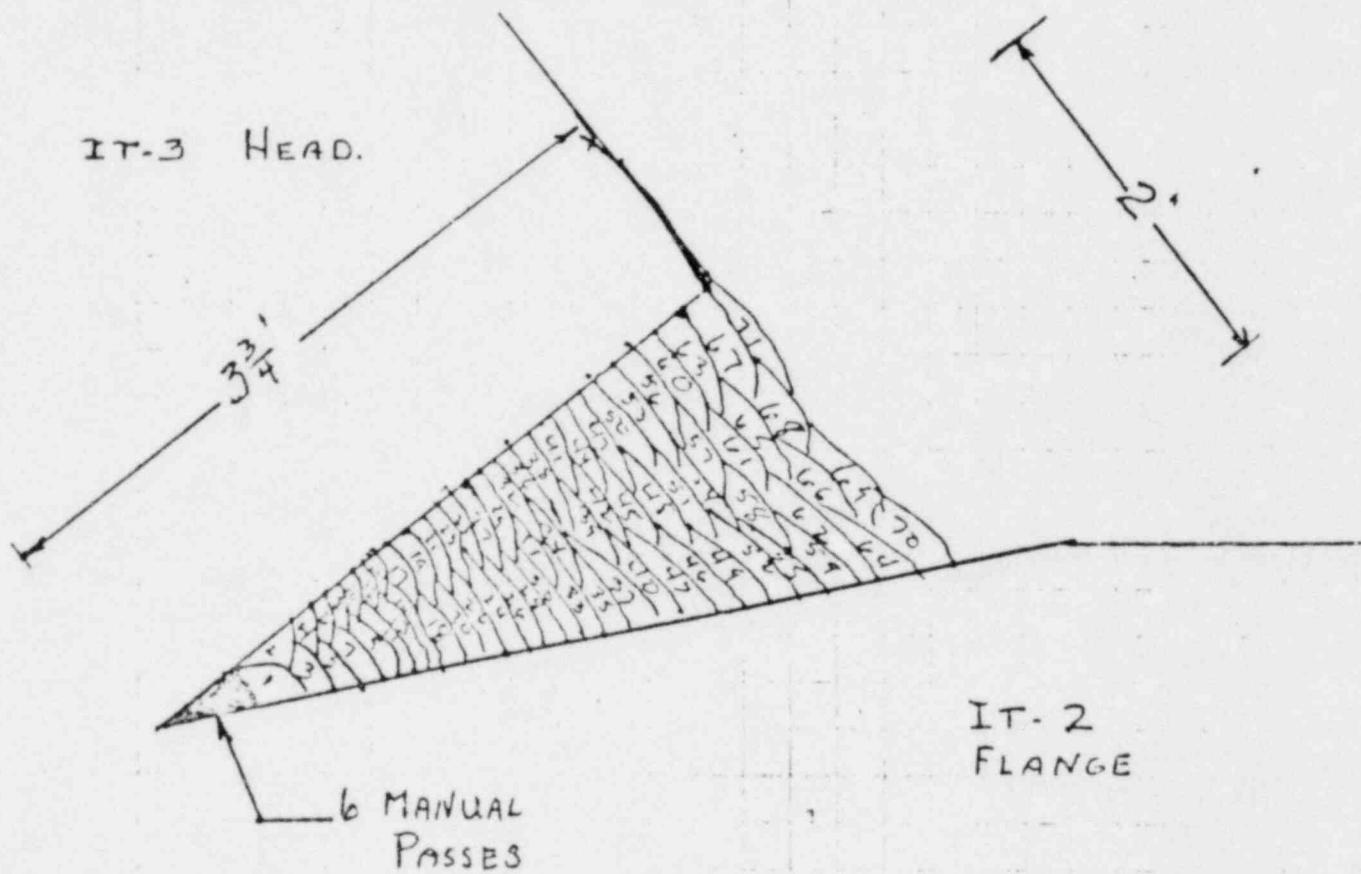
RADIOGRAPHY RESULTS AND APPROVAL. WELD SKETCH

REMARKS:

CONTINUED ON PAGE #2.

INSPECTOR
D. Huss
 DATE
12-13-63

SKETCH OF WELD PREPARATION
ON WELDING IT #2-3 (OUTSIDE)



APPROX TO SCALE

D. H. W. S.
12-15-63

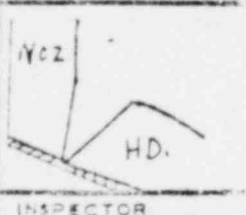
WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 0216	SHOP ORDER NO. 2-4300-00461
PART NAME REACTOR HEAD ASSEMBLY (UPPER)	DRAWING NO. 43-501-197-03-501		
WELD LOCATION ITEM #6 TO 3	WELDING PROCESS 43-101-710 - AUTO. SUB ARC 43-101-709 - MANUAL	SHIELDING GAS -	
GROOVE TYPE 43-501-197	PREHEAT 300° F	INTERPASS TEMPERATURE 300° - 500° F	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	901B-A	3C2B	190-260	25V
3/16	ACM-1436	R-5458	590-600	37V
EOX 20x200 FLUX 12IPM.				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
HULL, R.	12-10-63	2	324	5 MANUAL PASSES
CIESIELCZYK, C		3	179	1 MANUAL PASS
ADAMS, L	12-11-63	1	397	#7 THRU #30 - AUTO. SUB. ARC
FROST, D	12-11-63	2	459	#31 THRU #65 - AUTO. SUB. ARC
LAMPLEY, C	12-11-63	3	148	#66 THRU #70 - AUTO SUB ARC
ADAMS L	12-12-63	1	397	#71 THRU #74 - AUTO. SUB ARC

PROCEDURE and INSPECTION SEQUENCE			
LAYER	RESULTS	DISPOSITION	APPROVAL
MANUAL ROOT	M.P.I.	OK	HACKL
#3 PASS MANUAL	M.P.I.	OK	HACKL
#5 PASS MANUAL	M.P.I.	OK	HACKL
#8 PASS MANUAL	M.P.I.	OK	HACKL
AUTO. #18 PASS	M.P.I.	OK	Huss
AUTO #40 PASS	M.P.I.	OK	Huss
AUTO #74 PASS	M.P.I.	OK	Huss
FINAL	M.P.I.	OK	Huss

RADIOGRAPHY RESULTS AND APP	WELD SKETCH
REMARKS: AFTER C... ON OF THIS WELD HEAT WAS MAINTA... WHILE ITEM #2 WAS WELDED TO ITEM #3, THEN ENTIRE ASSEMBLY WAS INTERMEDIATELY STRESS RELIEVED.	
NO2315 - W/O QUAL. APP. I/PIC - HEAD. W/O QUAL. I/P. I/OE7	INSPECTOR Huss DATE 12-10-63

