

CLINTON POWER STATION - UNIT 1
"FRACTURE PREVENTION OF CONTAINMENT PRESSURE BOUNDARY"

GDC-51

INDEX

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INTRODUCTION

The enclosed documentation tabulates the fracture toughness data in response to a Nuclear Regulatory Commission request at a meeting held May 12, 1981 in Sargent & Lundy's offices.

During this meeting the NRC specified the following components, which form part of the containment boundary, will require material certification to justify the lowest service metal temperature:

Penetrations - only the thickest wall penetration for each type material.

Head fittings - only the thickest head fitting for each type head fitting design and each type material.

Personnel and equipment hatches - only the thickest section of the hatch assembly.

Piping - only MS and FW typical spool sections from inside the containment penetration through the first isolation valve.

The lowest service metal temperature specified for each component above was based on the following logic:

1. Results of an acceptable fracture toughness in accordance with NC-2300;

or

2. Derived from Table NC-2311(a)-1, ASME Code, Section III for the particular material and heat treatment plus the temperature adjustment for thickness;

or

3. Derived from NUREG-0577. An NDT temperature was obtained for the particular material and heat treatment in the NDT +1.3 σ column of Table 4.4, and to this value was added the temperature adjustment for thickness from Figure NC-2311(a)-1 of ASME Section III.

Several components in the containment boundary are exempt from material certification requirements because of size or the fact they are fabricated from austenitic stainless steel. See Section II for the exemptions allowed by the ASME Code, Section III.

FRACTURE TOUGHNESS EXEMPTIONS
PER ASME SECTION III
1977 SUMMER - 1977 ADDENDA

1. Material with a nominal section thickness of 5/8 inch and less - ASME Section III 1977, Summer 1977, NC-2311(a)(1).
2. Bolting, including studs, nuts, and bolts, with a nominal size of 1 inch and less - ASME Section III 1977, Summer 1977, NC-2311(a)(2)
3. Bar with a nominal cross-sectional area of 1 square inch and less - ASME Section III 1977, Summer 1977, NC-2311(a)(3).
4. All thicknesses of material for pipe, tube, fittings, pumps, and valves with a nominal pipe size of 6 inches in diameter and smaller - ASME Section III 1977, Summer 1977, NC-2311(a)(4).
5. Material for pumps, valves, and fittings with all piping connections of 5/8 inch nominal wall thickness and less - ASME Section III 1977, Summer 1977, NC-2311(a)(5).
6. Austenitic stainless steel - ASME Section III 1977, Summer 1977, NC-2311(a)(6).
7. Nonferrous materials - ASME Section III 1977, Summer 1977, NC-2311(a)(7).

PENETRATIONS

Component Number	Drawing/ Document	Description	Material	Thickness	Impact Test Temp.	Test Data		Derived LSMT	Exempt	Notes
						Charpy V-notch	Mils Lateral			
MC11	S27-1911	34"Ø	SA240 Gr304	.500"	--	--	--	--	NC2311(a)(6)	
MC28	S27-1911	14"Ø	SA312 TP304	1.406"	--	--	--	--	NC2311(a)(6)	
MC86	S27-1911	10"Ø	SA333 Gr1	.593"	--	--	--	--	NC2311(a)(4)	
MC05	S27-1911	42"Ø	SA516 Gr70	1.500"	-30°F	17-26-48 ft/lbs	.025-.036-.050 in	--	--	per #1
MC42	S27-1911	18"Ø	SA333 Gr6	.937"	-50°F	104-79-95 ft/lbs	.086-.067-.082 in	--	--	per #1

BETHLEHEM STEEL CORPORATION
METALLURGY DEPARTMENT
REPORT OF TESTS AND ANALYSIS

65 119

PLANT INDIAN HARBOR	SHIPMENT NO. 433-21312	DATE SHIPPED 12-1-75	CAR OR VEHICLE NO. CSS 100	FI 091578	PAGE 2
------------------------	---------------------------	-------------------------	-------------------------------	--------------	-----------

CHICAGO BRIDGE & IRON CO
BOX 774
KANKAKEE IL 60901

SH. TO

CHICAGO BRIDGE & IRON CO
TRAC #A1
INDIAN OAKS IL

[Handwritten signature]

DESCRIPTION & SPECIFICATION CUSTOMER ORDER NO. BSCD ORDER NO.	SERIAL NUMBER	HEAT NUMBER	SIZE & QUANTITY				YIELD STRENGTH	TENSILE STRENGTH	ELONG. IN. %	BEND	HARDNESS		
			No. Pcs.	Thickness	Width or Dia	Length					Weight	Type	Value
PLATE PLATES- MS-5-55 REV 2 & QAS-354 REV 0 ASME CLASS 1 GR 70 PVQ 6 ASME SECT 3 SUMMER 73 ADD LONG V 2 FT LB AT MINUS 30 DEG F PER NE-2300 74-2133F-6 GR 71-0369													
			1	1- 1/2	59	127- 7/8	3236	46100	74700	8	27	OK	
			1	1- 1/2	59	127- 7/8	3236	46100	74700	8	27	OK	
			1	1- 1/2	59	127- 7/8	3236	46100	74700	8	27	OK	
			1	1- 1/2	59	127- 7/8	3236	46100	74700	8	27	OK	
			1	1- 3/8	59	115- 5/8	2657	48900	77200	8	25	OK	
			1	1- 3/8	59	115- 5/8	2657	48900	77200	8	25	OK	



We certify that the requirements of the specification numbers shown hereon have been met.

PLATES NORMALIZED AND STAMPED MT

HEAT NUMBER	CHEMICAL ANALYSIS						McQUAD GRAIN SIZE			
	C	Mn	P	S	Si	Ti				
433-21312	0.25	1.10	0.017	0.015	0.23					
433-21312	0.25	1.18	0.015	0.030	0.23					

89B HSB

10 MC-5

I certify the above results to be correct as contained in the records of the Bethlehem Steel Corporation.

C. W. ROE
CHIEF METALLURGIST

[Handwritten signature]

IMPACT PROPERTIES

[Handwritten signature]

CUSTOMER: Chicago Bridge and Iron Company

PAGE 2 ATTACHMENT
SHIPMENT NO. 803-20312
DATE SHIPPED 11/2/75

LONGITUDINAL CHARPY V-NOTCH TESTED @ -30 °F

SERIAL NUMBER	HEAT NUMBER	CHARPY SIZE	FT. LBS.	% DUCTILE FRACTURE AREA	LATERAL EXPANSION (IN)
T 31466(1-4)	802T53670	FULL	17-26-48	36-36-47	.025-.036-.050
T 10197(1-2)	821S34920	FULL	25-24-25	50-50-50	.032-.030-.031

[Handwritten calculations]
17
26
48
31701
3



mc-5

RECORD OF HEAT TREATMENT

CUSTOMER: Chicago Bridge and Iron Company

PAGE 2 ATTACHMENT
SHIPMENT NO. 803-20312
DATE SHIPPED 10/2/75



SERIAL NUMBER	HEAT NUMBER	PLATE NORMALIZING CYCLE		COOLING
		FURNACE TEMP °F	TIME (MIN)	
T 31466(1-4)	802T53670	1700/1720	51	AIR COOL
T 10197(1-2)	821S34920	1700/1720	47	AIR COOL

mc-5

PLATES AND TEST SPECIMENS NORMALIZED PER PROCEDURE PM300.

TEST SPECIMENS NOT REMOVED UNTIL AFTER PLATE NORMALIZED.

7CHI BRIDGE I

CFGUYON-HOU

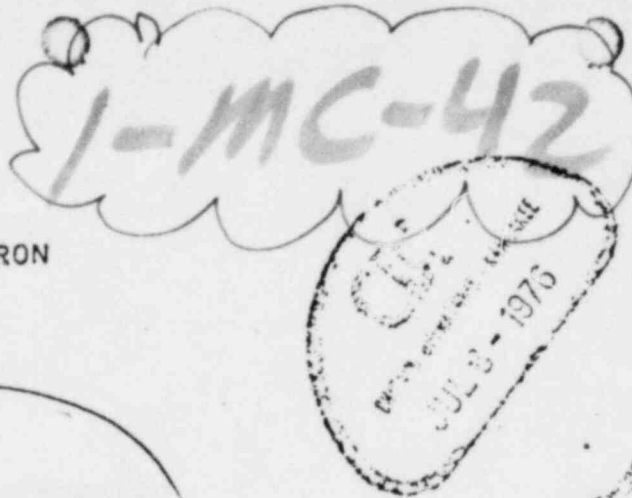
CHICAGO BRIDGE * IRON

KANKAKEE, ILLINOIS

7-1-76

ATTN: MS. SHIRLEY HERBERGER

REF: P.O. # C-111832-2653



mail to
Kankakee
TELEGRAM-URGENT

[Handwritten signature]

PER OUR DISCUSSION THIS DATE PLEASE USE THIS AS YOUR AUTHORIZATION
TO STENCIL THE FOLLOWING:

ASME SA-333 GR.6 PIPE

(A) 18" S/80 HT.NO. B16328 (U.S.S.)

STENCIL THE IMPACT TEST TEMPERATURE OF "LT-50" TO
THIS MATERIAL.

(B) 20" XH HT.NO. A01247 (U.S.S.)

STENCIL THE LETTERS U.S.S. (UNITED STATES STEEL)
AND HF (HOT FINISHED) TO THIS MATERIAL.

SORRY FOR ANY INCONVENIENCE.

LARRY G. FULCHER/CF

MGR. Q.A.

GUYON ALLOYS, INC.

HOUSTON, TEXAS



Line No. 27
Folder No. 3



United States Steel Corporation

Sheet 1 of 3

STANDARD SWORN TEST REPORT

TUBULAR PRODUCTS

National

WORKS

11-14-75

DATE

MATERIAL

Seamless Pressure Pipe

GRADE

1-6 ASME SA 332 ✓

TREATMENT

Normalized 1600°F - 113 min. (Aircooled) ✓

1-6 ASTM 333

C
U
S
T
O
M
E
R

NAME

Guyon Alloys, Inc.

CUSTOMER'S ORDER NO.

A-13203M

ADDRESS

U.S. STEEL ORDER NO.

E3 42920

CITY AND STATE

INVOICE NO.

356-06624

Longitudinal tensile tests

Q.T.	CODE OF LOT NO.	SIZE O.D.	WT./FT. OR WAL. THICKNESS	HEAT NUMBER	HYDRO. TEST PRESSURE MIN. P.S.I.	MECHANICAL PROPERTIES			CHEMICAL ANALYSIS (%)						
						YIELD STRENGTH P.S.I.	TENSILE STRENGTH P.S.I.	ELONG. IN. 2 IN.	C	Mn	P	S	Si	Mo	
01	4396	18"	.938	A03779	2200	46070	69990	47.5	.17	1.14	.009	.013	.14	check	
				A03779	2200	47650	68070	47.5	.17	1.19	.015	.013	.12	check	
									.19	1.13	.012	.015	.14	ladie	
				B16328	2200	45170	69000	53.0	.17	1.19	.015	.016	.12	check	
				B16328	2200	44870	70350	50.0	.16	1.26	.013	.017	.14	check	
									.18	1.14	.013	.016	.12	ladie	
Flattening tests satisfactory															
Full size longitudinal C.V.N. impacts at minus - 50°F															
						Ft. Lbs. % Shear	Lat. Exp.								
				B16328		104	71	.086							
						79	53	.067							
						95	62	.082							
				A03779		31	30	.028							
						81	59	.071							
						51	42	.046							

Chicago Bridge & Iron
C.O. #C-111832-2653



Q.A. APPROVED
BY: *[Signature]* DATE: 11/19/75
GUYON ALLOYS, INC.

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS

14th DAY OF NOVEMBER 1975

BEING DULY SWORN ACCORDING TO
LAW, DEPOSES AND SAYS THAT THE FIGURES SET FORTH ABOVE ARE CORRECT, AS
CONTAINED IN THE RECORDS OF THE COMPANY.

11-19-75
RECEIVED NO. 3

GUYON ALLOYS, INC.

TUBULAR PRODUCTS FOR THE ENERGY INDUSTRIES

☐ 950 South Fourth Street
Harrison, N.J. 07029
Phone (201) 485-5050
TWX (710) 995-4549

☒ P.O. Box 42345
Houston, Texas 77042
(713) 783-3710
(910) 881-3767

☐ 530 E. Swedesford Road
Wayne, Pa. 19087
(215) 687-3770
(510) 668-3991

☐ 1633-26th Street
Santa Monica, Cal. 90404
(213) 829-7401
(910) 343-7402

MATERIAL CERTIFICATION

Subject: Chicago Bridge & Iron Co.
Purchase Order Number C-111832-2653

Description: ASME SA 333 Grade 6

- (a) 6" S/40 Ht. No. 152749 (Armco)
- (b) 10" STD. Ht. No. A03616 (U.S.S.)
- 10" " " " B14811 (U.S.S.)
- (c) 12" STD. Ht. No. A03480 (U.S.S.)
- 12" " " " A02577 (U.S.S.)
- (d) 14" STD. Ht. No. 145106 (Armco)
- (e) 18" S/80 Ht. No. B16328 (U.S.S.)
- (f) 10" S/80 Ht. No. 45928 (Phoenix)
- (g) 12" XH Ht. No. 44827 (Phoenix)
- (h) 18" STD. Ht. No. B16355 (U.S.S.)
- 18" " " " B13612 (U.S.S.)
- (i) 20" XH Ht. No. A01247 (U.S.S.)
- (j) 16" STD. Ht. No. A03616 (U.S.S.)



