

# Duquesne Light Company

Beaver Valley Power Station  
P.O. Box 4  
Shippingport, PA 15077-0004  
(412) 393-5206  
(412) 643-8069 FAX

GEORGE S. THOMAS  
Division Vice President  
Nuclear Services  
Nuclear Power Division

September 13, 1994

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

**Subject: Beaver Valley Power Station, Unit No. 1**  
**Docket No. 50-334, License No. DPR-66**  
**10 CFR 50.55a(a)(3) Relief Request; Weld Repair**

The purpose of this submittal is to request NRC approval of a relief request, pursuant to 10 CFR 50.55a(a)(3), to utilize a later version of the ASME Boiler and Pressure Vessel Code to complete repairs on the Unit No. 1 charging/high head safety injection pump (CH-P-1B). It is requested that the repair methodology in the ASME Code, Section XI, 1989 Edition, 1990 Addenda, Article IWA-4000, be approved as an alternative to the present Inservice Inspection (ISI) Program code requirements which are based on the 1983 Edition, 1983 Summer Addenda.

There are three charging/high head safety injection pumps, two of which are required by technical specifications to be operable during plant operation. The technical specification requirements are currently being met with the "A" and "C" pumps operable. However, the "B" pump is inoperable due to code unacceptable indications identified in the casing pedestal support attachment weld to the pump. As such, if the "A" or "C" charging pump became inoperable and could not be restored to operable status within 72 hours, a technical specification required plant shutdown would occur since the "B" pump is unavailable until repairs can be completed.

Enclosure 1 describes in greater detail the circumstances surrounding this repair, including an evaluation of options. Approval of the request will permit use of an acceptable alternative material for weld qualification. The 1989 Edition, 1990 Addenda of the ASME Code, Section XI, Article IWA-4000, provides for an alternative to weld qualification which will maintain an acceptable level of quality and safety in weld repairs. It is requested that the NRC provide provisional relief in order that the pump repairs may be expedited.

100047

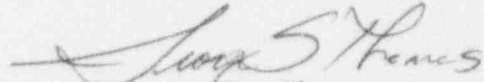
9409210248 940913  
PDR ADOCK 05000334  
P PDR

A001  
11/1

Beaver Valley Power Station, Unit No. 1  
10 CFR 50.55a(a)(3) Relief Request; Weld Repair  
Page 2

If you have any questions regarding this request, please contact  
Mr. Nelson R. Tonet, Manager, Nuclear Safety at (412) 393-5210.

Sincerely,

  
George S. Thomas

cc: Mr. L. W. Rossbach, Sr. Resident Inspector  
Mr. T. T. Martin, NRC Region I Administrator  
Mr. G. E. Edison, Sr. Project Manager

## TABLE OF CONTENTS

### Enclosure 1:

### REPAIR OF CHARGING PUMP, CH-P-1B SUPPORT ATTACHMENT WELDS

#### Enclosure 1 Attachments:

1. NDE Examination Report MT94-20
2. Drawing A-60398; Case Foot - Discharge End
3. Drawing A-60399; Case Foot - Suction End
4. NDE Examination Report MT94-22 (3 pages)
5. Procedure Qualification Record 466 (5 pages)
6. Welding Procedure Specification, Number 1-HBT-1 (4 pages)

## ENCLOSURE 1

### REPAIR OF CHARGING PUMP, CH-P-1B SUPPORT ATTACHMENT WELDS

#### Introduction:

On August 16, 1994, charging/high head safety injection pump CH-P-1B casing pedestal attachment welds were inspected and the results recorded on NDE Examination Report MT94-20 (Attachment 1). The U-shaped casing support feet are detailed on Drawings A-60398 and A-60399 (Attachments 2 and 3). As can be seen from the support detail drawing, the area of the indications is at the juncture of the fillet weld along the side of the U and the partial penetration weld with a 30° weld preparation along the bottom of the U. The indications noted (slag pockets and lack of fusion) were investigated and removed by grinding. The extent of excavation on the three attachment welds requiring repair is detailed in NDE Examination Report MT94-22 (Attachment 4). As documented on NDE Report, MT94-22, some of the indications required metal removal to the root of the partial penetration weld, near the bottom edge of the U, with the area of excavation tapering to the surface of the fillet weld running along the side of the U-shaped support bracket.