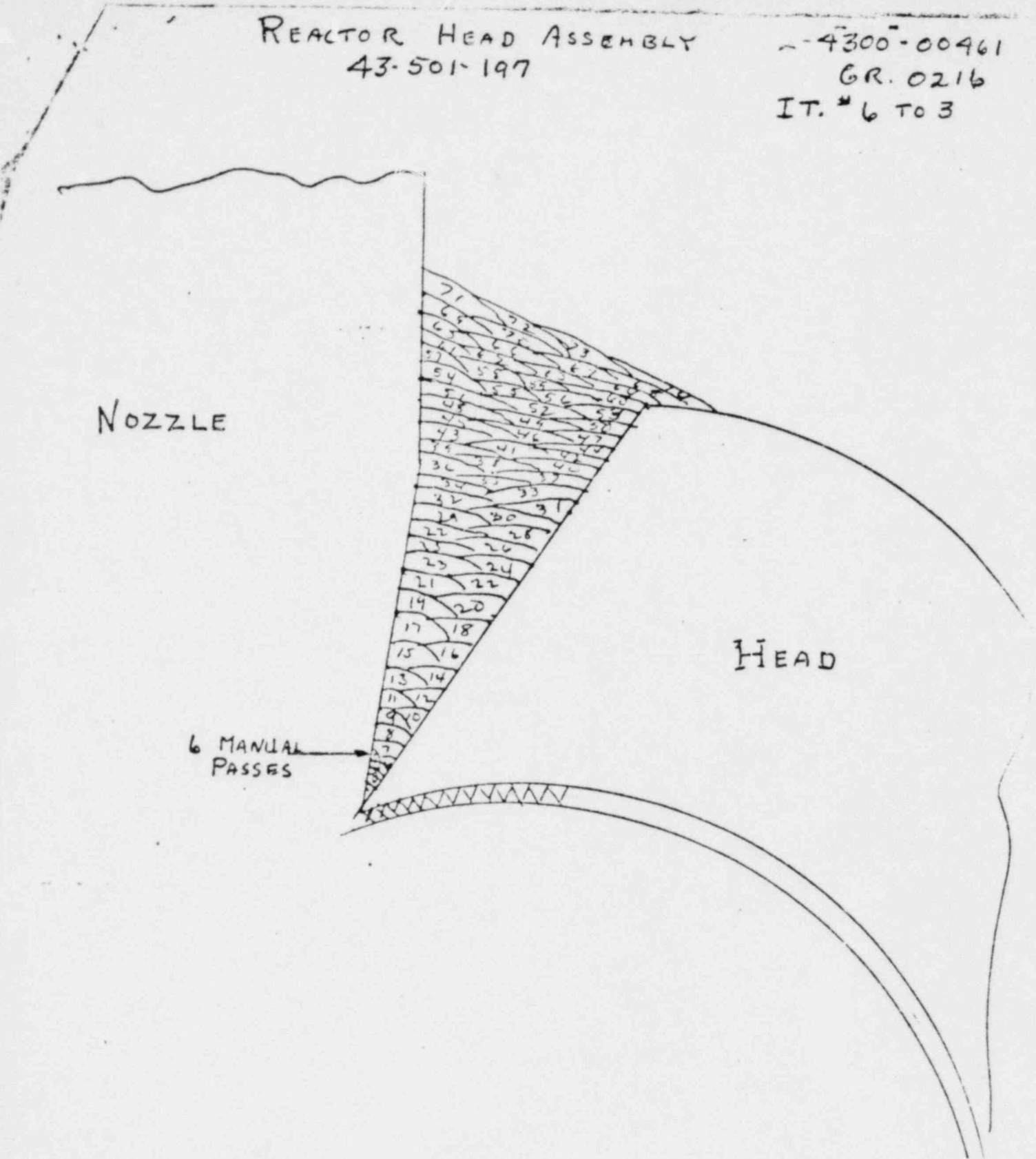
REACTOR HEAD ASSEMBLY
43-501-197

-4300-00461
GR. 0216
IT. # 6 TO 3

NOZZLE

HEAD

6 MANUAL
PASSES



WELD INSPECTION REPORT

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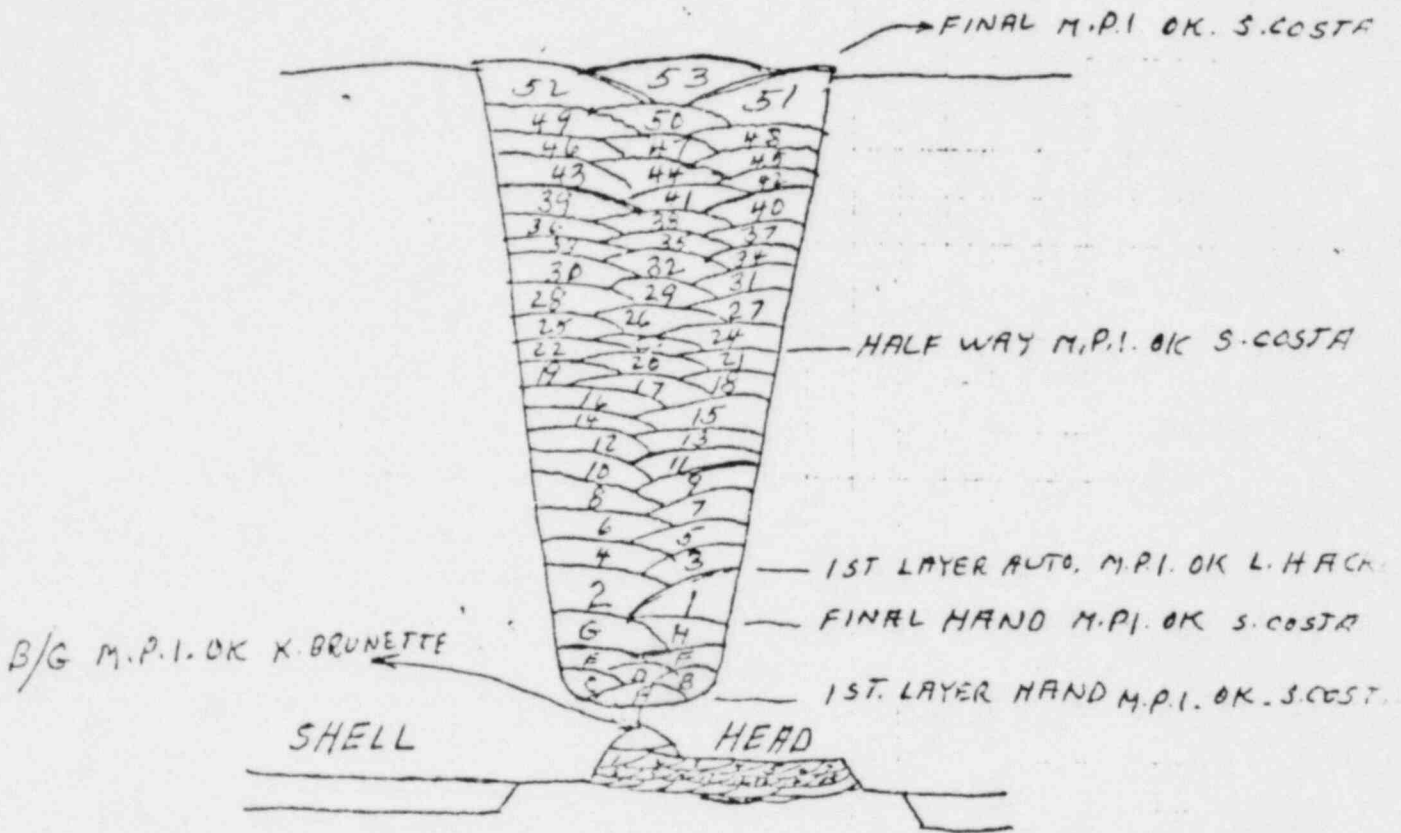
CUSTOMER LACBWR	UNIT NO. 1	GROUP 0210	SHOP ORDER NO. 2-4300-0046
PART NAME LOWER HEAD ASSEMBLY		DRAWING NO. 43-501-194-06-50	
WELD LOCATION ITEM 247	WELDING PROCESS 43-101-710 MK 401 43-101-709 MK 401		SHIELDING GAS
GROOVE TYPE "U" JOINT	PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016A	302B	210	
3/16	ACM 1436	R-5458	1.00	38 VOLTS
3/16	ACM 1436	P-5480B	600	12 IPM 24X60X200 FL. 38 VOLTS

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
E NAGY	2-25-64	1	196	MANUAL PASSES A-B-G-H
R. HULL	2-25-64	2	324	MANUAL PASSES B-C-D
C. CIESIELCZYK	2-25-64	3	179	MANUAL PASSES E-F
D. FRIST	2-26-64	2	459	AUTO. PASSES 1 THRU 9 - 29 THRU 40
M. SOMDDI	3-1-64	2	356	AUTO. PASSES 334 24 INSIDE
C. LAMPLEY	2-26-64	3	148	AUTO. PASSES 10 THRU 17 - 41 THRU 48
A. MANTNEY	2-27-64	1	351	AUTO. PASSES 49 THRU 53
L. ADAMS	2-28-64	1	397	AUTO. PASSES 1 THRU 7 INSIDE - 15 THRU 22 INSIDE