CERTIFICATION: This certifies that the piping material described herein is in accordance with ASME SA 333 Section II of the ASME Boiler and Pressure Vessel Code, 1971 Edition through the Summer 1973 Addenda and Chicago Bridge & Iron Specification QAS 354 (REV 0), and MS 764 (REV 1), as applicable.

Larry B. Fulcher
Larry B. Fulcher
Manager, Quality Assurance

Date: June 21, 1976

Quality System Certificate
(Matl) # N-934-2

LGF:dv
cc: J. Dowhin

Expiration Date: 1-6-78

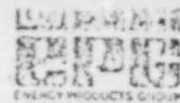
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Folder No. 3

HEAD FITTINGS

Component Number	Drawing/ Document	Description	Material	Thickness	Impact Test Temp.	Test Data		Derived LSMT	Exempt	Notes
						Charpy V-notch	Mils Lateral			
MC11	M06-1000-4	Forged	SA182 GrF316	2.000"	--	--	--	--	NC2311 (a) (6)	
MC06	M06-1000-3	Forged	SA350 GrLF2	3.500"	+60°F	135-126-128 ft/lbs	48-104-74	--	--	per #1
MC09	M06-1000-4	Forged	SA350 GrLF1	3.500"	+10°F	36-36-24 ft/lbs	29-23-22	41°F	--	N,Q,T, #3
MC53	EMD Report 4536-IPC-0682	Flat-plate	SA240 Gr304	1.750"	--	--	--	--	NC2311 (a) (6)	
MC16	EMD Report 4536-IPC-0682	Flat-plate	SA516 Gr60	2.000"	+10°F	42-45-44 ft/lbs	29-31-30	25°F	--	N, #3
MC44	EMD Report 4536-IPC-0682	Flat-plate	SA516 Gr70	.750"	+10°F	68-71-70 ft/lbs	51-55-52	--	--	per #1

CUSTOMER: Southwest Fabr & Welding Co.

TAYLOR FORGE/CICERO DIVISION
GULF WESTERN MANUFACTURING COMPANY
P.O. Box 425
Cicero, Illinois 60696



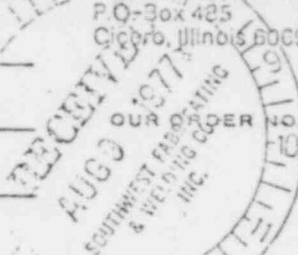
SPECIFICATION NO. See Below

CUSTOMER ORDER NO. Q 5243N-3

OUR ORDER NO. 107795

PACKING LIST NO. 310304-05

HEAT TREATMENT
25.80" ID Head Fitting
SA 350 LF-2



DESCRIPTION	CHARGE NO. TF Item	HEAT SYMBOL	MILL HEAT NO.	PHYSICAL PROPERTIES				CHEMICAL ANALYSIS										
				YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONG. IN 2" %	RED OF AREA %	C	MN	P	S	SI	PPH CO	CR	PPH CU	V	AL	
MC-6 6 - 25.80" ID x 36.00" OD x 8.50" Thick Head Fitting 250 RMS Surface Finish Per Dag. Sheet M-7623	601	EPZZ	6054205	63660	77500	33.07	4.2	.25	.73	.10	.017	.17						
		"	"	Check Analysis				.25	.73	.06	.018	.20	.006	.06	.10	.01	.01	
		S/N UTH1877-5		Grain Size: 8 - 10									SN .006 AS .01 Antimony .003					
				Charpy Impact Test, V-Notch, Transverse, Full Size:														
Serial No.	Charge No.			Ft. lbs.	% Shear Fracture	Mils Lateral Expansion										% Lateral Expansion		
UTH1877-1	462A	Plus 600F.:		135-126-128	95-95-95	18-104-74										12.1-26.4-13.8		
" -2	462B	Minus 500F.:		70-58-72	20-20-30	51-40-52										12.1-10.1-13.2		
UTH1877-3	462D																	
UTH1877-5	462F																	
" -7	462G																	
" -8																		

REMARKS: Tensile, impact tests and check analysis taken from test ring parted from product per heat per heat treat charge or continuation charge. Parts are capable of withstanding the hydrostatic test referenced in ASME SA350. Parts have been ultrasonic examined per TF 41.223 Dtd 2/12/75 Rev. 1 and were found to be satisfactory. Parts have been magnetic particle examined per TF 41.111 Dtd 2-7-75 Rev 1 Dtd 2-7-75 and were found to be satisfactory. NDE Reports attached. Heat Treatment charts attached. NDE Personnell qualification list and Eye Examination reports attached. Parts have been manufactured in complete compliance with the subject specifications and all special requirements of your purchase order have been met.

SUBSCRIBED AND SWORN TO BEFORE ME Certificate of Authorization No. N-991 Expires 3-3-78.

THIS 20th DAY OF May 19 77

BWRPD
CPB
DE 19 77

CPB
5-78

NOTARY PUBLIC
MY COMMISSION EXPIRES DEC. 18 1978
ISSUED THROUGH ILLINOIS NOTARY ASSOC

S.F.A.W.CO
Q 6 A

QUALITY CONTROL

ASME SA-516-60 MOD.

F01766-67

NORMALIZED- 1700°F. - 6 hrs - Air cooled.
QUENCHED - 1650°F. - 6 hrs - Water Quenched.
TEMPERED - 1250°F. - 10 hrs - Air cooled.

low Temp
SA 350 L.F. 1

Q A 6

MA-2-1000 EXPIRES AUG 18, 1977

QUALITY CONTROL

MC-16

Flat Plate head fitting mat

PURCHASER:

CHARBON STEEL PROD. CORP.
803 JULIA STREET
ELIZABETH, N.J.
07201

LUKENS STEEL COMPANY

COATESVILLE, PA. 19320

TEST CERTIFICATE

DATE 2/01/80

FILE NO. 1420-01-01

CONSIGNEE:

MILL ORDER NO.
33169 2

CUSTOMER P.O.
10531-C

12080 DG
L 13080

THIS MATERIAL HAS BEEN MANUFACTURED AND TESTED IN ACCORDANCE WITH PURCHASE ORDER REQUIREMENTS AND SPECIFICATIONS:

SA-516 GR. 70 A-516 GR. 70 ASME CODE SECT. II & III SUB NC 1974 EDITION THRU SUMMER
1974 ADDENDA N-1160 8/4/81

BEND TEST

O.K. - HOMOGENEITY TEST

CHEMICAL ANALYSIS

MELT NO.	C	MN	P	S	CU	SI	NI	CR	MO	V	TI	AL	B	GRAIN SIZE
D9346	.26	1.00	.005	.025		.28								7-8
C1997	.20	1.00	.012	.016		.20								7-8

RIR
S-91804

PHYSICAL PROPERTIES

MELT NO.	SLAB NO.	YIELD PSI X100	TENSILE PSI X100	% ELONG IN 2"	% R.A.	BHN	IMPACTS	DESCRIPTION
D9346	1B	500	832	24				(1- 2 X 55 X 220 1- 2 X 69 X 165
C1997	4C	470	715	29				1- 2 X 90 X 147

BALDWIN ASSOCIATES
RECEIVED

LIR 11100

DOCUMENT RECORDS CENTER
REC'D BY K. VIRTON

Plates and tests norm. 1625°F./1675°F., held 1/2 hr. per inch min. and air cooled.

Baldwin Associates
2 pcs. 2" x 47 x 47"
2 pcs. 2" x 27 x 27"



LUKENS STEEL COMPANY
This report to which this stamp is affixed is a copy of the original purchaser's test report. There is indicated not only a verification of this material but also a report of compliance with specification requirements. In this report, those items which are listed as being pertinent. We certify to you that the material supplied to you is completely identifiable by this document.
Inv. # 44934
Date 2/6/80
Signed *Ronald Kampa*
FOR THE QUALITY CONTROL DEPARTMENT

We hereby certify the above information is correct.

KR

City Testing & Research Laboratories, Inc.

250 WEST 54th STREET 212 Circle 5-4393 NEW YORK, N. Y. 10019



REPORT OF TESTS

Reference No. S-56321

MATERIAL

Carbon Steel Plate (2 inch)

Your Order No. 625

FROM

Carbon Steel Products Corp.
Elizabeth, N.J. 07201

Specification No. ASME SA516,
Grade 70 and
Sect. III, NE 22

Specimen Number

2 inch Carbon Steel Plate

Marked

Heat No.

D 9346, Slab 1B, Lukens

S.O.

35637

Re:

Baldwin Associates, P.O. C21480-75763

Charpy Impact Test

Specimen Type

"V" Notch

Specimen Size

10 x 10 mm

Test Temperature

Plus 10°F

Orientation and Location

The specimens were removed with the longitudinal axis located one-quarter thickness below the surface in the longitudinal direction. The notch was normal to the surface.

Specimen No.

1

2

3

Average

Required

Impact values, ft.-lbs.

42

45

44

44

20 Minimum

Lateral Expansion, mils

29

31

30

-

-

Shear Fracture, percent

30

30

30

-

-



R I R

S-9180

BALDWIN ASSOCIATES
RECEIVED

FEB 11 1980

REMARKS

KR

DOCUMENT RECORDS CENTER
REC'D BY K. BURTON

The submitted plate conforms to the requirements noted.

I certify that this report is a true report of
results obtained from our tests of this material

Subscribed and sworn to before me
this day of 19

Tests by H. Goldenberg, P.E. Date Feb. 5, 1980 Witnessed by
Asst. Technical Director

REQ., JOB, CONTRACT NO.

P.O. DATE

PURCHASE ORDER NO.

SHEETS NO.

MILL ORDER NO.

INVOICE NO.

7787

6/15/78

6607710

162-52174

VEHICLE

IDENTITY

160

HOMESTEAD WORKS
HOMESTEAD, PA. 15120

CARBON STEEL PRODUCTS CORP
883 JULIA STREET
ELIZABETH N J 07201

CARBON STEEL PRODUCTS CORP
883 JULIA STREET
ELIZABETH N J

WE HEREBY CERTIFY THAT THE
CHEMICAL ANALYSES AND/OR
TEST RESULTS SHOWN IN THIS
REPORT ARE CORRECT AS
CONTAINED IN THE RECORDS
OF THE COMPANY.

SIGNATURE M.W. MAXSON, CH. MFR.

DATE 06/17/78

SPEC.
&
INSP.

ASME SA-516 WINTER 1977 ADDENDA GRADE 70 & ASME SEC III WINTER 19
77 ADDENDA ARTICLE NF COMPONENT SUPPORTS WITH APPLICABLE PARA TO P
LATE PRODUCT OF SUBARTICLES NF-2130 & NF-2150, QUAL ASSUR (SEE DRD)
PLATES

MILL CERTIFIED T/R - ANALYSIS TO SOLD TO ATTN J GREENBAUM

Baldwin Assoc.
1 pc. 3/4" x 90 x 54"

ITEM NO.	MATERIAL DESCRIPTION			QUAN- TITY	WEIGHT	HEAT NO.	TEST OR PIECE IDENTITY	YIELD ST. KSI	TENSILE STR. KSI	ELONGATION %	
	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH							IN 8"	IN 2"
02	1.0000	90	306	1	7810	660256	73394A BC+ 52.5	79.3	27.5		
02	1.0000	90	306	1	7810	660256	73399B BC+ 52.5	79.3	27.5		
04	5/8	90	306	1	4881	660256	73114B BC+ 53.8	79.2	22.5		
05	3/4	90	306	1	5858	660256	73113B BC+ 47.8	78.8	20.0		

SPEC: QUAL. ASSUR. CERTIFICATION REQD. PER NA-3700 PRESSURE VESSEL QUALITY
NORMALIZE.

*YSEUL # .0050 EXT.

HEAT NO.	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO
660256	HEAT	24	119	005	023	24												

AVG. GR. SIZE 08 GS 5 OR FINER



BALDWIN ASSOCIATES
RECEIVED

SEP 7 1978

DOCUMENT RECORD CENTER
BARB BAUSCH

Your P. O. # C-13099-67471

Our Inv. #

Date

Signed Mary Gellinger

FOR THE QUALITY CONTROL DEPARTMENT

RIR
S-4228

Flat Plate
MC-44 head fitting material

City Testing & Research Laboratories, Inc.

WEST 54th STREET 212 Circle 5-4393 NEW YORK, N.Y. 10019



REPORT OF TESTS

Reference No. C-56063

MATERIAL

Carbon Steel Plate (5/8")

Your Order No. 603

FROM

Carbon Steel Products Corp.
Elizabeth, N.J. 07201

Specification No. AISC 360
Grade 70
Sect. 17

Specimen Number

5/8 inch Carbon Steel Plate

Marked

Heat No. 662256, Lab 731143, U.S.S.

S.O. 35637

RE: Baldwin Associates; P.O. C-21480-75763

Charpy Impact Test

Specimen Type

Vee Notch

Specimen Size

10 x 10 mm

Test Temperature

Plus 10°F

S-8736

Notation & Location

The specimens were removed with the longitudinal axis located one-quarter thickness below the surface in the longitudinal direction. The Vee Notch was normal to the surface.