#### Repair Option Evaluation

As the indication removal process proceeded, the repair options were being evaluated. Article IWA-4000 of ASME Section XI 1983 S83 was consulted to develop a repair methodology. As described in paragraph IWA-4120 (a), *"Repairs shall be performed in accordance with the Owner's Design Specification and the original Construction Code of the component or system. Later Editions and Addenda of the Construction Code or of Section III, either in their entirety or portion thereof, and Code Cases may be used. If repair welding cannot be performed with these requirements, the applicable alternative requirements of IWA-4500 ... may be used: ..."*. Repairs in accordance with the original design would require a full post weld heat treatment which is not desirable in this case due to the concern for the maintenance of the as-machined dimensions and tolerances of the pump casing. Therefore, the use of a temper bead technique which does not require a post weld heat treatment would be desirable. ASME Section III was reviewed for an applicable temper bead technique. The technique specified in paragraph NB-4622.9 was found to be non-applicable due to paragraph NB-4622.9(b), which limits the depth of the repair to not greater than one-third the base material thickness. The depth of the repair areas indicated on NDE Report MT94-22 for the support attachment weld exceeds one-third of the support thickness. As a result, the temper bead technique described in ASME Section XI would be recommended since there is not a limiting requirement for depth of repair.

Repairs performed to ASME Section XI are required to be performed to the year and addenda of Section XI specified in the inservice inspection program applicable to the inspection interval in accordance with the requirements of IWA-4500. At Beaver Valley, the code of record is the 1983 Edition with the Summer 1983 Addenda. Compliance to the 1983 S83 Section XI Code creates a situation which the repair process would be delayed until a piece of A266 Class I material with heat treatment equivalent to the original design requirements can be procured. In order to avoid unnecessary delays in the repair process and schedule, later editions of the ASME Section XI Code were reviewed to see if relief from this material specification requirement was incorporated into the later editions. In the 1990 Addenda to the 1989 Edition of the ASME Section XI Code, the material specification requirements for the qualification of the repair welding procedure were modified to only require materials from the same P-number and Group number with heat treatment equivalent to the original heat treatment rather than a material of the same specification type, grade and class. The material to meet the requirements of the later edition of the code was readily available and a welding procedure was qualified to the 1989 Edition Addenda 1990 of ASME Section XI. The Procedure Qualification Record (PQR) and the Welding Procedure Specification (WPS) are included as Attachments 5 and 6, respectively.

#### Evaluation of Code Year Editions

The following is a brief description of the changes between the code of record for Beaver Valley, 1983 S83, and the code year and addenda desired for use in the repair process, 1989 A90. In order to evaluate the requirements of each code year and addenda, a paragraph by paragraph review of the applicable paragraphs was performed since the 1990 Addenda to the Code included a complete rewrite of the repair by welding section moving and consolidating many of the requirements from the IWB, IWC and IWD sub-sections to the IWA sub-section of the 1990 Addenda Edition.

1983 S83 Requirements	1989 A90 Requirement
IWA-4120: Specification of applicable Code Year and Addenda	IWA-4120: Requirements are equivalent with additional guidance allowing the use of the latest approved (10 CFR 50.55a(b)) Edition of Section XI

IWA-4130: Description of the Repair Program requirements under which the Utility performs repair activities.	IWA-4130: Addresses all the requirements of the earlier addition and provides additional detail on what items are to be included in the Utility Repair Program. The repair plan for the pump repair would address all the items identified in IWA-4130.
IWA- 4140: Requirements for the services of an Authorized Inspection Agency.	Unchanged
IWA-4200: Material shall conform to the requirements of either the original Design Specification or Section III.	Unchanged
IWA-4300(a): Welding Procedure Specification qualification	IWA-4400(a) Unchanged
IWA-4300(b): Welder qualification	IWA-4400(b) Wording revised with the intent unchanged.
IWA-4300(c): Welder employment organization requirements	IWA-4400(c) Unchanged
IWA-4400: Pressure Test requirements following repair	IWA-4700: Requirements unchanged, but reference to testing following repairs in accordance with IWB were removed since repair procedures are now included in IWA
IWA-4500: Examination of the repaired area	IWA-4600: Unchanged