PROCEDURE and INSPECTION SEQUENCE				
LAYER	HAND	RESULTS	DISPOSITION	APPROVAL
1	OUTSIDE	M.P.I.	OK	S. COSTA
FINAL	OUTSIDE	M.P.I.	OK	S. COSTA
1	OUTSIDE	M.P.I.	OK	L. HACKL
HALF WAY	OUTSIDE	M.P.I.	OK	S. COSTA
FINAL	OUTSIDE	M.P.I.	OK	S. COSTA
B/G		M.P.I.	OK	K. BRUNETT
FINAL	INSIDE	M.P.I.	OK	S. COSTA

RADIOGRAPHY RESULTS AND APPROVAL REMARKS: HEAD WA-946370 NP-1052 A-302 SHELL WA-946374 NP-1058 A-302	WELD SKETCH INSPECTOR <i>[Signature]</i> DATE
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1 1/2 PASSES TO FILL B/G
 24 PASSES TO BUILD UP HEAD INSIDE

WELD INSPECTION REPORT

CUSTOMER: LACOR
 UNIT NO: 2
 GROUP: L210
 SHEET NUMBER: 2-4300 11 1/2
 PART NAME: LOWER HEAD ASSEMBLY
 WELDING PROJECT NO: 43-101-716 MA 400
 WELD LOCATION: 171MS 5 1 1
 GROOVE TYPE: J
 PREHEAT: 300°C
 INTERPASS TEMPERATURE: 300°C

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
1/8	9016A	2 B19A	140	
3/16	9016A	302B	210	

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
R. HULL	4-7-64	2	324	COMPLETE
A. SATTERFIELD	4-7-64	2	343	
C. CIESIELCZYK	4-7-64	3	174	
J. ALSSHART	4-7-64	3	229	
E. NACY	4-8-64	1	196	
P. ZALE	4-8-64	1	2	

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1	OUTSIDE	M.P.I.	OK	L. HACKL
	HALF WAY OUTSIDE	M.P.I.	OK	L. HACKL
	FINAL OUTSIDE	M.P.I.	OK	L. HACKL
	B/G	M.P.I.	OK	S. COOPE
	FINAL INSIDE	M.P.I.	OK	L. HACKL

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS: SHELL WA-946374 NP-1058 17-302
 NOZZLE WA-946770 NP-1042 17-336

WELD SKETCH

DATE: 4-30-64

WELD INSPECTION REPORT

CUSTOMER: LACBUR
 UNIT NO: 2
 GROUP: 6210
 SHOP ORDER NO: 2-4300-5140
 PART NAME: RECIR INLET NOZZLE TO HEAD
 DRAWING NO: 43-501-194-2
 LOWER HEAD ASSEMBLY
 WELDING PROCESS: 43-101-710 MK 402
 WELD LOCATION: ITEM 249
 GROOVE TYPE: J
 PREHEAT: 300°
 SHIELDING GAS: 50%
 INTERPASS TEMPERATURE: 125°

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO	AMPERAGE	POSITION
1/8	7016A	2B19B	140	
3/16	9016A	302B	211	

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZIALE	3-30-64	1	7	COMPLETE
E. NAGY	3-30-64	1	196	
R. HULL	3-30-64	2	324	
A. SATTERFIELD	3-30-64	2	343	
C. CIESIELCZYA	3-30-64	3	179	
J. BOSSHART	3-31-64	3	229	

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1	OUTSIDE	M.P.I.	OK	S. COSTA
HALF WAY	OUTSIDE	M.P.I.	OK	S. COSTA
FINAL	OUTSIDE	M.P.I.	OK	L. H. HICK
B/C		M.P.I.	OK	S. COSTA
FINAL	INSIDE	M.P.I.	OK	K. BRUNE

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS:
 NOZZLE WH-946770 NP-1086 A-336
 HEAD WH-946370 NP-1052 A-302

WELD SPECIFICATION

DATE: 4-29-64

WELD INSPECTION REPORT

CUSTOMER: **LACKWAK**
 PART NAME: **RECIR. OUTLET NOZZLE TO SHELL**
LOWER HEAD ASSEMBLY
 WELD LOCATION: **ITEMS 5-17**
 GROOVE TYPE: **J**
 UNIT NO.: **43-101-710 MK 402**
 GROUP: **626**
 SHOP ORDER NO.: **43-101-710**
 DRAWING NO.: **43-101-710**
 WELDING PROCESS: **SHIELDING GA**
 PREHEAT: **300°**
 INTERPASS TEMPERATURE: **500° MAX**

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
1/8	9016A	2B19B	140	
3/16	9016A	302B	210	

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	4-11-64	1	2	} COMPLETE
E. NACY	4-11-64	1	191	
R. HULL	4-11-64	2	324	
H. SHATTERFIELD	4-11-64	2	343	
J. BOSSHART	4-11-64	3	229	
C. CIESIELCZYK	4-11-64	3	179	

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1	OUTSIDE	M.P.I.	OK	D. HUSS
HALF WAY	OUTSIDE	M.P.I.	OK	M. YOHANN
FINAL	OUTSIDE	M.P.I.	OK	J. MEIERS
R/G		M.P.I.	OK	S. COSTA
FINAL	INSIDE	M.P.I.	OK	L. HACKL

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS:
 SHELL WA-946374 NP-1056 A-302
 NOZZLE WA-946770 NP-1094 A-336

WELD SKETCH

 INSPECTOR:
[Signature]
 DATE:

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 1206	SHOP ORDER NO. 2-4300-00461
PART NAME UPPER CYLINDER ASSEMBLY		DRAWING NO. 43-501-195-08-501	
WELD LOCATION ITEM 3457	WELDING PROCESS 43-101-710 MK. 402 43-101-709 MK. 402		SHIELDING GAS
GROOVE TYPE "U"	PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	MPERAGE	CURRENT
3/16	9016A	302B	210	
3/16	ACM 1436	R-5458	600	36 VOLTS
3/16	ACM 1436	P-5480B	600	36 VOLTS

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
A. SATTERFIELD	3-6-64	2	343	4 HAND PASSES
C. CIESIELCZYK	3-6-64	3	179	4 HAND PASSES
P. ZALE	3-7-64	1	2	2 HAND PASSES
K. ZIELINSKI	3-7-64	1	463	1 THRU 4 - 25 THRU 35 - 56 THRU 60
D. FROST	3-7-64	2	459	5 THRU 14 - 36 THRU 46
M. GARDNER	3-7-64	3	290	15 THRU 24 - 47 THRU 55
L. ADAMS	3-9-64	1	397	1 THRU 5 INSIDE

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1	C.D. HAND	M.P.I.	OK	L. HACKL
FINAL	C.D. HAND	M.P.I.	OK	S. CCSTA
1	C.D. AUTO.	M.P.I.	OK	S. CCSTA
HALF WAY	C.D. AUTO.	M.P.I.	OK	S. CCSTA
FINAL	C.D. AUTO.	M.P.I.	OK	S. CCSTA
B/G		M.P.I.	OK	K. BRUN
FINAL	INSIDE AUTO.	M.P.I.	OK	L. HACKL

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
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REMARKS:
SHELL WA-946374 NP-1057 A-302
FLANGE WA-946710 NP-1063 A-336

INSPECTOR
[Signature]
 DATE
4-6-64

WELD INSPECTION REPORT

CUSTOMER: **LACBWR**
 UNIT NO: **2**
 GROUP: **0206**
 WELD ORDER NO: **2-4300-0046**
 PART NAME: **STEAM OUTLET NOZZLE 70**
 DRAWING NO: **43-501-195-11 601**
UPPER CYLINDER ASSEMBLY
 WELD LOCATION: **ITEM 64-57**
 WELDING PROJECT NO: **43-101-710-NK 402**
 SHEET NO: **500**
 GROOVE TYPE: **300'**

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO	AMPERAGE	CURRENT
3/16	9016-FH	502-B	210	

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
E. NAGY	5-20-64	1	196	COMPLETE
A. SATTERFIELD	5-20-64	2	343	
C. CIESIELCZYK	5-20-64	3	179	
J. BOSSHART	5-21-64	3	229	
P. ZALE	6-6-64	1	2	

PROCEDURE and INSPECTION SEQUENCE			
LAYER	RESULTS	DISPOSITION	APPROVAL
1 OUTSIDE	M.P.I.	OK	S. C. S.
HALE WA	M.P.I.	OK	J. M. F.
FINAL OUTSIDE	M.P.I.	OK	S. C. S.
B/C	M.P.I.	OK	M. F. C.
FINAL INSIDE	M.P.I.	OK	M. F. C.