Specimen No.

1

2

3

Average

Required

Impact Values, ft.-lbs.

66

71

70

70

15 Minimum
20 Minimum

Lateral Expansion, mils

51

55

52

-

-

Char Fracture, percent

95

95

95

-

-

BALDWIN ASSOCIATES
RECEIVED

REMARKS

DOCUMENT RECORD CENTER

The submitted plate conforms to the requirements noted.

We certify that this report is a true report of
results obtained from our tests of the material



Submitted and return to before us
this day of 19

Tests by J. J. Colaneri, P.E. Date Dec. 12, 1979. Witnessed by
Asst. Technical Director

MC 44

EQUIPMENT AND PERSONNEL HATCHES

Component Number	Drawing/ Document	Description	Material	Thickness	Impact Test Temp.	Test Data		Derived LSMT	Exempt	Notes
						Charpy V-notch	Mils Lateral			
51-3	74-2653 #50	Equipment Hatch Dish Head	SA516 Gr70	1.00"	-30°F	38-38-45 ft/lbs	.038-.037-.045	--	--	per #1
52-1	74-2653 #50	Equipment Hatch Cantilever Flange	SA516 Gr70	3.00"	-30°F	82-100-70 ft/lbs	.056-.075-.064	--	--	per #1
52-4	74-2653 #50	Equipment Hatch Barrel	SA516 Gr70	.750"	-30°F	30-30-31 ft/lbs	.026-.029-.033	--	--	per #1
150-1	74-2653 #150	Personnel Lock Barrel	SA516 Gr70	5/8"	--	--	--	--	NC2311(a)(1)	
154-1	74-2653 #151	Personnel Lock Head Plate	SA516 Gr70	1.00"	-30°F	16-29-20 ft/lbs	12-22-20	30°F	--	N, per #2
156-1	74-2653 #156	Personnel Lock Door	SA516 Gr70	1.50"	-30°F	31-45-51 ft/lbs	28-39-43	--	--	per #1

BETHLEHEM STEEL CORPORATION
METALLURGICAL DEPARTMENT
REPORT OF TESTS AND ANALYSIS

74-2653
WS. 9. 20

PLANT BURNS HARBOR SHIPMENT NO. 803-25660 DATE SHIPPED 12-31-79 CAR OR VEHICLE NO. CSS ICG MP 825006 PAGE 2

CHICAGO BRIDGE & IRON CO
BOX 774
KANKAKEE IL 60901

CHICAGO BRIDGE & IRON CO
TRACK #A1
INDIAN OAKS IL



DESCRIPTION & SPECIFICATION CUSTOMER ORDER NO. BSCD ORDER NO.	SERIAL NUMBER	HEAT NUMBER	No. Pcs	V	Thickness	SIZE & QUANTITY Width or Dia. GR 70 LRG Q & A	YIELD STRENGTH	TENSILE STRENGTH	ELONG. IN. %	BEND	HARDNESS		RED. %
											Type	Value	
73 ADD LONG V 20 FT LB AT MINUS 30 Q# 074-2553G-1 GH 021-0529A						DEG F PER NE-2300							
T 33497-01802T79800			1	1	✓	113 ✓ 1 / 4 425 ✓	13636	48200	72000	8 23	OK		

PLATES NORMALIZED AND STAMPED MT

We certify that the requirements
of the specification numbers
shown herein have been met.

HEAT NUMBER	CHEMICAL ANALYSIS											McQ. CO. GRAIN SIZE
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	
021T79800	.23	1.09	.008	.022	.25							5/8

I certify the above results to be correct as contained in the records of the Bethlehem Steel Corporation.

C. W. ROE

CHIEF METALLURGIST

Chen

POK 51-3

IMPACT PROPERTIES

CUSTOMER: Chicago Bridge and Iron Company

PAGE 2 ATTACHMENT
SHIPMENT NO. 803-25660
DATE SHIPPED 12/31/75



LONGITUDINAL CHARPY V-NOTCH TESTED @ -30 °F

<u>SERIAL NUMBER</u>	<u>HEAT NUMBER</u>	<u>CHARPY SIZE</u>	<u>FT. LBS.</u>	<u>% DUCTILE FRACTURE AREA</u>	<u>LATERAL EXPANSION (IN)</u>
T 33497-1	802T79800	FULL	38-38-45	60-41-69	.038-.037-.045

PCMK 51-3

Jpa

26.2

RECORD OF HEAT TREATMENT

CUSTOMER: Chicago Bridge and Iron Company



PAGE 2 ATTACHMENT
SHIPMENT NO. 803-25660
DATE SHIPPED 12/31/75

SERIAL NUMBER
7 33497-1

HEAT NUMBER
802T79800

FURNACE
TEMP °F
1640/1705

PLATE NORMALIZING CYCLE
TIME
(MIN)
36

COOLING
AIR COOL

PLATES AND TEST SPECIMENS NORMALIZED PER PROCEDURE PM300.

TEST SPECIMENS NOT REMOVED UNTIL AFTER PLATE NORMALIZED.

74-2653

251

AK

BETHLEHEM STEEL CORPORATION
METALLURGICAL DEPARTMENT

REPORT OF TESTS AND ANALYSIS

CORRECTED COPY 1/20/77

PLANT BURNS HARBOR	SHIPMENT NO. 803-01970	DATE SHIPPED 1/17/77	CAR OR VEHICLE NO.
-----------------------	---------------------------	-------------------------	--------------------

PAGE 2

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CHICAGO BRIDGE & IRON CO
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KANKAKEE IL 60901

SHIP TO
CHICAGO BRIDGE & IRON CO
SHOP RECEIVING YARD
ILLINOIS RT 50 & ST GEORGE RD
INDIAN OAKS IL



me

DESCRIPTION & SPECIFICATION CUSTOMER ORDER NO. BSCO ORDER NO.	SERIAL NUMBER	HEAT NUMBER	SIZE & QUANTITY				YIELD STRENGTH	TENSILE STRENGTH	ELONG. IN. %	BEND	HARDNESS		REC 75	
			No. Pcs.	Thickness	Width or Dia.	Length					Weight	Type		Value
STEEL PLATES-M-6065 REV 2& QAS 354 REV 0 ASME SA516 GR 70 PVQ & ASME SECT 3 SUMMER 73 ADD LONG V 20 FT LB AT MINUS 30 DEG F PER NE2300 MICRO ALLOY ADDITIONS UT A 578 LEVEL 2-100%														
C.O. & C74-2653G-1 GH 21-0529 REP #1 X 10544-1 801X22870														
			1	3	73	350	21738	45400	71800	2 28	OK			

PLAT. NORMALIZED AND STAMPED MT.

We certify that the requirements
of the specification numbers
shown hereon have been met.

HEAT NUMBER	CHEMICAL ANALYSIS											McQUAD-EM GRAIN SIZE
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	
801X22870	.21	1.18	.008	.017	.25							5/8

mk 52-1

BETHLEHEM STEEL CORPORATION
METALLURGICAL DEPARTMENT
REPORT OF TESTS AND ANALYSIS

PLANT

SHIPMENT NO.

DATE SHIPPED

CAR OR VEHICLE NO.



PAGE 2

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ILLINOIS RT 50 & ST GEORGE RD
INDIAN OAKS IL

JB

55

DESCRIPTION & SPECIFICATION CUSTOMER ORDER NO. BSCO ORDER NO.	SERIAL NUMBER	HEAT NUMBER	SIZE & QUANTITY				YIELD STRENGTH	TENSILE STRENGTH	ELONG. IN. %	BEND	HARDNESS		RED. %	
			No. Pcs.	Thickness	Width or Dia.	Length					Weight	Type		Value
STEEL PLATES-MS-6065 REV 28 QAS 354 REV O ASME SA516 GR 70 PVQ & ASME SECT 3 SUMMER 73 ADD LONG V 20 FT LB AT MINUS 30 DEG F PER NE2300 MICRO ALLOY ADDITIONS UT A 578 LEVEL 2-100%														
	X 10544-1	801X22870	1	3	73	350	21738	45400	71800	2 28	OK			

PLA: NORMALIZED AND STAMPED MT.

We certify that the requirements
of the specification numbers
shown hereon have been met.

HEAT NUMBER	CHEMICAL ANALYSIS											McQUAID-EMM GRAIN SIZE
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	
01X22870	.21	1.16	.008	.017	.25							5/8

I certify the above results to be correct as contained in the records of the Bethlehem Steel Corporation.

C.W. ROE
CHIEF METALLURGIST

Per J. Clark

PMK 52-1

RECORD OF HEAT TREATMENT



CUSTOMER: Chicago Bridge & Iron Company

PAGE 2 ATTACHMENT
SHIPMENT NO. 803-01970
DATE SHIPPED 1/17/77

PLATE NORMALIZING CYCLE

<u>SERIAL NUMBER</u>	<u>HEAT NUMBER</u>	<u>FURNACE</u> <u>TEMP °F</u>	<u>TIME</u> <u>(MIN)</u>	<u>COOLING</u>
X 10544-1	801X22870	1655/1700	170	AIR COOL

TEST COUPON STRESS RELIEVING CYCLE

<u>RATE OF HEATING</u> <u>°F PER HOUR</u>	<u>HOLDING</u> <u>TEMP °F</u>	<u>TIME</u> <u>(MIN)</u>	<u>RATE OF</u> <u>COOLING</u>
65/95	1150	480	75/115 DEG F PER HOUR

PLATE AND TEST SPECIMENS NORMALIZED PER PROCEDURE PM300.

TEST SPECIMENS NOT REMOVED UNTIL AFTER PLATE NORMALIZED.

TEST COUPONS REMOVED FROM NORMALIZED PLATE PWHT PER PROCEDURE PM501A.

PCMK 52-1

IMPACT PROPERTIES



CUSTOMER: Chicago Bridge and Iron Company

Handwritten signature

PAGE 2 ATTACHMENT
SHIPMENT NO. 803-01970
DATE SHIPPED 1/17/77

315

LONGITUDINAL CHARPY V-NOTCH TESTED @ -30 °F

<u>SERIAL NUMBER</u>	<u>HEAT NUMBER</u>	<u>CHARPY SIZE</u>	<u>FT. LBS.</u>	<u>Z DUCTILE FRACTURE AREA</u>	<u>LATERAL EXPANSION (IN)</u>
X 10544-1	801X22870	FULL	82-100-70	66-55-63	.056-.075-.064

Bethlehem Steel Corporation

BURNS HARBOR PLANT

BOX 248

CHESTERTON, IND. 46304



January 14, 1977

Chicago Bridge & Iron Company
Box 774
Kankakee, Illinois 60901

Gentlemen:

The following plate has been ultrasonically inspected and found acceptable to ASTM A578-75, Level II.

Equipment: Branson Sonoray 303
Test Method: Contact
Surface: Normalized
Couplant: Water
Transducer: 2.25 MHz., 1" diameter
Bethlehem Manifest Number: 803-01970

<u>Customer Order No.</u>	<u>Item Number</u>	<u>Serial Number</u>	<u>Heat Number</u>	<u>Plate Size</u>	<u>Recordable Indications</u>
C74-2653G-1	IT 1 G3	X 10544-1	801X22870	3 x 73 x 350	See Sketch

Very truly yours,
BETHLEHEM STEEL CORPORATION

P. J. Diffenbach
Metallurgical Supervisor
160" Plate Mill Division



PK 52-1

31
6

100" PLATE MILL - METALLURGICAL DEPT.
ULTRASONIC DEFECTIVE MATERIAL REPORT
40788 (5-68)



REPORT NO.

903-01970

DATE

1-14-77

PLATE SERIAL NO.

GRID SCALE: BLOCK = 20"

PLATE HEAT NO.

801 X 22870



X 10544-1

350"

73"

A

D

E

I

J

L

F

K

N

DEFECT SIZES:

A = 2"x2" - 79" FROM W. END, 31" FROM S. EDGE
B = 1"x1" - 141"
C = 1"x1" - 164"
D = 1 1/2"x1 1/2" - 161" FROM E. END, 44"
E = 1 1/2"x1" - 146"
F = 2 1/2"x1 1/2" - 160"
G = 1"x1" - 139"
H = 1"x1" - 132"
I = 3"x1 1/2" - 118"
J = 2"x1 1/2" - 84 1/2"
K = 1"x1" - 79"
L = 5"x9" - 57"
M = 2"x1" - 1 1/2"
N = 1"x1" - 6"

PLATE GRA - 3"

CUSTOMER ORDER NO. - C 74-26536-1

GH NO. - 21-0529

* CLUSTER OF RECORDABLE INDICATIONS

PC MK-52-4

BETHLEHEM STEEL CORPORATION
METALLURGICAL DEPARTMENT
REPORT OF TESTS AND ANALYSIS

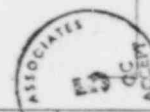
210

74-2653
W.S.