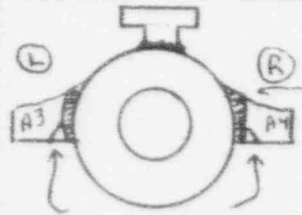
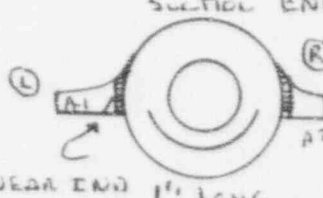
IWA-4700: Records	IWA-4800: Unchanged
IWB-4320: Repair welding by half bead welding technique	IWA-4510: Requirements unchanged
IWB-4321: General requirements for welding. Sub-parts a, b, c, d and e will be addressed separately since the later edition moved the requirements to several locations.	IWA-4513.1(a) addresses sub-part (a); IWA-4513.1(b) and (c) address sub-part (b) eliminating some specific temperature references with a requirement to use manufacturer's recommendations for electrode pre-heat and moisture control. IWA-4210 addresses sub-part (c) in a more general manner. Sub-part (d) concerning electrode selection for tensile strength greater than the base metal has been removed. Sub-part (e) concerning peening is unchanged in intent.
IWB-4322: Welding qualification	IWA-4500(c): References have changed, but intent unchanged.
IWB-4322.1(a): Specifies the material requirements for the procedure qualification testing.	IWA-4500(c)(1): Changes the material requirements from the same specification type, grade and class to the same P-number and Group Number. Post-weld heat treatment remain unchanged.
IWB-4322.1(b) through (h): Test assembly dimensional requirements and configuration to simulate the restraint that the weld metal will experience in the repair section of the component.	IWA-4513 Figure IWA-4513-1 specifies the plate size and groove design to be tested along with locations for all test specimens. The figure eliminates the requirements for configuration specific test assemblies and replaces it with a standardized groove in plate design test plate.

IWB-4322.1(i): Welding material testing requirements	Material property testing of each lot of welding material was removed from the 1989 A90 Edition of the Code.
IWB-4322.1(j): Identifies testing type and location for test specimens to be taken from the qualification plate at the maximum practical depth of repair.	IWA-4513: Figure IWA-4513-1 specifies the plate size and groove design to be tested along with locations for all test specimens. The new requirements are more specific.
IWB-4322.1(k): Impact testing requirements for procedure qualification are detailed in several sub-paragraphs.	IWA-4512: Impact testing requirements have been completely rewritten, eliminating specific requirements in the earlier edition of the Code replacing the requirements with Charpy V-notch testing in accordance with the ASME Section II SA-370, Specification for Mechanical Testing of Steel Products.
IWB-4322.2: Performance qualification of the welder	IWA-4400(b): Addresses this requirement generically through the requirements of the Utility Repair Program and IWA-4120. The changes drops the specific reference to performance qualification in areas of physical obstruction.
IWB-4323(a): Preheat and interpass temperature requirements. IWB-4323(b): Identifies that thermocouples are to be used to monitor preheat and interpass requirements.	IWA-4500(d)(2): Eliminates the 30 minute preheat soak time, but keeps the preheat at 350°F. The maximum interpass temperature is lower to 450°F from 500°F. The preheat area is reduced from 3T or a maximum of 10 inches to 1.5T or a maximum of 5 inches. Thermocouple monitoring requirements are unchanged.