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS: **SHELL WA-946374 NP-1157 A-302**
NOZZLE WA-946770 NP-1089 A-336

WELDER: *[Signature]*
 DATE: **6-18-64**

WELD INSPECTION REPORT

CUSTOMER: LACBWR
 UNIT NO: 1
 GROUP: 02.06
 ORDER NO: 2-4300-00461
 PART NAME: STEAM OUTLET NOZZLE TO UPPER CYLINDER ASSEMBLY
 DRAWING NO: 43-501-195-11-501
 WELD LOCATION: ITEM 6457
 WELDING PROCESS: 43-101-710 MK. 402
 SHIELDING GAS:
 GROOVE TYPE: J"
 PREHEAT: 300°
 INTERPASS TEMPERATURE: 500° MAX

SIZE	TYPE	ELECTRODE OR FILLER WIRE	LOT NO.	AMPERAGE	CURRENT
3/16	9016-A		302B	210	

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
R. HULL	5-15-64	2	324	COMPLETE
C. CIESIELCZYK	5-15-64	3	179	
E. NAGY	5-16-64	1	196	
P. ZALE	6-7-64	1	2	

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1 OUTSIDE	M.P.I.	OK	L. HACKL	
HALFWAY	M.P.I.	OK	S. COSTA	
FINAL OUTSIDE	M.P.I.	OK	L. HACKL	
B/G	M.P.I.	OK	C. HUSS	
FINAL INSIDE	M.P.I.	OK	L. HACKL	

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS: SHELL WA-946374 NP-1057 A-302
 NOZZLE WA-946770 NP-1089 A-336

WELD SPATCH

6-18-64

WELD INSPECTION REPORT

CUSTOMER LFCBWR	UNIT NO.	GROUP 0202	SHOP ORDER NO. 2-4300-00461
PART NAME CENTER CYLINDER	DRAWING NO. 43-401-471-06-504		
WELD LOCATION ITEM 44-5 CIRCUMFERENTIAL JOINT	WELDING PROCESS 43-101-710 MK. 401 43-101-709 MK. 401	SHIELDING GAS	
GROOVE TYPE 'U'	PREHEAT 450°	INTERPASS TEMPERATURE 500° MAX.	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016A	3C2B	210	
5/16	ACM-1436	R-5458	600	38 VOLTS

12 IPM
20 X 80 X 200 FLUX

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	4-16-64	1	2	1ST HAND PASS
R. HULL	4-16-64	2	324	
A. SATTERFIELD	4-16-64	2	343	3 1/2 HAND PASSES
C. CIESIELCZYK	4-16-64	3	179	
J. BOSSHART	4-16-64	3	229	3 1/2 HAND PASSES
A. MANTHEY	4-17-64	1	351	1 THRU 4 - 10 THRU 24 - 50 THRU 51
M. SOMPPPI	4-17-64	2	350	5 THRU 6 - 25 THRU 33 - 1 THRU 4 INSIDE
C. LAMPLEY	4-17-64	3	148	9 THRU 15 - 34 THRU 42 - 43 THRU 49

PROCEDURE and INSPECTION SEQUENCE				
LAYER		RESULTS	DISPOSITION	APPROVAL
1	C.D. HAND	M.P.I.	OK	L. HACKL
FINAL	C.D. HAND	M.P.I.	OK	S. COSTA
1	C.D. AUTO.	M.P.I.	OK	S. COSTA
HALF WAY	C.D. AUTO.	M.P.I.	OK	S. COSTA
FINAL	C.D. AUTO.	M.P.I.	OK	S. COSTA
B/G		M.P.I.	OK	S. COSTA
FINAL	INSIDE AUTO.	M.P.I.	OK	L. HACKL

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS:
CYLINDERS - WA-94637A NP-1054 & NP-1055 A-302
 WITH INSTRUCTIONS FROM TONY GEORGE, SHELLS WERE WELDED IN THIS MANNER. PREHEAT 450°-500°, WELD OUTSIDE COMPLETE, REDUCE PREHEAT TO NOT LESS THAN 350°, BACK GRIND UNDER HEAT, WELD INSIDE COMPLETE, COVER WITH BLANKETS & ALLOW TO COOL SLOWLY. X-RAY BASE

INSPECTOR
[Signature]
DATE
4-20-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 0202	SHOP ORDER NO. 2-4300-00461
PART NAME CENTER CYLINDER ASSEMBLY	DRAWING NO. 43-401-471-10-501		
WELD LOCATION ITEMS 244 CIRCUMFERENTIAL JOINT	WELDING PROCESS 43-101-710 MK. 401 43-101-709 MK. 401		SHIELDING GAS
GROOVE TYPE "V"	PREHEAT 450°	INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016A	3C2B	210	
3/16	ACM-1436	R-5458	600	38 VOLTS
12 IPM 20 X 80 X 200 FLUX				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	6-1-64	1	2	2 1/2 HAND PASSES
R. HULL	6-1-64	2	324	6 1/2 HAND PASSES
A. SATTERFIELD	6-1-64	2	343	
C. CIESIELCZYK	6-1-64	3	179	
A. MANTHEY	6-2-64	1	351	1 THRU 4 - 13 THRU 23 - 39 THRU 49
M. SOMPPPI	6-2-64	2	350	5 THRU 9 - 24 THRU 34
C. LAMPLEY	6-2-64	3	148	10 THRU 12 - 35 THRU 38
D. FROST	6-5-64	2	459	3 1/2 PASSES INSIDE

PROCEDURE and INSPECTION SEQUENCE				
LAYER		RESULTS	DISPOSITION	APPROVAL
1	C.D. HAND	M.P.I. OK	OK	D. HUSS
FINAL	C.D. HAND	M.P.I.	OK	D. HUSS
1	C.D. AUTO.	M.P.I.	OK	D. HUSS
HALF WAY	C.D. AUTO.	M.P.I.	OK	D. HUSS
FINAL	C.D. AUTO	M.P.I.	OK	L. HAFCKL
B/G		M.P.I.	OK	D. HUSS
FINAL	INSIDE AUTO.	M.P.I.	OK	K. BRUNET

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS: CYLINDERS WA-946374 NP-10544NP-1056 A-302 WITH INSTRUCTIONS FROM TONY GEORGE, SHELLS WERE WELDED IN THIS MANNER. PREHEAT 450°-500°, WELD OUTSIDE COMPLETE, REDUCE HEAT TO NOT LESS THAN 350°, BACK GRIND UNDER HEAT WELD INSIDE COMPLETE, COVER WITH BLANKETS TO COOL SLOWLY. X-RAY BASE METAL WELD BEFORE CLAD. X-RAY AFTER FINAL STRESS RELIEVE.	INSPECTOR <i>[Signature]</i> DATE 6-20-64

WELD INSPECTION REPORT

CUSTOMER LACOR	UNIT NO. 2	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER #4		DRAWING NO. 43-401-471-06-501	
WELD LOCATION LONGITUDINAL JOINT		WELDING PROCESS #3-101-710 MK 401 #3-101-709 MK 401	SHIELDING GAS
GROOVE TYPE "U"		PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016 A.	302B	210	
3/16	ACM 4436	R-5458	600	VOLTS
20X80X200 FLUX 12 IPM				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
A. SATTERFIELD	1-30-64	2	343	COMPLETE
C. LAMPLY	1-30-64	3	148	
L. ADAMS	1-31-64	1	397	
D. FROST	1-31-64	2	459	