PLANT BURND HARBOR	SHIPMENT NO. 803-25149	DATE SHIPPED 12-27-75	CAR OR VEHICLE NO. CSS ICG	PRR 474465	PAGE 5
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CHICAGO BRIDGE & IRON CO
TRACK #A1
INDIAN OAKS IL



DESCRIPTION & SPECIFICATION CUSTOMER ORDER NO. BSCO ORDER NO.	SERIAL NUMBER	HEAT NUMBER	SIZE & QUANTITY				YIELD STRENGTH	TENSILE STRENGTH	ELONG. IN. %	BEND	HARDNESS		RED. %
			No. Pcs.	Thickness	Width or Dia.	Length					Type	Value	
STEEL PLATES- MS-6065 REV 2 & QAS-354 REV 0 ASME ✓ 73 ADD LONG V 20 FT LB AT MINUS 30 CO. 74-2653G-1 GH 021-0529A													
	T 33506-01822T73640	✓	1	3/4	72- 1/2	344- 1/2	5307	51200	79900	8 25	OK		
	T 33506-02622T73640	✓	1	3/4	72- 1/2	344- 1/2	5307	51200	79900	8 25	OK		

PLATES NORMALIZED AND STAMPED MT

We certify that the requirements
of the specification numbers
shown hereon have been met.

HEAT NUMBER	CHEMICAL ANALYSIS											McQUAD-EM GRAIN SIZE
	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Ti	
822T73640	.22	1.10	.020	.018	.23							5/8

I certify the above results to be correct as contained in the records of the Bethlehem Steel Corporation.

C. W. ROE

CHIEF METALLURGIST

Per *Cracker*

PCMK 52-4

25

RECORD OF HEAT TREATMENT

CUSTOMER: Chicago Bridge and Iron Company



PAGE 5 ATTACHMENT
SHIPMENT NO. 803-25149
DATE SHIPPED 12/27/75

SERIAL NUMBER

T 33506-1
T 33506-2

HEAT NUMBER

822T73640
822T73640

PLATE NORMALIZING CYCLE

FURNACE

TEMP °F
1680/1700
1680/1700

TIME

(MIN)
29
29

COOLING

AIR COOL
AIR COOL

PLATES AND TEST SPECIMENS NORMALIZED PER PROCEDURE PM300.

TEST SPECIMENS NOT REMOVED UNTIL AFTER PLATE NORMALIZED.

PCMK 52-4

IMPACT PROPERTIES

CUSTOMER: Chicago Bridge and Iron Company

PAGE 5 ATTACHMENT
SHIPMENT NO. 803-25149
DATE SHIPPED 12/27/75

LONGITUDINAL CHARPY V-NOTCH TESTED @ -30 °F

<u>SERIAL NUMBER</u>	<u>HEAT NUMBER</u>	<u>CHARPY SIZE</u>	<u>FT. LBS.</u>	<u>% DUCTILE FRACTURE AREA</u>	<u>LATERAL EXPANSION (IN)</u>
T 33506-1	822T73640	FULL	28-34-32	38-44-38	.029-.036-.035
T 33506-2	822T73640	FULL	30-30-31	10-10-15	.026-.029-.033



ITEM	SERIAL NUMBER	PAT. NO.	HEAT NUMBER	SIZE AND QUANTITY				YIELD POINT PSI	TENSILE STRENGTH PSI	ELONG.		REMARKS
				NO. PCS	THICKNESS INCHES	WIDTH OR DIA. INCHES	LENGTH INCHES			WEIGHT POUNDS	IN	
PLATES	MS-3167-ADD REV 0 & GAS-3000-ADD REV 0 ASME SABIG GR 70 PQV 8 ASME SECT 3 SUMMER 76 ADD CH-V SA2055 MULT L 20FTLB AT -30F INFO L MILSESHR AT -30F && NORMALIZED FLATTENED TO STD 10L CO# 73291 SHEET 1 GR 025-8844											
PLATES HEAT TREATED WITH TEST SPECIMENS ATTACHED AND YIELD STRENGTH @ .5% E.U.L.												
3	32290	01	801B20600	1	1 1/2	73	377	11707	44200	70900	8 24	
					N 1650 DEG F - 51 MIN							

Q—QUENCH TEMPERATURE

T—TEMPERATURE

N—NORMALIZE TEMPERATURE

Q—QUENCH TEMPERATURE

T—TEMPERATURE

N—NORMALIZE TEMPERATURE

*CUSTOMER HAS PERMISSION TO RESTAMP FROM 801A20600 TO 801B20600

SERIAL NUMBER	PAT NO	HEAT NUMBER	HARD	BEND	THICKNESS INCHES	CHARPY IMPACT										LAT EXP MILS		
						TYPE	SIZE	DIR	TEST TEMP	ENERGY FT. LBS.			SHEAR (%)			1	2	3
32290	1	801B20600			1.500	V	FULL	L	-30	16	29	20	12	19	17	12	22	20

HEAT NUMBER	C	Mn	P	S	Si	Cu	NE	Cr	Mo	V	Ti	Al	B	Co	N	McQUAY GRAIN SIZE
801B20600	.22	1.07	.022	.021	.215											5/8

SUSCRIBED AND SWORN TO BEFORE ME

THIS 6th DAY OF April 1978

[Signature]

NOTARY PUBLIC

PORTER COUNTY INDIANA

MY COMMISSION EXPIRES JULY 26, 1980

R. L. Miller

CHIEF METALLURGIST

W. R. Krane

CHICAGO BRIDGE & IRON CO
SALT LAKE CITY UT

N—NORMALIZE TEMPERATURE

PL 7



SUBSCRIBED AND SWORN TO BEFORE ME
THIS 6th DAY OF April 1978
HA Ering

NOTARY PUBLIC
PORTER COUNTY INDIANA
MY COMMISSION EXPIRES JULY 26 1980

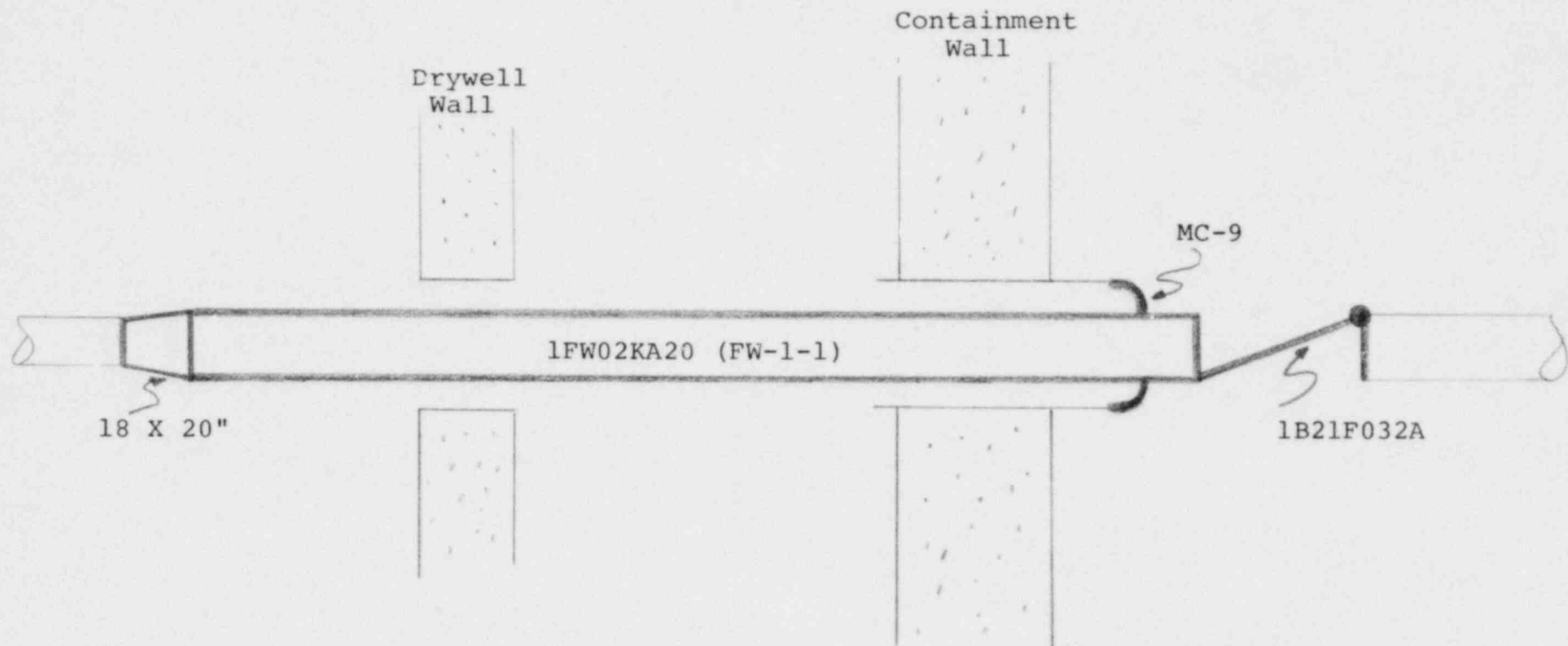
CHIEF METALLURGIST

PLR Wm Kra.

FEEDWATER SYSTEM CONTAINMENT BOUNDARY

Component Number	Description	Material	Thickness	Impact Test Temp.	Test Data		Derived LSMT	Exempt	Notes
					Charpy V-notch	Mils Lateral			
1B21F032A	Valve Body	SA216 WCB	3.295"	50°F	85-87-66	68-71-56	54°F	--	N,T, per #3
1B21F032A	Valve Bonnet	SA105	6.000"	40°F	72-78-84	61-63-65	58°F	--	N, per #3
1B21F032A	Valve Disc	SA216 WCB	4.500"	50°F	55-69-63	50-61-59	62°F	--	N,T, per #3
1B21F032A	Shaft Cover	SA105	1-7/8"	40°F	51-68-52	41-56-43	--	--	per #1
1FW02KA20	1-FW-1-1 Pipe Spool	SA106 GrB	1.969"	40°F	85-80-86	58-56-60	--	--	per #1
MC-9	Forge Head Fitting	SA350 GrLF1	3.500"	--	--	--	--	--	See Head Fitting Section
1FW02KA20	18 X 20 Reducer	SA234 WPB	1.969"	40°F	97-73-64	85-70-64	--	--	per #1

FEEDWATER SYSTEM



FORM NPV-1 MANUFACTURERS' DATA REPORT FOR NUCLEAR PUMPS OR VALVES*

As Required by the Provisions of the ASME Code Rules

Manufactured by Anchor/Darling Valve Co. Order No. E-6214
701 First St., Williamsport, PA 17701
(Name & Address of Manufacturer)

Manufactured for Illinois Power Company Order No. C-2513
Clinton Power Station Unit 1
(Name and Address)

Owner Illinois Power Company

Location of Plant Clinton Power Station, DeWitt County, Illinois

Pump or Valve Identification E-6214-157-1 TAG.# 1B21-F032A

20" 1500# TILTING DISC CHECK VALVE WITH AIR CYLINDER, SOLENOIDS AND LIMIT SWITCHES
(Brief description of service for which equipment was designed)

(a) Drawing No. 93-15204 R/C Prepared by Anchor/Darling Valve Co.

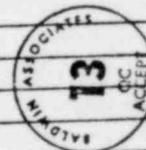
(b) National Board No. N/A

Design Conditions 3215 psi 100 °F or Pressure Class N/A (1)
(Pressure) (Temperature)

The material, design, construction, and workmanship complies with ASME Code Section III. Class 1

Edition 1974, Addenda Date Summer 1975, Case No. 1516.1, 1567, 1622, 1635.1, 1677

Mark No.	Material Spec. No.	Manufacturer	Remarks
(a) Castings			
Body HT.# 1134 S/N R5916	SA216-WCB	Dodge Foundry and Machine Co.	
Disc HT.# 7910 S/N R6308	SA216-WCB	Dodge Foundry and Machine Co.	
(b) Forgings			
Bonnet HT. # 216149 S/N 1	SA105	Cann and Saul Steel Co.	
Drain Connections HT.# 6015079	SA105	Cann and Saul Steel Co.	
Gasket Ret. Ring HT.# 219378	SA105	Cann and Saul Steel Co.	
Shaft Covers HT.# 217937 S/N 1 and S/N 3	SA105	Cann and Saul Steel Co.	
Drain Cap HT.# L40923	SA105	Capitol Pipe and Steel Co.	



(1) For Manually Operated Valves Only.

*Supplemental sheets in form of lists, sketches or drawings may be used provided (1) size is 8 1/2" x 11", (2) information in items, 1, 2, 5a and 5b on this data report is included on each sheet, and (3) each sheet is numbered and number of sheets is recorded at top of this form.

FORM NPV-1 (back).

Mark No.	Material Spec. No.	Manufacturer	Remarks
(c) Bolting			
Cover Studs	SA193-B7	R.E.C. Corp.	
HT.# 65079			
Cover Nuts	SA194-7	Nuts, Incorporated	
HT.# 75467			
(d) Other Parts			
Drain Pipe	SA106-B	Keystone Tubular Service Corp.	
HT.# M02709			

9. Hydrostatic test 5625 psi.

CERTIFICATION OF DESIGN

Design information on file at Anchor/Darling Valve Co. 701 First St., Williamsport, PA 17701
 Stress analysis report on file at Anchor/Darling Valve Co., 701 First St., Williamsport, PA 17701
 Design specifications certified by H. M. Sroka (I) Prof. Eng. State IL Reg. No. 62-23543
 Stress analysis report certified by Robert D. Burns (I) Prof. Eng. State MS Reg. No. 25401
 (I) Signature not required. List name only.