PROCEDURE and INSPECTION SEQUENCE			
LAYER	RESULTS	DISPOSITION	APPROVAL
1	OUTSIDE HAND	M.P.I.	OK
FINAL	OUTSIDE HAND	M.P.I.	L. HACKL
1	2 1/2" AUTO OUTSIDE	M.P.I.	OK
3/4"	1 1/2" AUTO OUTSIDE	M.P.I.	OK
FINAL	OUTSIDE	M.P.I.	OK
B/G		M.P.I.	OK
FINAL	INSIDE	M.P.I.	OK

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
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REMARKS: SHELL - WF-946374 NP-1055-2 A-302	
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INSPECTOR
[Signature]
DATE **2-3-64**

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER #4	DRAWING NO. 43-401-471-06-501		
WELD LOCATION CIRCUMFERENTIAL JOINT	WELDING PROCESS 43-101-710-17K 401 43-101-709-MK 401		SHIELDING GAS
GROOVE TYPE U	PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016 A	302B	210	
3/16	ACM-1436	P-5458	600	36 VOLTS
3/16	ACM-1436	P-5480 B	600	36 VOLTS
121PM 20 X 80 X 200 FLUX				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
A. SATTERFIELD	2-21-64	2	343	3 PASSES HAND WELD
J. BESHART	2-21-64	3	279	3 1/2 PASSES HAND WELD
E. NAGY	2-22-64	1	196	1 1/2 PASSES HAND WELD
L. ADAMS	2-22-64	1	397	1+2-18 THRU 23 - 1 THRU 5 ON INSIDE 42 THRU 49
D. FROST	2-22-64	2	459	3 THRU 8 - 24 THRU 31
M. GARDNER	2-22-64	3	290	10 THRU 17 - 32 THRU 41

PROCEDURE and INSPECTION SEQUENCE				
LAYER		RESULTS	DISPOSITION	APPROVAL
1	OUTSIDE HAND	M.P.I.	OK	L. HACKL
FINAL	OUTSIDE HAND	M.P.I.	OK	S. COSTA
1	AUTO-OUTSIDE	M.P.I.	OK	B. HAUSCH
HALF WAY	AUTO-OUTSIDE	M.P.I.	OK	B. HAUSCH
FINAL	OUTSIDE	M.P.I.	OK	L. HACKL
B/G		M.P.I.	OK	S. COSTA
FINAL	INSIDE	M.P.I.	OK	S. COSTA

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS: SHELL - WA-946374 NP-1055-1 & NP-1055-2	
A-302	

INSPECTOR
[Signature]
DATE
3-3-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER #3	DRAWING NO. 43-401-471-06-502		
WELD LOCATION CIRCUMFERENTIAL JOINT	WELDING PROCESS 43-101-710 MK. 401 43-101-709 MK. 401	SHIELDING GAS	
GROOVE TYPE "U"	PREHEAT 300°	INTERFASST TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016A	3C2B	210	
3/16	ACM 1436	R-5458	600	36 VOLT
3/16	ACM 1436	P-5480B	600	36 VOLT

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	3-9-64	1	2	4 PASSES HAND WELD
R. HULL	3-9-64	2	324	4 PASSES HAND WELD
C. CIESIELCZYK	3-9-64	3	179	2 PASSES HAND WELD
A. MANTHEY	3-10-64	1	351	17 2-17 THRU 21
D. FROST	3-10-64	2	459	9 THRU 8-22 THRU 29-33 THRU 41
C. LAMPLEY	3-10-64	3	148	9 THRU 16-30 THRU 32-42 THRU 45
L. ADAMS	3-13-64	1	397	1 THRU * INSIDE

PROCEDURE and INSPECTION SEQUENCE			
LAYER	RESULTS	DISPOSITION	APPROVAL
1 C.D. HAND	M.P.I.	OK	S. COSTA
FINAL 1/2 C.D. HAND	M.P.I.	OK	K. BRUNETTE
1 C.D. AUTO	M.P.I.	OK	L. HAECKL
HALF WAY 1/2 C.D. AUTO	M.P.I.	OK	K. BRUNETTE
FINAL 1/2 C.D. AUTO	M.P.I.	OK	S. COSTA
B/G	M.P.I.	OK	S. COSTA
FINAL 1/2 INSIDE AUTO	M.P.I.	OK	S. COSTA

RADIOGRAPHY RESULTS AND APPROVAL _____ WELD SKETCH _____

REMARKS: **SHELL WA-946374 NP-1654741054-2 A-302**

INSPECTOR
[Signature]
DATE

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO. 1054-2	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER	DRAWING NO. 43-401-471-06		
WELD LOCATION LONGITUDINAL JT.	WELDING PROCESS 43-101-710 MANUAL 43-101-709 AUTOMATIC	SHIELDING GAS —	
GROOVE TYPE 43-101-471 "DET B"	PREHEAT 300° F MIN	INTERPASS TEMPERATURE 500°	OR OK

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	MIL-9016A	3C2B	210	
3/16	ALM-1436	R-5458	600	38 V.
FLUX	8CK20X200			12 I. P. M.

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
SATTERFIELD, A.	2-20-64 2-18-64	2	343	2 MANUAL PASSES "A-B" INSIDE 8 MANUAL PASSES "A THRU H" OUT
ADAMS, L.	2-19-64	1	397	#1 THRU #16 OUTSIDE. AUTO
FROST, D.	2-19-64	2	459	#17 THRU #36 OUTSIDE. AUTO
GARDNER, M.	2-19-64	3	290	#37 THRU #45 OUTSIDE. AUTO
FROST, D.	2-20-64	2	459	#1 THRU #7 INSIDE. AUTO

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
ROOT	MANUAL	M.P.I.	OK 2-18	L. HACKB
FINAL	MANUAL	M.P.I.	OK 2-18	L. HACKB
ROOT	AUTOMATIC	M.P.I.	OK 2-19	O. HUSS
HALF WAY	AUTOMATIC	M.P.I.	OK 2-19	L. HACKB
FINAL	O/S	M.P.I.	OK 2-19	K. BRENN
B/GR	I/S.	M.P.I.	OK 2-20	S. COSTA
FINAL	I/S	M.P.I.	OK 2-20	L. HACKB

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS BASE MATERIAL A-302 ST. STL. CHAD TEST NO. N.P. 1054-2 WA-946374	INSPECTOR <i>[Signature]</i> DATE 2-19-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO. 1054-1	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER	DRAWING NO. 43-401-471-06		
WELD LOCATION LONGITUDINAL JT	WELDING PROCESS 43-101-710 MANUAL	SHIELDING GAS —	
GROOVE TYPE 43-101-471 "DET. B"	PREHEAT 300°F MIN.	INTERPASE TEMPERATURE 500°F MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16"	MIL. 9016A	3C2B	210	
3/16"	ACM-1436	R-5458	600	38V
FLUX	80X20X200			12 IPM.