We certify that the statements made in this report are correct.

Date 11-19 19 79 Signed Anchor/Darling Valve Co.
(Manufacturer)H. Yoon
H. YoonCertificate of Authorization No. N1712 expires 4/15/80

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State of ~~Massachusetts~~ Pennsylvania and employed by Commercial Union Insurance Co. of Boston, Mass. have inspected the equipment described in this Data Report on 11-28-78 to 11-19-79, and state that to the best of my knowledge and belief, the Manufacturer has constructed this equipment in accordance with the applicable Subsections of ASME Code, Section III.
 By signing this certificate, neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the equipment described in this Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 11-20 19 79

Russell E. Montgomery
 (Inspector)
 Russell E. Montgomery

Commissions

Pennsylvania WC972

(National Board, State, Province and No.)

1B21-F032A

Anchor/Darling Valve Co. 701 First Street Williamsport, Pa. 17701		Same	
050		MADE FOR P.O.	
COLLECT XX		TRUCK	
TERMS Net 30 days			
Anchor/Darling Valve Co. - Pa.		See below 2-05315 1-2	
PATTERN NO. 6529-1-5-1 (20" 1500# TOC Body)		CUSTOMER ORDER NO. M-2123	
1 2		5436 10872 25	
LO-6529-1-5		Spec. C10 128	
2/8/78		SA216-WCB, VT-MSS-SP55 No weld, Nucl.	
04			
Louden.		5 K.B. & special Test Block	
2/28/78		Min. wall 3.233	
		Upon approval of sample will advise delivery	

Body

CERTIFICATION OF CHEMICAL & PHYSICAL TESTS-HEAT TREATMENT-N.D.E. TESTS									
1134 AB-1307									
CHEMICAL ANALYSIS-MAT. SPEC. SA216 WCB									
110 90 60 0.02 30 26 15 0.41 0.08									
WELD METAL CHEMICAL ANALYSIS									
WELDING PROCEDURE NUMBER									
TENSILE PROPERTIES OF CASTING									
77,300 54,300 297,570 103									
TENSILE PROPERTIES OF WELDING ELECTRODE									
HEAT TREATMENT									
NORMOGENIZED									
NORMALIZE 1700°F 6 1/2 2521									
NORMALIZE 1650°F 6 2523									
TEMPER 1250°F 7 2524									
WATER QUENCH									
OIL QUENCH									
STRESS RELIEVE									
ANNEAL									
PWHT TO 1150 15									
REMARKS 10003 1000V-06 PROCEDURE HEAT TREAT 48.03 REV.1									

NON-DESTRUCTIVE TESTS AND RELEASE REPORT									
N.D.E. SPECIFICATIONS									
SER. NO. 1307 OK 5/78									
DATE 11-28-78									
ANCHOR/DARLING VALVE CO.									
L. J. SYNDER									
Q.A. 31									
DATE 11-28-78									
REPORTS ATTACHED									
VT-VLR									
DIMENSIONAL LAYOUT									
DIMENSIONAL CONFORMANCE CERT.									
WELD REPAIR MAP									
SNF-TO-1A CERTIFICATES									
WELD REPAIR MAP									
WELDING PROCEDURE									
WELDERS QUALIFICATION TEST									
WELD MANUFACTURERS CERTIFICATE									
WELDING SKETCH & TECH.									
WELD FILM & READER SHEETS									
CLEANING CERTIFICATION									
CERTIFICATE OF COMPLIANCE									
MERCURY EXCLUSION CERTIFICATE									
HEAT TREATMENT CHART									
HEAT TREATMENT CAR LOADING RECORD									

SEE ATTACHED REPORT
RAMBALL TESTLAB

4 ROUGH TESTBARS

We hereby certify that the above material has been tested in accordance with the listed specifications and conforms to all applicable requirements thereof.

William H. H. 5-15-78

DODGE FOUNDRY & MACHINE CO.



BALDWIN ASSOCIATES
RECEIVED

JAN 9 1980

DOCUMENT RECORD CENTER
REC'D BY S. WHITEHEAD

Ramball Testlab

8501 STATE ROAD - PHILADELPHIA, PA. 19135

(215) 332-4011

LABORATORY REPORT

Date: May 10, 1978

P.O.# M-2129

Anchor/Darling Valve Co.
701 First Street
Williamsport, PA 17701

Heat # 1134, PO#N-2123
Material: ASME-SA-216, WCB

TENSILE TEST

LAB # 20003

YIELD STRENGTH 54,300 psi
TENSILE STRENGTH 77,300 psi
ELONGATION 29 %
REDUCTION OF AREA 57 %
0.505" diameter tensile
specimen, 2" gauge length.

CHARPY IMPACT TEST

LAB # 20004, 20005, 20006

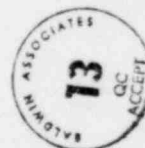
SPECIMEN #	FOOT POUNDS	MILS LATERAL EXPANSION	% SHEAR
1	85	60	50
2	87	71	55
3	66	56	60
Average	79	65	55

The above test specimens were heat treated with production castings. The test bars only were given an additional stress relief heat treatment at 1150 degrees F for 15 hours. The Charpy V-Notch Impact Test was performed at +50 degrees F.

BALDWIN ASSOCIATES
RECEIVED

JAN 29 1980

Louis L. Ramball
Metallurgist



RECEIVED
REC'D BY S. WHITEHEAD

CANN & SAUL STEEL CO.

ROVERSFORD, PA. 19468

Report of Physical Tests and/or Chemical Compositions

Date 3/19/79

Customer ANCHOR/DARLING VALVE CO.
701 FIRST STREET
Address WILLIAMSPORT, PA. 17701

Customer's Order No.
P-2915
S.O.#E-6214-157

E6214-157-1

BONNET

Cann & Saul Order No.
50844

1B21-F032A
Bonnet

Attention PURCHASING DEPT.

CHEMICAL COMPOSITIONS

HEAT NO.	C	MN	P	S	SI	CR	NI	MO	CB
216149	.27	.93	.009	.018	.15				

Lab. No.

PHYSICAL TESTS

CUT FROM	TEST NUMBER	GAUGE	YIELD PT. LBS.	YIELD PER Square In Lbs.	BROKE AT LBS.	ULTIMATE TENSILE LBS.	ELONG %	REDUCED AREA	Reduction %	B.H.N.
Forging	50844 1	.505	YS 9,700	YS .2% 48,500	15,500	77,500	33.0	.066	67.0	
Charpy Impacts Notch		61 63 72 78 20 20	65 Mils Lat. Exp. @ +40°F 84 Ft. Lbs 20 percent shear							

OTHER TESTS

BRINELL 149/179

SONIC A388 R/23 (7/9/75) O.K.
Heat Treat. Proc. #5D(3/5/76)

We certify the material meets
the ASME Code, Section III, 1974
Edition thru 1975 summer addenda.

Customer's Specifications: ASME SA105
CHARPY "V" IMPACT 40 MILS LAT. EXP. @ +40°F
26/35 CARBON B.H.N. 187 MAX.

XXX

T.

E.

R.

BALDWIN ASSOCIATES

RECEIVED

70,000

22%

30%

JAN 29 1980

THE ABOVE TESTS COVER THE FOLLOWING MATERIAL:

2 - 20" 1500 TDC BONNET FORGINGS FOR DRAWING B-51609
Forgings serialized #1 & 2

DOCUMENT RECORD CENTER
REC'D BY S. WHITEHEAD

CANN & SAUL STEEL COMPANY

Inspector

ANCHOR/DARLING VALVE CO.
L. B. SNYDER
Q.A. 81

DATE: 3-23-79

CANN & SAUL STEEL CO.

Eng. of Tests

1821-F032A

Ramball Testlab

6501 STATE ROAD - PHILADELPHIA, PA. 19135
(215) 332-4011

LABORATORY REPORT

Date: March 29, 1978
P.O.# M-2129

Anchor/Darling Valve Co.
701 First Street
Williamsport, PA 17701

Heat # 7910, PO# N-2123
Material: ASME-SA-216, WCB

TENSILE TEST

LAB # 19331

YIELD STRENGTH 43,900 psi
TENSILE STRENGTH 72,200 psi
ELONGATION 36 %
REDUCTION OF AREA 63 %
0.505" diameter tensile
specimen, 2" gauge length.

CHARPY IMPACT TEST

LAB # 19332, 19333, 19334

SPECIMEN #	FOOT POUNDS	MILS LATERAL EXPANSION	% SHEAR
1	55	50	35
2	69	61	60
3	63	59	40
Average	63	57	45

The above test specimens were heat treated with production castings. The test bars only were given an additional stress relief heat treatment at 1150 degrees F for 20 hours. The Charpy V-Notch Impact Test was performed at +50 degrees F.

D. Ramball

Metallurgist



CANN & SAUL STEEL CO.

ROVERS FORD, PA. 19468

Report of Physical Tests and/or Chemical Compositions

~~BALDWIN ASSOCIATES~~

RECEIVED

Date 2/8/79

Customer ANCHOR/DARLING VALVE CO.

701 FIRST STREET

Address WILLIAMSPORT, PA. 17701

Customer's Order No.

P-2915

S.O. #E-6214-157

Cann & Saul Order No.

JAN 29 1980

DOCUMENT RECORD CENTER

REC'D BY S. WHITEHEAD

Attention PURCHASING DEPT.

CHEMICAL COMPOSITIONS											
HEAT NO.	C	MN	P	S	SI	CR	NI	MO	CB		
217937	.30	.92	.012	.022	.23						

Lab. No.

PHYSICAL TESTS

CUT FROM	TEST NUMBER	GAUGE	YIELD PT. LBS.	YIELD PER Square in Lbs.	BROKE AT LBS.	ULTIMATE TENSILE LBS.	ELONG %	REDUCED AREA	Reduction %	S.H.N.
Forging	50845 1	.505	YS 10,200	YS .2% 51,000	16,400	82,000	31.0	.069	65.5	
Charpy Impacts			51 68	52 Ft.Lbs.						
"V" Notch @			41 56	43 Mils Lat.Exp.						
+40°F			10 20	10 % Shear						

RECEIVED
 FEB 16 1979
 BUREAU OF THE ARMY

PURCHASING DEPT.

OTHER TESTS

BRINELL 143/149

SONIC A388 R/23 (7/9/75): O.K.

Heat Treat Proc. #5D (3/5/76)

We certify that the material meets the ASME Code, Section III, 1974 Edition thru summer 1975 Addenda.

Customer's Specifications: ASME SA105

CHARPY "V" IMPACT 40 MILS LAT. EXP. @ +40°F

26/35 CARBON

B.H.N. 187 MAX.

XXX 36.000 YS.29

T.	70,000
----	--------

E. 229

R. 30%

THE ABOVE TESTS COVER THE FOLLOWING MATERIAL:

NO

4 - 20" 1500 SHAFT COVER PER DRAWING 8-51610, /REV.
Forgings serialized #1 thru 4

CANN & SAUL STEEL COMPANY

Inspec an

CANN & SAUL STEEL CO.

ANCHOR/DARLING VALVE CO

L. B. SNYDER

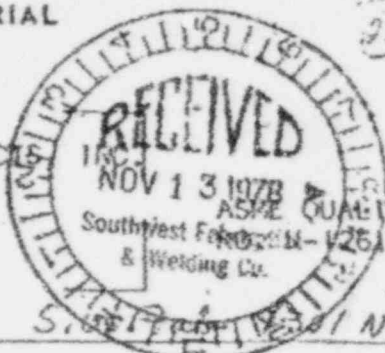
9A 31

DATE: 2-19-79

Eng. of Tests

CERTIFICATE OF TEST ON PIPE MATERIAL

CAPITOL PIPE & STEEL PRODUCTS
2055 S. GESSNER, Suite 130
Houston, TX 77063



Rec'd 7-21-81
002
Cameron
IRON WORKS, INC.

P. O. BOX 1212
HOUSTON, TEXAS 77001

ASME QUALITY SYSTEM CERTIFICATE (MANUFACTURER)
EXPIRES 10-27-78.

Order No. 903-35N C.J.W. Sales Order No. F-9526 Specification ASME SA106 Gr. B ASME Sec. III, Cl. 2; 1974 Ed. Thru Summer '74 Addenda Date 28 September 1978

Location of serial O.D. 20" x I.D. SCH. 160

T. Part No. 86-9526-200-162

Chemical Analysis	C	MN	P	S	SI	CR	NI	MO
J7516	.26	.95	.019	.005	.22			

1-1-1 PIPE CERT

ALL OPERATIONS WERE PERFORMED BY CIW & MEET THE REQUIREMENTS OF THE LISTED MATERIAL SPECIFICATION AND SEC. III DIV. 1.

MECHANICAL PROPERTIES	Tensile PSI	.2% Offset Yield PSI	% Elong. 2 in.	Red. Area	Macro Etch	Bend Test	Flattening Test	Specimen Size	Test Lot#
J 7516 A-T	78,900	50,900	30.9	61.8			OK	.505	470

V-Notch Impact Test Results at 40°F.	Ft.Lbs.	Lat. Exp.	% D/F
31655	85.0	58 MILS	60%
31656	80.0	56	55
31656	86.0	60	70

FROM - S.W. Lab.
ATTN: Mr. Earl Thomas



Hydrostatic Test Each length of pipe hydrostatically tested at 2800 psi for 5 sec. and found acceptable.
Heat Treatment: 1600°F., held 1 hr. at temp. Air cooled.

Witnessed and sworn to before me this 28th day of September 1978

[Signature]

I certify these tests to be correct as contained in the records of the company.

[Signature]
Metallurgical Representative W. F. GILBERT, 101

Babcock & Wilcox

Tubular Products Division

P.O. Box 230, Beaver Falls, Pa. 15010

FORM 595-F

FITTINGS & FORGINGS OPERATIONS

20" X 18" S/160 Reducer
CERTIFICATE OF TESTS

B & W ORDER NO.

CUSTOMER

SOUTHWEST FABRICATING &

WELDING CO., INC.

CUST. ORDER NO.

4301H217

DATE

11/22/78

SPECIFICATION SA 234 WPB NORM. TO SECT 3 CLASS 2
197th EDITION INCLUDING ADDENDA THRU SUMMER 74
SW FAB NOTES 1 & 3 OF QA 20 (10 CFR.21)

ITEM	PCS.	DESCRIPTION	SIZE	TEMP (° F)	FT.-LBS.	% SHEAR	LAT. EXP.	CHEM. & TENSILE PROPERTIES TO	HEAT TREATMENT TO	SHN IN ACCORDANCE WITH
2		20 x 18" SCH 160 CONC RED	8CCT	+40	97-73-64	86	085-070-064	A 106 Gr B	NORMALIZE	SA 234 Para 9.1

ITEM	PCS.	DESCRIPTION	SIZE	TEMP (° F)	FT.-LBS.	% SHEAR	LAT. EXP.	CHEM. & TENSILE PROPERTIES TO	HEAT TREATMENT TO	SHN IN ACCORDANCE WITH

ITEM	PCS.	DESCRIPTION	SIZE	TEMP (° F)	FT.-LBS.	% SHEAR	LAT. EXP.	CHEM. & TENSILE PROPERTIES TO	HEAT TREATMENT TO	SHN IN ACCORDANCE WITH

REVISIONS: RT=ENDS OF MATCH PT=PLATE TYPE SCRAPER BARS T/B=TAPER BORED TER TO END

- ☐ ULTRASONICALLY INSPECTED AND ACCEPTED PER B & W PROCEDURE
- ☐ MAGNETIC PARTICLE INSPECTED AND ACCEPTED PER B & W PROCEDURE
- ☐ LIQUID PENETRANT INSPECTED AND ACCEPTED PER B & W PROCEDURE
- ☒ FITTINGS ARE CAPABLE OF WITHSTANDING A HYDROSTATIC TEST PRESSURE EQUAL TO THE CALCULATED TEST PRESSURE OF THE MATCHING PIPE.
- ☐ THE BURSTING PRESSURE OF THE FITTINGS IS AT LEAST EQUAL TO THE COMPUTED BURSTING PRESSURE OF THE MATCHING PIPE PER ☐ ANSI B16.9 ☐ MSS SP-75



- TENSILE TEST SPECIMEN TYPE:
 - 1. STRIP TEST OR FULL SECTION
 - 2. STANDARD ROUND

- TESTS NOT PERFORMED ON RAW MATERIAL:
 - ☐ HYDROSTATIC
 - ☐ FLATTENING
 - ☐ OTHER

SWORN TO AND SUBSCRIBED BEFORE ME:

[Signature] 11/22/78



Gertrude I. Mohrbecher, Notary Public
Borough of Koppel, Beaver Co., PA
My Commission Expires
February 1, 1981

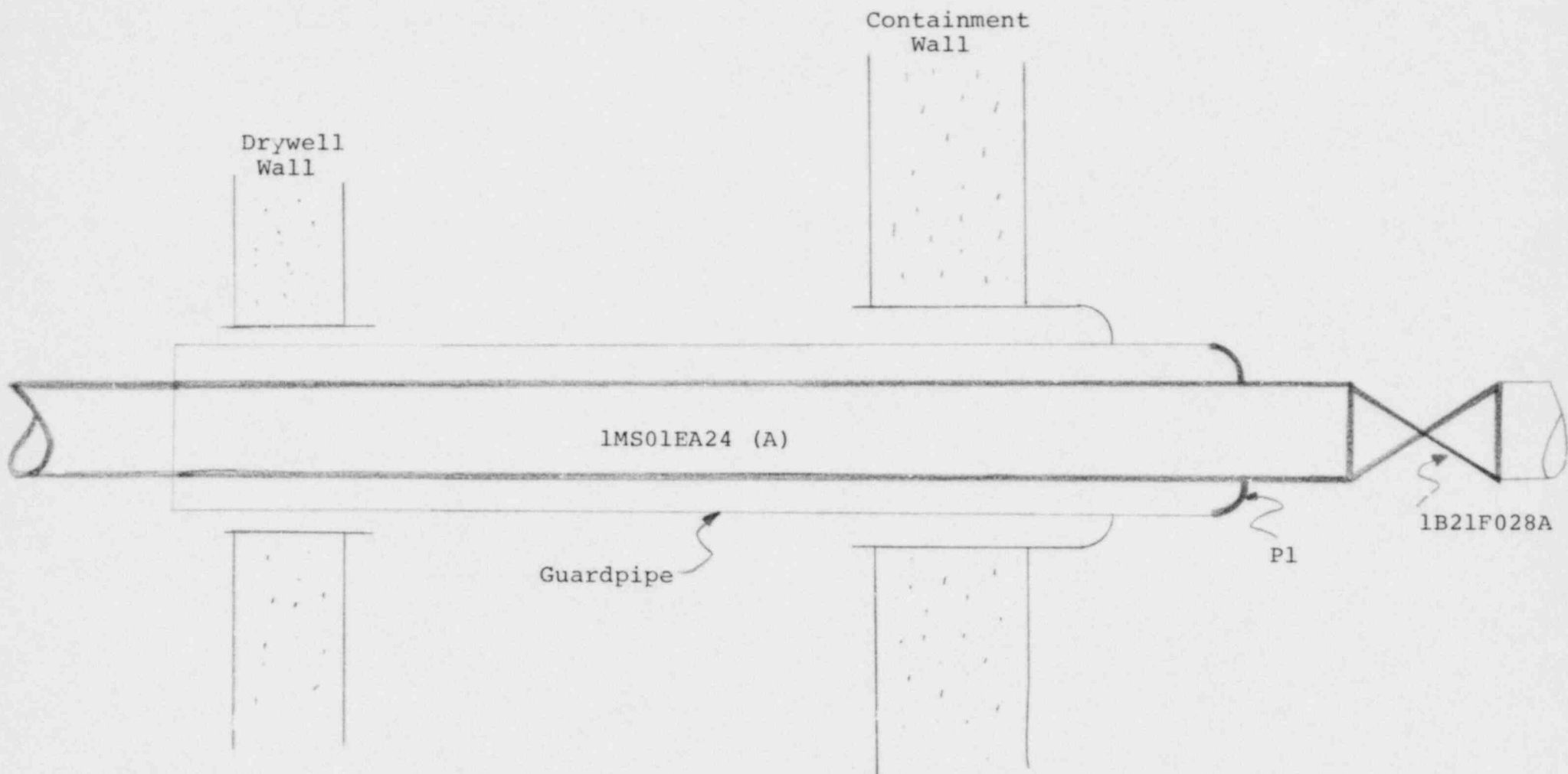
I HEREBY CERTIFY THIS REPORT TO BE TRUE
AND CORRECT ACCORDING TO THE RECORDS
OF THE BABCOCK AND WILCOX COMPANY.

[Signature]
HAROLD G. WARSO
TWS

MAIN STEAM SYSTEM CONTAINMENT BOUNDARY

Component Number	Description	Material	Thickness	Impact Test Temp.	Test Data		Derived LSMT	Exempt	Notes
					Charpy V-notch	Mils Lateral			
1B21F028A	Valve Body	SA216 WCB	2.500"	60°F	26-23-26	29-28-29	40°F	--	N,T, per #3
1B21F028A	Valve Poppets	SA350 GrLF2	6.031"	60°F	32-40-48	28-35-36	57°F	--	N,Q, per #3
1B21F028A	Valve Cover	SA105	5.813"	60°F	68-73-71	54-43-50	55°F	--	N,Q, per #3
IMS01EA24	GE Head Fitting "A"	SA350 GrLF2	5.000"	60°F	135-126-128	48-104-74	50°F	--	N, per #3
IMS01EA24	GE Spool "P1"	SA333 Gr6	1.218"	60°F	181-154-142	91-86-82	--	--	per #1

MAIN STEAM SYSTEM



FORM NPV-1 MANUFACTURERS' DATA REPORT FOR NUCLEAR PUMPS OR VALVES*

As Required by the Provisions of the ASME Code Rules

B-21-FC28A

1. Manufactured by Atwood & Morrill Co., Inc. Salem, Mass. 01970 Order No. 13562-01
(Name & Address of Manufacturer)

2. Manufactured for General Electric Co., San Jose, California Order No. 205-AF777
(Name and Address)

3. Owner Illinois Power Company

4. Location of Plant Decatur, Illinois

5. Pump or Valve Identification Valve S/N 8-562 24" Main Steam Isolation Valve

for Service in Main Steam Piping System

(Brief description of service for which equipment was designed)

6(a) Drawing No. 13562-01-H Rev. 3 Prepared by Robert J. Knox

6(b) National Board No. N/A

Design Conditions 1375 (Pressure) psi 586 °F (Temperature)

7. The material, design, construction, and workmanship complies with ASME Code Section III, Class 1

8. Edition 1974, Addenda Date N/A, Case No. 1622

Mark No.	Material Spec. No.	Manufacturer	Remarks
6(a) Castings			
Body	SA216-WCB	Quaker Alloy	S/N 8-562
RT #P490			
6(b) Forgings			
Poppet	SA350, Gr. LF-2	Cann & Saul	S/N 8-562
Cover	SA105 (QT)	Cann & Saul	S/N 8-562

*General sheets in form of lists, sketches or drawings may be used provided (1) size is 8 1/2" x 11", (2) information in items, 1, 2, 5a and 7 is included on each sheet, and (3) each sheet is numbered and number of sheets is recorded at top of this form.

Mark No.	Material Spec. No.	Manufacturer	Remarks
(c) Bolting			
Cover Studs	SA540-Gr. B23 Cl. 5	Jos. Dyson & Sons	Ht. #8094156 Code A56
Cover Nuts	SA540-Gr. B23 Cl. 5	Jos. Dyson & Sons	Ht. #123173 Code A73
(d) Other Parts			
* 3/4 - Nipples	SA106-Gr. B	U.S. Steel	S/N 8-562
* 45° Elbow	SA105	Vogt Mach. Co.	S/N 24-562
* Note: These items comply with the Code for Material Construction and workmanship, but are not included as far as design is concerned.			

Hydrostatic test Body Poppet
2175 1450 psi.

CERTIFICATION OF DESIGN

Design information on file at General Electric Co. San Jose, California
 Stress analysis report on file at Atwood & Morrill Co. Inc., Salem, Mass.
 Design specifications certified by Forrest E. Funk (1) Prof. Eng. State Calif. Reg. No. 14031
 Stress analysis report certified by Herbert Cook (1) Prof. Eng. State Mass. Reg. No. 10981
 (1) Signature not required. List name only.

We certify that the statements made in this report are correct.

Date 6-14-76 19____ Signed Atwood & Morrill Co. Inc. By [Signature]
 (Manufacturer) Quality Control Manager

Certificate of Authorization No. N812 expires May 7, 1977

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State of Province of Massachusetts and employed by Hartford Steam Boiler Insp. & Ins. Co. at Hartford, Conn. have inspected the equipment described in this Data Report on 6-16 19 76, and state that to the best of my knowledge and belief, the Manufacturer has constructed this equipment in accordance with the applicable Subsections of ASME Code, Section III.
 By signing this certificate, neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the equipment described in this Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 6-16 19 76

[Signature]
 (Inspector) G.O. Carpenter

Commissions

Mass. 756
 (National Board, State, Province and No.)

CUSTOMER Atwood & Morrill Co. PURCHASE ORDER AM25354 CONTRACT NO. 205AF777SHOP ORDER D312-40 Q DESIGNATION Q70 PATTERN NO. 16730-30146-101MATERIAL SPEC. & GRADE ASME SA216 GR.WCB DESCRIPTION body SIZE 24"HEAT NO. F7476 CASTING SERIAL NO. F7476-4 R.T. SERIAL NO. P301NUCLEAR CLASS 1 PCS. COVERED ON THIS REPORT 1 SOURCE INSPECTION Atwood & G.E.CERTIFIED MATERIAL TEST REPORT

The records enclosed in this folder comprise the certified material test report for the subject material.

1821 F028A
Body

AFFIRMATION

We certify that the contents of this report are correct and accurate and that all test results and operations performed by Quaker Alloy Casting Company or our sub-contractors are in compliance with the material specification and appropriate material requirements of the ASME Code 1974 through n/a

Addenda, Section III, as stipulated in the procurement documents.

Paul P. Battaglin
Quaker Alloy Casting Company

3-24-76

Date

3-24-76

MAR 24 1976

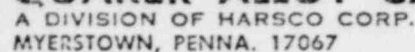
QA1 Rev. 2
11/11/75

APPROVED

BY

DATE

ATWOOD & MORRILL CO. INC.