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
SATTERFIELD, A	2-18-64	2	343	8 MANUAL PASSES - "A" THRU "H" OUTSIDE
ADAMS, L	2-19-64	1	397	#1 THRU #16 - OUTSIDE
FROST, D.	2-19-64	2	459	#17 THRU #36 - OUTSIDE
GARDNER, M.	2-19-64	2	290	#37 THRU #45 - OUTSIDE
FROST, D	2-20-64	2	459	#1 THRU #7 - INSIDE

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
ROOT	MANUAL	M.P.I.	OK 2-18	L. HACKL
FINAL	MANUAL	M.P.I.	OK 2-18	L. HACKL
ROOT	AUTOMATIC	M.P.I.	OK 2-19	O. HUSS
HALF WAY	AUTOMATIC	M.P.I.	OK 2-19	L. HACKL
FINAL	O/S.	M.P.I.	OK 2-19	K. BRUNF
B/GOR.	I/S.	M.P.I.	OK 2-20	S. COSTA
FINAL	I/S.	M.P.I.	OK 2-20	L. HACKL

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS: BASE MATERIAL A-302-S. STA. CHAD TEST NO. N.P. 1054-1 WA-946374	WELD SKETCH
	INSPECTOR [Signature] DATE 2-19-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO. 1	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER #4		DRAWING NO. 43-401-471-06-501	
WELD LOCATION LONGITUDINAL JOINT		WELDING PROCESS 43-101-710 MK 401 43-101-709 MK 401	
GROOVE TYPE "U"		PREHEAT 300°	
		SHIELDING GAS 	
		INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016 A1	302B	210	
3/16	ACM 1436	R-5458	600	36 VOLTS
20x80x200 FLUX 12 IPM				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
R. HULL	1-30-64	2	324	} COMPLETE
C. LAMPLY	1-30-64	3	148	
L. ADAMS	1-31-64	1	397	
D. FROST	1-31-64	2	459	

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1	OUTSIDE HAND	M.P.I.	OK	L. HACKL
FINAL	OUTSIDE HAND	M.P.I.	OK	L. HACKL
1	2 1/4" AUTO. OUTSIDE	M.P.I.	OK	K. BRUNETTE
3/8"	1 1/2" AUTO. OUTSIDE	M.P.I.	OK	K. BRUNETTE
FINAL	OUTSIDE	M.P.I.	OK	L. HACKL
5/8"		M.P.I.	OK	K. BRUNETTE
FINAL	INSIDE	M.P.I.	OK	K. BRUNETTE

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
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REMARKS: SHELL - WA-946374 NP-1055-1 A-302	
INSPECTOR <i>Sam B. Co.</i>	DATE 2-3-64

WELD INSPECTION REPORT

CUSTOMER LACBUR	UNIT NO. 2	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER		DRAWING NO. 43-401-471-06-503	
WELD LOCATION LONGITUDINAL JOINT	WELDING PROCESS 43-101-710-401 43-101-709-401	SHIELDING GAS -	
GROOVE TYPE 43-101-709	PREHEAT 300°F MIN.	INTERPASS TEMPERATURE 500°F MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16"	MIL, 9016 A	3C2B	210	
3/16"	ACM-1436	R-5458	600	36 VOLT
FLUX	20x80x200			12 IPM.

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
ZALE, D	2-10-64	1	2	8 MANUAL PASSES "A" THRU
MANTHEY, A	2-10-64	1	351	#1 THRU #5 AUTO. PASSES
FROST, D	2-10-64	2	454	#6 THRU #25 AUTO. PASSES
LAMPLEY, C	2-10-64	3	14E	#26 THRU #37 AUTO. PASSES
MANTHEY, A	2-11-64	1	351	#38 THRU #50 AUTO. PASSES
ADAMS, L	2-12-64	1	347	#1 THRU #10 AUTO - SECTIONS
MANTHEY, A	2-12-64	1	351	

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
ROOT c/s	MANUAL	MPI	OK	S. COSTA
FINAL c/s	MANUAL	MPI	OK	S. COSTA
ROOT c/s	AUTOMATIC	MPI	OK	O. HUSS
Half-Way c/s	AUTOMATIC	MPI	OK	L. HACKL
1ST SIDE FINAL c/s	AUTOMATIC	MPI	OK	O. HUSS
B/G R. 1/S		M.P.I	OK	K BRUNE
FINAL 2ND SIDE 1/S	AUTOMATIC	MPI	OK	O. HUSS

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS CYLINDER - WA-946379. NP-1056-2 A-302 BASE MATERIAL	2-10-64

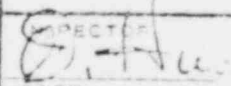
WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO. 1	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CENTER CYLINDER	DRAWING NO. 43-401-471-06-503		
WELD LOCATION LONGITUDINAL JT.	WELDING PROCESS 43-101-710-401 43-101-709-401	SHIELDING GAS -	
GROOVE TYPE 43-101-709	PREHEAT 300°F MIN	INTERPASS TEMPERATURE 500°F MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16"	MIL 9016A	3C2B	210	.
3/16"	ACM-1436	R-5458	600	36 VOLTS
FLOX	20 X 80 X 200			12 P.M.

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
ZALE, P.	2-10-64	1	2	8 MANUAL PASSES #1 THRU #14
MANTHEY, A	2-10-64	1	351	5 AUTO. PASSES #1 THRU #5
FROST, D	2-10-64	2	459	#6 THRU #25 AUTO. PASSES
LAMPLEY, C	2-10-64	3	148	#26 " #37 AUTO. PASSES
MANTHEY, A	2-11-64	1	351	#38 " #47 AUTO. PASSES
FROST, D	2-11-64	2	459	#48 " #53 AUTO. PASSES
ADAMS, L	2-12-64	1	347	#1 THRU #10 AUTO. PASSES - 2"
MANTHEY, A			351	

PROCEDURE and INSPECTION SEQUENCE			
LAYER	RESULTS	DISPOSITION	APPROVAL
ROOT MANUAL PASS	M.P.I.	OK	S. COSTA
FINAL MANUAL PASS	M.P.I.	OK	S. COSTA
ROOT AUTOMATIC	M.P.I.	OK	O. HUSS
HALF WAY AUTOMATIC	M.P.I.	OK	L. HACKL
1 ST SIDE FINAL AUTOMATIC	M.P.I.	OK	O. HUSS
B/G R	M.P.I.	OK	K. BRUNDT
FINAL INSIDE AUTOMATIC	M.P.I.	OK	O. HUSS

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS: CYLINDER WA-946374 NP-1056-1 A-302 BASE MATERIAL	
	SPECTOR  DATE 2-10-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO. U	GROUP 0100	SHOP ORDER NO. 2-4300-0049
PART NAME CENTER CYLINDER #2		DRAWING NO. 43-401-471-06-503	
WELD LOCATION CIRCUMFERENTIAL JOINT	WELDING PROCESS 43-101-710 MK. 401 43-101-709 MK. 401		SHIELDING GAS
GROOVE TYPE "U"	PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPENAGE	CURRENT
3/16	9016A	3028	210	
3/16	ACM-1436	R-5458	600	38 VOLTS
3/16	ACM-1436	P-5480B	600	38 VOLTS

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	2-28-64	1	2	MANUAL PASSES A THRU E
R. HULL	2-28-64	2	324	MANUAL PASSES F THRU H
K ZIELINSKI	2-29-64	1	463	AUTO. PASSES I THRU 7 - LO THRU 37
D. FROST	2-29-64	2	459	AUTO. PASSES 8 THRU 18 - 38 THRU 53
C. LAMPLEY	2-29-64	3	148	AUTO. PASSES 19 THRU 28
L. ADAMS	3-3-64	1	397	AUTO PASSES I THRU 5 INSIDE

PROCEDURE and INSPECTION SEQUENCE				
LAYER	RESULTS	DISPOSITION	APPROVAL	
1	HAND OUTSIDE	M.P.I.	OK	S. COSTA
FINAL	HAND OUTSIDE	M.P.I.	OK	L. HACKL
1	AUTO. OUTSIDE	M.P.I.	OK	O. HUSS
HALFWAY	AUTO. OUTSIDE	M.P.I.	OK	L. HACKL
FINAL	AUTO. OUTSIDE	M.P.I.	OK	K. BRUNET
B/G		M.P.I.	OK	K. BRUNETT
FINAL	AUTO. INSIDE	M.P.I.	OK	L. HACKL

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS: SHELL WA-946374 NP-1056-1 & NP-1056-2 A-302	
	INSPECTOR <i>[Signature]</i> DATE 3-10-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO.	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME UPPER CYLINDER	DRAWING NO. 43-511-195-07-501		
WELD LOCATION CIRCUMFERENTIAL JOINT	WELDING PROCESS 43-101-710 MK. 401 43-101-709 MK. 401	SHIELDING GAS	
GROOVE TYPE "U"	PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX	

SIZE	TYPE	LOT NO.	AMPERAGE	VOLTS
3/16	9016A	3028	210	
3/16	ACM-1436	R-5458	600	50 VOLTS
3/16	ACM-1436	P-5450B	600	36 VOLTS