MATERIAL TEST REPORT

205AF777

5/11 5:56 2

22

METALLURGIST

POLY CAST, INC.

800 RICKETT ROAD · P.O. BOX 237

BRIGHTON, MICHIGAN 48116

TELEPHONE 313-229-2934

Nº 10194

Ref: 5458

1821 F028A
body

SOLD TO • ATWOOD & MORRILL
• 285 Canal Street
• Salem, Mass. 01970

SHIP TO • SAME



INVOICE DATE
2/20/76
SHIPPING DATE
2/20/76
CARRIER
Interstate

CUSTOMER ORDER NO.	DATE	DATE ENTERED	SALESMAN
3219	12/23/75		N/A

FREIGHT PREPAID	FREIGHT COLLECT	FORM	TERMS	NET - 30 DAYS
	XXX	Welding Rod	XXX	
LBS. ORDERED	DESCRIPTION		PRICE PER LB.	

500#
3/16" dia. x 14" long Poly Cast No. 21
PC-21-MOD-118 Nuclear Gas Quality
This material meets AWS A5.13-70 Class
RCcCr-X and conforms to Article NB-2000,
Section III, ASME Boiler & Pressure Vessel
Code and complies with the marking require-
ments for welding materials of Section III,
1974, thru summer 1975, addenda of ASME
Boiler & Pressure Vessel Code, para.

STATUS OF ORDER	COMPLETE	PARTIAL
	XXX	
NET LBS. SHIPPED	PRICE EXTENSION	
552#		

NA3766.6(B) Color Code: Red CHEMICAL ANALYSIS

HEAT NO.	C	Mn	Si	P	S	Ni	Cr	W	Mo	Fe	Co	Others
PC-21-MOD-118	.22	.30	.70	.015	.018	2.06	27.5	.08	5.11	.84	BAL.	4.50

Certification of quality assurance tests to follow.
Usability Tests Performed.
Poly Cast, Inc. certifies that the content of this report is correct and accurate.

Reviewed By: *[Signature]* Date: *5/2/76*
R. E. Ciampa, Quality Control Representative
General Electric Co. - BWR Projects Dept.

We hereby certify that the foregoing data is a true copy of the data resulting from tests performed in our laboratory or of the data furnished us by the laboratory performing the tests.

DATE February 20, 1976
Subscribed to and sworn before me

POLY CAST, INC.

[Signature]
NOTARY PUBLIC
Acting in Livingston Co., Mich.

WILLIAM R. GALE
Notary Public, Washtenaw County, Mich.
My Comm. Expires 2-24-77

[Signature]
AUTHORIZED AGENT
Stephen J. Barkovich

ALL CLAIMS MUST BE MADE WITHIN 30 DAYS. PRICES SUBJECT TO CHANGE WITHOUT NOTICE

We hereby certify that these goods were produced in compliance with all applicable requirements of Section 6, 7 and 12 of the Fair Labor Standards Act of 1938, as amended and all regulations and orders of the administrator of the Wage and Hour Division issued under Section 14 thereof. Shipments under \$500 go Freight Collect.

CERTIFIED REPORT OF CHEMICAL ANALYSIS AND MECHANICAL TESTS

Suburban Welders Supply
72 Nicholson St.
Ashland, Mass.

1821 F028A
Body

Atwood & Morrill Co., Inc.
P.O. AM3739
240 lbs. 1/4" #21 Coated

SPECIFICATION NO.	ALLOY	CUSTOMER IDENTIFICATION	OUR IDENTIFICATION
OUR SALES ORDER NO.	CUST. PURCHASE ORDER NO.	QUANTITY SHIPPED	DATE SHIPPED
87107	22221	240 lbs.	2/15/76

CHEMICAL ANALYSIS

LOT 31042 NEXT NO.	C	Co	Cr	Cu	Fe	Mn	Mo	Ni	P	S	Si	W
1503	.24	Bal	27.23		.33	.30	5.50	2.34			.49	.06

TESTS AT

HEAT NO.	RUPTURE LIFE, HRS.	ULTIMATE STRENGTH, PSI	YIELD STRENGTH, PSI .2% OFFSET	YIELD STRENGTH, PSI .02% OFFSET	% ELONGATION IN	% ELONGATION INCHES	R. A.	ROCKWELL AS CAST	HARDNESS
----------	-----------------------	---------------------------	-----------------------------------	------------------------------------	--------------------	------------------------	-------	---------------------	----------

This material meets the working requirements of ASME Boiler and Pressure Vessel Code, Section III, Para. NA-3766.6, Para. B, Welding and Brazing Material Identification/

Reviewed By: REC Date: 3/26/76
R. E. Ciampa, Quality Control Representative
General Electric Co. - BWR Projects Dept.

CERT. OF COMPLIANCE
REPORT CHECKED

By: M. Francis
Date: 3-26-76
ATWOOD & MORRILL CO. INC.

DATE: March 12, 1976

SUBSCRIBED AND SWORN TO, BEFORE ME /

Notary Public

Harold J. Lytle
(AUTHORIZED AGENT)

CANN & SAUL STEEL CO. S/N 1-562 thru S/N 8562

ROVERSFORD, PA. 19466

Report of Physical Tests and/or Chemical Compositions

3-9-76

Customer ATWOOD & MORRILL CO., INC. AM-1635
285 CANAL ST.
Address SALEM, MASS. 01970

Customer's Order No.

Cann & Saul Order No.

REF. #13562-01-002

36150

POPPETS
1821 F02BF

Attention PURCHASING DEPT.

CHEMICAL COMPOSITIONS

HEAT NO.	C	MN	P	S	SI	CR	NI	MO	CB
632225	.24	1.20	.024	.030	.25				

Lab. No.

PHYSICAL TESTS

CUT FROM	TEST NUMBER	GAUGE	YIELD PT. LBS.	YIELD PER Square In. LBS.	BROKE AT LBS.	ULTIMATE TENSILE LBS.	ELONG %	REDUCED AREA	Reduction %	B.H.N.
Forging	36150 1	.505	YS 9,000	YS. 2% 45,000	114,800	714,000	33.0	.058	71.0	
Charpy Impacts:- "V" Notch			32.0 28 15	40.0 35 20	48.0 ft. lbs. @ 36 20	plus 60 mils lateral expansion percent shear	F CHEMICAL & PHYSICAL REPORT CHECKED BY <i>D. J. Sharp</i> DATE 3/16/76 ATWOOD & MORRILL CO., INC.			

OTHER TESTS

SONIC A388, REV. 20 4/11/75 ~~RECEIVED~~:- Acceptable
Heat Treat to H.T.Proc. #66 8-14-75:- and Addendum dated 11/25/75

M.P. B&PV #12, REV. 1 (XX 5/7/75) :- Acceptable

We certify that the contents of this report are correct and accurate and that all operations performed by our company or subcontractors are in compliance with the requirements of the materials specification and the ASME Code Sec. III 1974 Edition.

Customer's Specifications: ASME SA350-3, GR. LF-2
CHARPY "V" IMPACT 25 MILS. LAT. EXP. @+60°F

B.H.N.

Y. P. 36,000
T. 70,000
E. 22%
R. 30%

THE ABOVE TESTS COVER THE FOLLOWING MATERIAL:

8 - POPPET FORGINGS PER DWG. 30521-604-D (NO REV.) FOR CODE 30521-604-2974

Forgings serialized #1 thru 8 inclusive

Reviewed By: *R. E. Ciampa* Date: 4/1/76
R. E. Ciampa, Quality Control Representative
General Electric Co. - BWR Projects Dept.
CANN & SAUL STEEL CO.

C. Bowers
Eng. of Tests

GE & A & M

APPROVED

DATE 3/16/76

BY *R. E. Ciampa*

ATWOOD & MORRILL CO., INC.

3-9-76

3-18-76

S/N 1 thru 8

CANN & SAUL STEEL CO.

ROYERSFORD, PA. 19450

Report of Physical Tests and/or Chemical Compositions

Date 4-23-76

REVISED COPIES FOR COPIES DATED 3-29-76

Customer Atwood & Morrill Co., Inc.
285 Canal St.
Address Salem, Ma. 01970

Customer's Order No.

AM-1635

Ref. 13562-01-211

G.E. #205-AF-777

Cann & Saul Order No.

36152

Attention Purch. Dept.

CHEMICAL COMPOSITIONS

HEAT NO.	C	MN	P	S	SI	CR	NI	MO	CB
632202	.26	.94	.023	.015	.20				

Lab. No.

PHYSICAL TESTS

CUT FROM	TEST NUMBER	GAUGE	YIELD PT. LBS.	YIELD PER Square In Lbs.	BROKE AT LBS.	ULTIMATE TENSILE LBS.	ELONG %	REDUCED AREA	Reduction %	B.H.N.
Forging	36152 1	.505	9,800	49,000	15,400	77,000	33.0	.066	67.0	170/17
Charpy Impacts:- 68 73 71 ft. lbs. @ plus 60°F										
"V" Notch 54 43 50 mils lateral expansion										
35 35 35 percent shear										

OTHER TESTS

Sonic to A388 Rev. 20(4-11-75):-Acceptable

Mag. Part B&PV #12 Rev. 1(5-7-75):- Acceptable for A&M information only.

Heat Treatment to C&S Proc. 5B(10-25-74) & Addendum (11-25-75)

We certify that the contents of this report are correct and accurate and that all operations performed by our company or subcontractors are in accordance with the requirements of the materials specification and the ASME Code Sec. III 1974 Edition.

Customer's Specifications: ASME SA105-QT

Charpy "V" Impact 25 mils lat. exp. @ plus 60°F

B.H.N. 187 Max.

36,000 YS.2%

T. 70,000

E. 22%

R. 30%

THE ABOVE TESTS COVER THE FOLLOWING MATERIAL:

2 - Cover Forgings per Dwg. 30861-406-D(No Rev.) for Code 30861-406-2974.

Forgings serialized #6 & 7

Reviewed By *REC* Date *4-27-76*
R. E. Ciampa, Quality Control Representative
General Electric Co. - BWR Projects Dept.

CANN & SAUL STEEL CO.

Eng. of Tests

G.E. & A&M

A&M
Q.C. 1
A

Inspection

CHEMICAL & PHYSICAL
REPORT CHECKEDBY *W. Trane*DATE *4-26-76*

ATWOOD & MORRILL CO. INC.

Inspector

① A.N.I. for W.F.C.
4/20/76 updated copy #6-502.

75E Wacker

POLY CAST, INC.

800 RICKETT ROAD - P.O. BOX 237

BRIGHTON, MICHIGAN 48116

TELEPHONE 313-229-2934

Ref: 5458
No 10128

1B21F028A
CVR

SOLD TO

ATWOOD & MORRILL CO., INC.

SHIP TO

SAME

285 Canal Street

Salem, MASS. 01970

CHEMICAL & PHYSICAL

REPORT CHECKED

BY

DATE

12/12/75
ATWOOD & MORRILL CO. INC.

INVOICE DATE

12/5/75

SHIPPING DATE

12/5/75

CARRIER

Interstate

CUSTOMER ORDER NO.	DATE	DATE ENTERED	SALESMAN
AM 2906	11/26/75	11/26/75	D. Harrook

FREIGHT PREPAID	FREIGHT COLLECT	FORM	TERMS NET - 30 DAYS
	XXX	Welding Rod	XXX
LBS. ORDERED	DESCRIPTION		PRICE PER LB.
300#	Material not color coded. 3/16" dia. x 14" long Poly Cast No. 21 PC-21-110 Nuclear Gas Quality MEETS: AWS A5.13-70 Class RCoCr-X Poly Cast, Inc. certifies that the contents of this report are correct and accurate. Poly cast materials comply with the marking requirements for welding materials of Sec- tion III, 1974, thru summer 1975 addenda of the ASME Boiler & Pressure Vessel Code.		

STATUS OF ORDER	COMPLETE	PARTIAL
	XXX	

NET LBS. SHIPPED	PRICE EXTENSION
------------------	-----------------

196#

CHEMICAL ANALYSIS

HEAT NO.	C	Mn	Si	P	S	Ni	Cr	W	Mo	Fe	Co	Others
PC-21-110	.26	.08	1.02	.011	.016	2.21	27.25		5.70	2.14	BAL.	4.50
Reviewed By: R. E. Ciampa, Quality Control Representative General Electric Co. - BWR Projects Dept. Date: 5-26-76												

We hereby certify that the foregoing data is a true copy of the data result from tests performed in our laboratory or of the data furnished us by laboratory performing the tests.

DATE December 5, 1975

Subscribed to and sworn before me

WILLIAM R. CALE

Notary Public, Washtenaw County, Mich.

My Commission Expires 2-24-77

NOTARY PUBLIC

Acting in Livingston Co., Mich.

AUTHORIZED AGENT

Stephen G. Barkovich

ALL CLAIMS MUST BE MADE WITHIN 30 DAYS. PRICES SUBJECT TO CHANGE WITHOUT NOTICE

We hereby certify that these goods were produced in compliance with all applicable requirements of Section 6, 7 and 12 of the Fair Labor Standards Act 1938, as amended and all regulations and orders of the administrator of the Wage and Hour Division issued under Section 14 thereof. Shipments under \$1 go Freight Collect.

SHIPPED TO: Middlesex Welding Supply 2 Rindge Ave. Cambridge, Mass. 02140	DATE: 9/11/74 (821F028A)
Winter Addenda 1973	AIRCO ORDER NO. A458-673
SECTION II - SFA 5.1	CUSTOMER ORDER NO. C-4513

ITEM	POUNDS	SIZE	TYPE	HEAT	LOT NO.
1	500	1/8	E7018	432N1871	029B696
2					Certified Material Test Report-Accept
3					BY: <i>St. Louis</i>

Actual CHEMICAL ANALYSIS OF Weld Deposit									
ITEM	C	Mn	P	S	Si ✓	Ni ✓	Cr ✓	Mo	V
1	.053	.69 ✓	.020	.018	.58	.056	.033	.009	.005
2									
3									

Actual PHYSICAL PROPERTIES OF Weld Deposit					
ITEM	TENSILE STRENGTH PSI	YIELD STRENGTH PSI	ELONGATION % IN 2"	REDUCTION IN AREA %	
	76,925 ✓	67,800 ✓	34.0 ✓	77.7	As Welded
	71,630	60,530	34.0	77.9	Stress Relieved

*Stress Relieved at 1100°F for 8 hours.

ADDITIONAL TEST RESULTS
The above material meets the paragraphs of NB-2130, NB-2140, NB-2152 and NB-2400 of Section III, 1971. (including addenda thru Winter 1973)

X-Ray results satisfactory to Paragraph 8.1.1 of SFA 5.1
Fillet Weld Usability Test satisfactory to Paragraph 8.1.4 of SFA 5.1

Each container has a label which gives AWS classification 7018 and diameter and a stamp which indicates Lot Number and Heat of Core Wire.

Impact results for As Welded and Stress Relieved conditions on attached sheet.

STATE OF Massachusetts
COUNTY OF Worcester
NOTARY PUBLIC
SUBSCRIBED AND SWORN TO before me this 11th DAY of September 19 74
MY COMMISSION EXPIRES July 1, 1978

[Signature]
NOTARY PUBLIC

[Signature]
General Electric Co. - DWR Projects Dept.

I certify the chemical analysis and physical or mechanical test results reported above meet the specifications on the described material and are correct as contained in the records of the Company.

[Signature]
J. J. Loughman
Quality Control Expediter

ARCRODS PLANT

CERTIFICATE OF TEST
CHARPY V-NOTCH IMPACTS

TESTED IN ACCORDANCE WITH SA-370 - Section II of the
ASME Code including Addenda thru Winter 1973.

Airco Order No. A458-673

Date 9/11/74

Cust. Order No. C-4513

Type	Diameter	Lot No.	Heat No.
E7018	1/8	029B696	432N1871

TEST TEMPERATURE -20°F

As-Welded

<u>Specimen No.</u>	<u>Energy (ft-lbs)</u>	<u>Lateral Expansion (in)</u>	<u>Shear (%)</u>
1	95*	.075	25
2	107	.076	30
3	113*	.079	30
4	113	.078	40
5	108	.078	30
Average	109		

Stress Relieved @ 1100°F for 8 Hours

<u>Specimen No.</u>	<u>Energy (ft-lbs)</u>	<u>Lateral Expansion (in)</u>	<u>Shear (%)</u>
1	240	**	**
2	240	**	**
3	240	**	**
4	240	**	**
5	240	**	**
Average	240		

* The extreme lowest and highest values were disregarded for computing average.

** The specimen failed to fracture at 240 ft-lb the maximum reading for our instrument.

Reviewed By: RSC Date: 11/6/76
R. E. Clump, Quality Control Representative
General Electric Co. - BWR Projects Dept.

J. J. Loughman
J. J. Loughman
Quality Control Expediter

77

CUSTOMER Southwest Fabr & Welding Co.

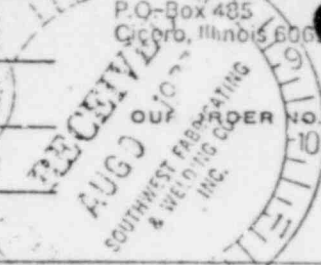
TAYLOR FORGE/CICERO DIVISION
GULF & WESTERN MANUFACTURING COMPANY
P.O. Box 485
Cicero, Illinois 60610



SPECIFICATION NO. See Below

CUSTOMER ORDER NO. Q 5243N-3

PACKING LIST NO. 510304-05



107795

"A"

HEAT TREATMENT

25.80" ID Head fitting

SA 350 LF-2

DESCRIPTION

CHARGE NO.
TF Item

HEAT SYMBOL

MILL HEAT NO.

PHYSICAL PROPERTIES

CHEMICAL ANALYSIS

YIELD STRENGTH
TENSILE STRENGTH
ELONG. IN 2"
RED OF AREA

C

MN

P

S

SI

CO

CR

CU

V

AL

6 - 25.80" ID x 36.00" OD x 8.50"
Thick Head Fitting 250 RMS
Surface Finish Per Dwg.
Sheet M-7623

601

EPZZ

6054205

ASME SA350-LF2 Per ASME Sect. III Cl. 1, 1974 Ed. Incl.
1975 Summer Addenda, S.W. Fab. Form QA-20 Dtd 10-11-74,
G.E. QRL No. 207 Rev. 1 & G.E. NL No. 207 Rev. 0 &
G.E. H50YPL59 Incl. Change Notice NE 80046 Dtd 8-2-76.
Heat treatment: 1700°F. - 5 hrs - Air cooled. 1650°F. -
5 hrs - Water Quenched. 1225°F. - 9 hrs - Air cooled.

63660

77500

33.07

4.2

.25

.73

.010

.017

.17

.006

.08

.10

.01

.01

Serial No.

Charge No.

UT41877-1
" -2
UT41977-3
UT41877-5
" -7
" -8

462
462A
462B
462D
462F
462G

Plus 600F.:
Minus 500F.:

Charpy Impact Test, V-Notch, Transverse, Full Size:
Ft. lbs. % Shear Fracture

135-126-128
70-58-72

95-95-95
20-20-30

18-104-74
31-40-52

12.1-26.4-13.8
12.1-10.1-13.2

REMARKS: Tensile, impact tests and check analysis taken from test ring parted from product per heat per heat treat charge or continuation charge. Parts are capable of withstanding the hydrostatic test referenced in ASME SA350.
Parts have been ultrasonic examined per TF 41.223 Dtd 2/12/75 Rev. 1 and were found to be satisfactory.
Parts have been magnetic particle examined per TF 41.41 Dtd 2-7-75 Rev 1 Dtd 2-7-75 and were found to be satisfactory. NDE Reports attached. Heat Treatment charts attached. NDE Personnel qualification list and Eye Examination reports attached. Parts have been manufactured in complete compliance with the subject specifications and all special requirements of your purchase order have been met.

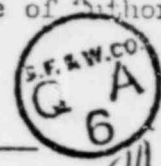
SUBSCRIBED AND SWORN TO BEFORE ME Certificate of Authorization No. N-991 Expires 3-3-78.



THIS 20th DAY OF May 19 77



NOTARY PUBLIC
STATE OF ILLINOIS
MY COMMISSION EXPIRES DEC. 18 1979
ISSUED THROUGH ILLINOIS NOTARY ASSOC



Signature: Jacqueline Shred
QUALITY CONTROL

CERTIFICATE OF TEST ON PIPE MATERIAL

77

CAPITOL PIPE & STEEL PRODUCTS, INC.
P. O. BOX 35431
HOUSTON, TX 77056

Pipe: Cameron

IRON WORKS, INC.
P. O. BOX 1212
HOUSTON, TEXAS 77001

21.700" ID

1.066"/1.152" ECC MW "A"

LOW Temp SA 333 GR 6. Date 28 April 1977

Customer Order No. D-82083-30N	C.I.W. Sales Order No. F-5949	Specification ASME SA333 GR 6 SEC III CLASS I 1974 EDITION THRU SUMMER 1975 & MODIFIED BY G.E. 850YPI57 REV. 0 W/ENG. CHANGE NOTICE #NE-80053
Description of Material O.D. _____ x I.D. 21.700" x WALL 1.066"/1.152" ECC	ASME QUALITY SYSTEM CERTIFICATE (MATERIALS) NO. N-1261 EXPIRES 10-27-78.	
C.I.W. Part No. 86-5949-241-217		

Heat No.	Location or Serial No.	CHEMICAL ANALYSIS												
		C	MN	P	S	SI	CR	V MAX	AL MAX	CU	CO	SN	AS	SB
6540		.17	1.22	.010	.016	.33	.11	.01	.026	.08	.010	100ppm	90ppm	25ppm
6541		.19	1.25	.017	.015	.35	.11	.01	.038	.12	.010	100ppm	120ppm	19ppm
6542		.17	1.22	.011	.022	.33	.16	.01	.034	.13	.010	100ppm	80ppm	20ppm
3485		.17	1.22	.012	.016	.30	.11	.01	.028	.13	.01	97ppm	90ppm	16ppm
3710		.18	1.20	.015	.019	.33	.21	.01	.028	.12	.011	100ppm	70ppm	30ppm

Quantity Serial No.	Heat No.	Tensile PSI	MECHANICAL PROPERTIES					
			% Offset Yield PSI	% Elong. In.	% Red. Area	Macro Etch	Bend Test	Flat- tening Test
3	J 6540	See attachment for mechanical properties.						
5	J 6541							
6	J 6542							
4	L 3485							
4	L 3710	Southwest Fab & Wld. PO Q5242N-5 SO JLN-1279-B7						

Southwest Fab & Wld.
PO Q5242N-5
SO ILN-1279-B7
Item # 1

Forging serial numbers attached.

Pipe has been ultrasonically tested in accordance with approved CIW Procedure PU-33 Rev. A W/Add. 5949 and found acceptable. Report attached.

Wall thickness has been verified by ultrasonic method to be equal to or greater than 1.066" at each open end and a four foot interval along each joint.

Pipe has been hydrostatically tested in accordance with approved CIW Procedure PI-15 W/Add. 5949 and found acceptable.

Hydrostatic Test Each length of pipe hydrostatically tested at 1900 psi for 5 sec. and found acceptable.

Heat Treatment: See attachment for heat treatment.

Subscribed and Sworn to before me this
28th Day of April 1977

Notary Public

SAFECO
Q 6

QA-EET
CPB

RWRPD-OC
J.F.B. 6-28-77

W 5 certify these tests to be correct as contained in the records of the company.

Metallurgical Representative

G. A. TROUGHTON

CAMERON PIPE & STEEL PRODUCTS, INC.

MECHANICAL PROPERTIES:

(A) Heat Treatment: 1650°F., held 1 hr. at temp. Air cooled.

2nd sheet
"PL"

Test Ser.#	Test Lot#	Tensile PSI	.2% Offset Y.S. psi	% Elong. 1"	% Red. Area	Flattening Test	Grain Size	Tensile Specimen Size
28250	900	74,600	47,200	32.2	64.0	OK	Avg. #8	.505
28252	895	76,100	53,900	31.3	61.1	OK	#8	.505
28253	895	74,900	48,900	30.9	62.1	OK	#8	.505
28255	897	74,900	50,600	29.5	50.3	OK	#9	.505
28260	893	77,400	53,900	29.9	58.3	OK	#8	.505
28262	891	74,600	52,100	31.9	61.1	OK	#8	.505

	Test Temp.	Ft.Lbs.	Lat. Exp.	% D/F	Test Temp.	Ft.Lbs.	Lat. Exp.	% D/F
✓								
28250	-50°F.	50.0	40 MILS	45%	+60°F.	181.0	91 MILS	100%
	-50	64.0	52	55	+60	154.0	86	100
	-50	66.0	52	50	+60	142.0	82	90
28252	-50	46.0	35	45	+60	137.0	83	100
	-50	71.0	51	50	+60	127.0	79	100
	-50	55.0	46	45	+60	125.0	79	100
28253	-50	70.0	51	55	+60	135.0	82	100
	-50	75.0	59	50	+60	135.0	78	100
	-50	69.0	50	55	+60	128.0	82	100
28255	-50	94.0	72	65	+60	163.0	86	100
	-50	45.0	35	50	+60	132.0	86	100
	-50	72.0	59	60	+60	128.0	76	100
28260	-50	49.0	41	40	+60	164.0	89	100
	-50	85.0	66	65	+60	155.0	87	100
	-50	145.0	94	80	+60	153.0	86	100
28262	-50	100.0	81	70	+60	196.0	91	100
	-50	77.0	61	60	+60	160.0	84	100
	-50	158.0	98	100	+60	170.0	83	100



6-28-77



CONCLUSION

Based on the fracture toughness data and material test results compiled in this report, Sargent & Lundy concludes the reactor containment pressure boundary meets the intent of General Design Criterion 51, "Fracture Prevention of Containment Pressure Boundary".

This conclusion was derived from either acceptable impact test results or the metallurgical characterizations of this material as specified in NUREG 0577 and ASME Section III, Subsection NC. The components selected for the report included equipment and personnel hatches, penetrations, head fittings, and elements of the main steam and feedwater systems. Also included in this report are the material test results and reference documents from which the components were selected.

DOCUMENT/ PAGE PULLED

ANO. _____

NO. OF PAGES 18

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