12 IPM 20 X 50 X 200 FLU

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	2-14-64	1	2	4 PASSES HAND WELD
A. SATTERFIELD	2-14-64	2	343	3 PASSES HAND WELD
A. MANTHEY	2-15-64	1	351	1 THRU 7 - 26 THRU 34
D. FROST	2-15-64	2	1	8 THRU 16 - 35 THRU 43
C. LAMPLEY	2-15-64	3	1	17 THRU 25 - 44 THRU 49
L. ADAMS	2-17-64	1	397	45 - 17 THRU 510

PROCEDURE and INSPECTION SEQUENCE				
LAYER		RESULTS	DISPOSITION	APPROVAL
1	C.D. HAND	M.P.I.	OK	K. BRUNETT
	L.D. HAND	M.P.I.	OK	K. BRUNETT
1	C.D. AUTO	M.P.I.	OK	O. HUSS
	L.D. AUTO	M.P.I.	OK	L. HACKL
1	C.D. AUTO	M.P.I.	OK	S. COSTA
	L.D. AUTO	M.P.I.	OK	K. BRUNETT
1	C.D. AUTO	M.P.I.	OK	L. HACKL
	L.D. AUTO	M.P.I.	OK	

RADIOGRAPHY RESULTS AND APPROVAL

REMARKS: SHELL WA-946374 NP-1057-1 NP-1057-2 F-302

INSPECTOR
DATE
4-6-64

WELD INSPECTION REPORT

CUSTOMER LACBWR	UNIT NO. 1	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME CYLINDER - UPPER		DRAWING NO. 43-501-195-06-50	
WELD LOCATION LONGITUDINAL JOINT	WELDING PROCESS 43-101-710 MAX 43-101-719 MAX	SHIELDING GAS	
GROOVE TYPE "U"	PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX	

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016 F	302B	210	
5/16	ACM 1436	R-5458	600	36 VOL
20X80X200 FLUX				
12 IPM				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	1-23-64	1	2	HAND WELD 6 PASSES COMPLETE
L. ADAMS	1-23-64	1	397	
M. SCHIPPI	1-23-64	2	350	
M. GARDNER	1-23-64	3	290	

PROCEDURE and INSPECTION SEQUENCE				
LAYER		RESULTS	DISPOSITION	APPROVAL
1	C.D. HAND	M.P.I.	OK	S. COSTA
2	C.D. HAND	M.P.I.	OK	S. COSTA
1	2 1/2" AUTO C.D.	M.P.I.	OK	S. COSTA
17 TH	1 1/2" AUTO C.D.	M.P.I.	OK	M. YOHANN
FINAL	A.D.	M.P.I.	OK	B. HAUSCH
B/G		M.P.I.	OK	K. BRUNETT
FINAL	IN	M.P.I.	OK	K. BRUNETT

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS: SHELL - WA-946374 NP-1057-1 A-302	
TEST BARS WELDED WITH SHELL 1057-1 & 1058	
	INSPECTOR <i>[Signature]</i>
	DATE 2-4-64

WELD INSPECTION REPORT

CUSTOMER LACBWA	UNIT NO. Z	GROUP 0100	SHOP ORDER NO. 2-4300-00499
PART NAME WA-946374		DRAWING NO. 43-501-195-06-501	
WELD LOCATION LONGITUDINAL JOINT		WELDING PROCESS 43-161-710 MK 401 43-161-769 MK 401	SHIELDING GAS
GROOVE TYPE, U"		PREHEAT 300°	INTERPASS TEMPERATURE 500° MAX

ELECTRODE OR FILLER WIRE				
SIZE	TYPE	LOT NO.	AMPERAGE	CURRENT
3/16	9016A	3C2B	210	
3/16	ACM 1436	R-5458	600	36 VOLT
20 X 80 X 200 FLUX 12' 1PM				

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
P. ZALE	1-23-64	1	2	HAND WELD 6 PASSES COMPLETE
L. ADAMS	1-23-64	1	397	
M. SOMPPPI	1-23-64	2	350	
M. GARDNER	1-23-64	3	290	

PROCEDURE and INSPECTION SEQUENCE			
LAYER	RESULTS	DISPOSITION	APPROVAL
1	M.P.I.	OK	S. COSTA
2	M.P.I.	OK	S. COSTA
1	M.P.I.	OK	S. COSTA
17 TH	M.P.I.	OK	M. YOHANA
FINAL	M.P.I.	OK	B. HAUSCH
B/G	M.P.I.	OK	K. BRUNETTE
FINAL	M.P.I.	OK	K. BRUNETTE

RADIOGRAPHY RESULTS AND APPROVAL	WELD SKETCH
REMARKS: SHELL - WA-946374 NP-1657-2 A-302	

INSPECTOR
[Signature]
DATE **2-4-64**

WELD INSPECTION REPORT

LACEWR
 CENTER CYN TO LOWER HEAD ASSEM
 CIRCUMFERENTIAL
 43-501-186-01 DCT'W"
 0201 2-4300
 43-501-186-01 501
 300°F MIN 500°F MAX

SIZE	TYPE	LOT NO	AMPERAGE	CURRENT
3/16"	MIL 9016A	4D-2EB	200	
3/16"	ACM-1436	S-1324T	600	12 I P 8 X 20 CAL
3/16"	ACM-1436	P-5480B	600	12 I P 8 X 20 CAL

WELDER	DATE	SHIFT	STAMP	PORTION WELDED
ZALE, P	12-2-64	1	2	1 - MANUAL
REBHART, J	12-2-64	2-3	229	6 - MANUAL
ZALE, P	12-3-64	1	4	2 - MANUAL
ADAMS, L	12-3-64	1	347	6 - AUTOMATIC
FROST, D	12-3-64	2	454	14 - AUTOMATIC
LAMPY, C	12-3-64	3	148	9 - AUTOMATIC
MANTHEY, A	12-4-64	1	351	12 - AUTOMATIC
FROST, D	12-4-64	2	459	9 - AUTOMATIC
FROST, D	12-5-64	2	454	4 - AUTOMATIC - INSIDE

PROCEDURE AND INSPECTION SEQUENCE

LAYER	RESULTS	DISPOSITION	APPROVER
ROOT	M T	OK	K. FROST
MANUAL	M T	OK	S. CLISTO
FINAL	M T	OK	S. CLISTO
MANUAL	M T	OK	C. HUSS
ROOT	M T	OK	C. HUSS
AUTOMATIC	M T	OK	C. HUSS
1 1/4" FROM TOP	M T	OK	L. HALL
3/4" FROM TOP	M T	OK	J. MOICER
3/8" FROM TOP	M T	OK	C. HUSS
FINAL	M T	OK	L. HALL
B/GPND	M T	OK	C. HUSS
FINAL	M T	OK	L. HALL
INSIDE	M T	OK	L. HALL

REMARKS

C. Huss
 12-7-64

ATTACHMENT E

REHEAT-TREATED LOWER CYLINDER

DEVIATION REPORT

Form 7714-1
Printed in U.S.A.
No. 01698

For Material Review Board Action: Yes No

A-C ORDER NO. 2-4300-00461	GROUP NO. 0210	ITEM 7	UNIT NO. SERIAL NO. NEXT NO. NP-1058	DRAWING NO. 43-501-194	ISSUE	MARK
A-C DRAWING NO.				PLT. DRWG. NO.	ISSUE	MARK

CUSTOMER NAME: **LACBWR** PART NAME: **CYLINDER.**

CUSTOMER ORDER NO. _____ CUSTOMER SPECIFICATION _____

VENDOR _____ VENDOR CODE _____ PURCHASE ORDER _____ SUFFIX _____

Description of Deviations: **RESULTS OF PHYSICAL TESTS TAKEN ON DRGP OUTS REMOVED FROM ABOVE DEVIATED FLATE. PLATE WAS FORMERLY DEVIATED ON DEVIATION # 01046 AXIAL WELD DROP OUT**

SAMPLE NO	DIMENSIONS	AREA	ULT. LOAD LB.	ULT. STRESS P.S.I.	ELONG.	RED. IN AREA
# 1 T.O	.505"	.2	T.S. 15,260 Y.P. 11,900	76,300 57,500	25%	62% 49% 66%
# 2 T.O	.505"	.2	T.S. 15,600 Y.P. 12,340	78,000 61,700	23%	65%
# 1 W	.505	.2	T.S. 15,000 Y.P. 12,360	75,000 61,800	25%	67%
# 2 T.	.505	.2	T.S. 15,440 Y.P. 12,820	79,700 64,000	23%	66%
BASE METAL DROP OUT.	.505"	.2	T.S. 17,200 Y.P. 13,200	86,000 64,000	29%	7%

CHARPICS @ 710°F
WELD: 1 93.5 41 3 43 / 26 37.5 38.5
HAZ: 1 26 37.5 38.5 / 2 80 96 52
BASE METAL: 1 80 2 96 3 52

1. SIDE BEND TAKEN
BASE METAL SHOWS
NO VISIBLE DEFECTS

Noted: R. J. ... 1/8/69

DEPT: 1009 DATE: 1-2-64 LOCATION OF MATERIAL: TANK & PLATE SHOP

DISPOSITION: By Material Review Board? Yes No (If yes, three signatures required below)

USE AS IS <input type="checkbox"/>	Corrective Action Taken:	RESPONSIBILITY:
REPAIR <input type="checkbox"/>		<input type="checkbox"/> Vendor
SCRAP <input type="checkbox"/>		<input type="checkbox"/> Other Work
NO SCRAP MAT'L TO:		A-C Dept. _____
General Scrap <input type="checkbox"/>	Comments or Instructions:	REFER TO:
Supplier <input type="checkbox"/>		5727 Serial No.
Special Stock <input type="checkbox"/>		1143288 5746 Order No.

MACHINE OUT THE AXIAL WELD SEAM AND RE-WELD AS PER ENGINEERING CHANGE NOTICE ISSUED 1/8/69. MEMO TO COVER THE REQUIRED TESTING WILL BE ISSUED.

RECEIVED
JAN 10 1964

DISTRIBUTION: #4 Copy _____ #5 Copy _____

Reproduced Extra Copies To: _____

DATE: 1/8/69

ENGINEERING COPY

INTER-OFFICE CORRESPONDENCE

To: ATOMIC ENERGY DIVISION - BETHESDA

Date: May 5, 1965

Attn: Mr. E. Rothen

From: Inspection Dept.
Non-Destructive Test Sect.Subject: LACBWR REACTOR VESSEL
REF: SHELL COURSE N.P. 1058

Attached you will find the test results from the overheated and retreated shell course N.P. 1058.

TEST NO. 1 - dated 12-30-63

Physicals	Failed
Side Bend	Acceptable
Charpies-Weld	Acceptable
Charpies-H.A.Z.	Acceptable
Charpies-Base Metal	Acceptable

Axial Weld was then removed from this shell as per Deviation Report 01098, dated 1-2-64 and Engineering Change Notice dated 1-8-64. After rewelding and full stress relieving, a drop out section was removed and tested as per Memo from J.A. George, dated 1-23-64, with the results reported on:

TEST NO. 2 - dated 1-31-64

Physicals	Acceptable
Charpies-Weld	Failed
Charpies-H.A.Z.	Acceptable

The fact that the charpies failed in the all weld area was thought to be from faulty machining preparation, additional samples were then removed, and machined with the test results reported on:

TEST NO. 3 - dated 2-11-64

Charpies - All Weld @ +15 degree F.	Acceptable
Charpies - All Weld @ + 10 degree F.	Acceptable

Summary

Acceptable Physicals	Test No. 2
Acceptable Charpies-Base Metal	Test No. 1
Acceptable Charpies-H.A.Z.	Test No. 2
Acceptable Charpies-All Weld	Test No. 3

Orville Huss

Orville Huss
Department 8036 Inspection

cc: R.N. Hafemeister
noted: K. Bistau

K. Bistau

ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

FORM 4427-C
LITHO IN U.S.A. - A-1-C

WELDER: _____ CLOCK NO.: _____ STAMP NO.: _____ DATE: 12-3-63

DESCRIPTION OF BASE MATERIAL: _____ SIZE: _____ BASE MATERIAL SPEC.: _____

FILLER METAL SPEC.: _____ SIZE: _____

DESCRIPTION OF WELD JOINT: _____

POSITION OF WELDING: TACK SWELDED FROM OPERATOR END OF PLATE. JOBS OF MATERIAL (MATERIAL IDENTIFIED)

PROCEDURE SPEC. OR CODE: _____ PERFORMANCE SPEC. OR CODE: _____

PREHEAT: _____ POST HEAT: _____

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB.	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				
1	5/8	3/16	.8	15,500	19,000	EA 20% EA-60%
2	5/8	3/16	.8	15,500	19,000	EA 20% EA-60%
3	5/8	3/16	.8	15,500	19,000	EA 20% EA-60%
4	5/8	3/16	.8	15,500	19,000	EA 20% EA-60%
5	5/8	3/16	.8	15,500	19,000	EA 20% EA-60%

1/2 GUIDED BEND TESTS

SAMPLE NO.	TYPE OF BEND	RESULTS
1	3/4"	10. visible defects
		11. visible defects
		12. visible defects
		13. visible defects
		14. visible defects
		15. visible defects
		16. visible defects
		17. visible defects
		18. visible defects
		19. visible defects
		20. visible defects
		21. visible defects
		22. visible defects
		23. visible defects
		24. visible defects
		25. visible defects
		26. visible defects
		27. visible defects
		28. visible defects
		29. visible defects
		30. visible defects



SWORN TO BEFORE ME THIS _____ DAY OF _____ 1963

SIGNED: ETHEL G. MICHAELIS
Notary Public, State of Wisconsin
My Commission Expires March 12, 1967

WITNESSED BY: _____

Not Qualified
1/3/64
THE UNITED STATES CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE: 12-3-63
SIGNATURE: E. G. Michaelis



ALLIS-CHALMERS MFG. CO.
RESEARCH LABORATORIES

3027

WELDING PROCEDURE AND WELDER QUALIFICATION TEST

FORM 5497-2
LITHO IN U.S.A.-A.C.

WELDER _____ CLOCK NO. _____ STAMP NO. _____ DATE 1-31-64

DESCRIPTION OF BASE MATERIAL A302 SIZE 4" BASE MATERIAL SPEC. A302-A302

FILLER METAL SPEC. W.-1435 SIZE 3/16" wire dia.

DESCRIPTION OF WELD JOINT G Double "D" G. 0070

POSITION OF WELDING Flat

PROCEDURE SPEC. OR CODE _____ PERFORMANCE SPEC. OR CODE 43-101-701 P-10.

PREHEAT 300°F to 500°F POST HEAT 1150°F - 4 HRS.

REDUCED-SECTION TENSILE TEST

SAMPLE NO.	DIMENSIONS		AREA	ULTIMATE LOAD LB	ULTIMATE STRESS P.S.I.	CHARACTER AND LOCATION OF FRACTURE
	WIDTH	THICKNESS				
2		.300	.41	13700	33500	21.0-23.0 Clean.
		.500	.27	14420	53400	15.0-19.0 Flaw LONGITUDINAL at end of

GUIDED BEND TESTS

SAMPLE NO.	TYPE OF BEND	RESULTS
1	All Weld	27
2	" "	22
3	" "	20
4	" "	17
5	" "	42
6	" "	17

SWORN TO BEFORE ME THIS 21st DAY OF July 1964

SIGNED J. H. Cull

MY COMMISSION EXPIRES 21st Dec. 1967
NOTARY PUBLIC MILWAUKEE COUNTY, WISCONSIN

WITNESSED BY _____

THE UNDERSIGNED CERTIFIES THAT THE STATEMENTS MADE IN THIS REPORT ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE MENTIONED CODE.

DATE 2-4-64

SIGNATURE J. H. Cull