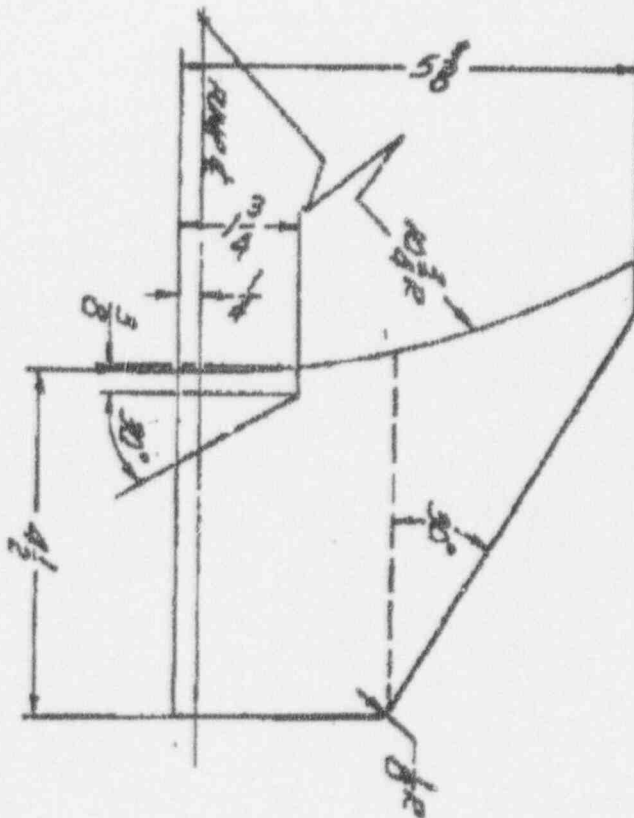
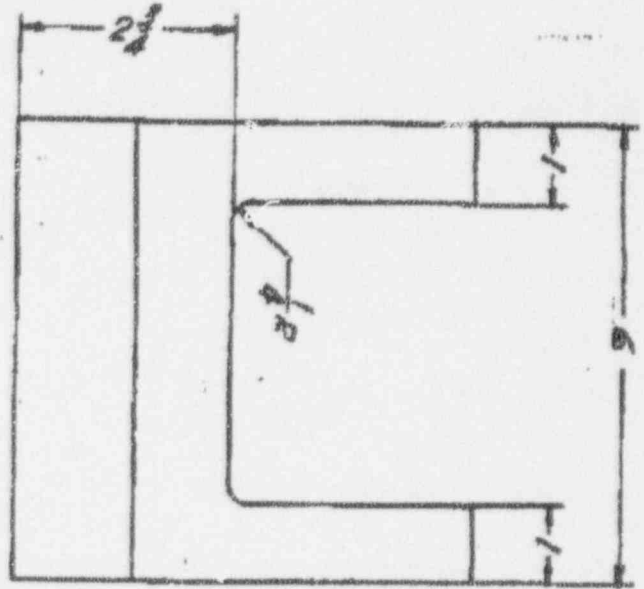


IWB-4323(c): Methodology for deposition of weld material and electrode size limits for each layer.	IWA-4513.1(d): This section is unchanged.
IWB-4323(d): Post weld heat treatment requirements.	IWA-4513.1(e): The time and temperature requirements are unchanged. The 1990 Addenda removes the 3T band width requirement for post weld heat treatment and notes that the weld area shall be post weld heat treated.
IWB-4324: Examination requirements for the repair process and post repair evaluation.	IWA-4513.2: The examination requirements are unchanged except for the requirements to examine a 3T band which is now limited to the weld area.

The changes in the code requirements allow for the qualification of a broader set of materials with a single procedure qualification without impacting the quality of the weld deposited. Additionally the later edition of the code makes more use of references to other Sections of the ASME Code, such as Section II for definition of requirements rather than restating many of the requirements in the body of Section XI. The change to heat treatment areas from the minimum 3T band width to only the weld area allows the weld area to receive the required heat treatment while minimizing the potential for dimensional damage through distortion to the remaining component.

 <b>Duquesne Light</b>		RTL# A9.730B		<b>MAGNETIC PARTICLE EXAMINATION REPORT</b>				REPORT NO. MT94-20		PAGE 1 of 1			
		PLANT/UNIT: BAPS-1		PROC./REV(S): MT-201 REV. 11		APPLICABLE CODE/YEAR/ADDENDA ASME XI 1983 Edition S'83 Addenda							
		SYSTEM: CHARGING (7)		LINE: CH-P-1B		ISO/REV: 9700-2.32-26(TM)		EXAM. CAT.: C-C		ITEM # C.03.030			
SUMMARY NUMBER		MATERIAL: CARBON STEEL		THICKNESS: 1 1/16" E"		SURFACE CONDITION: WELDS AS FOUND WIRE BRUSHED							
TEST MATERIALS:				MAGNETIZING APPARATUS				ILLUMINATION				TEMPERATURE	
TYPE: <input type="checkbox"/> WET <input checked="" type="checkbox"/> DRY <input type="checkbox"/> VISIBLE <input type="checkbox"/> FLUOR. MANUFACTURER: TIEDE COLOR: RED YELLOW P.O. OR BATCH: 116635 162036				TYPE/DB#: 516 CAL/DUE: 11-95 5-95 CURRENT TYPE: 60F 846.4 <input checked="" type="checkbox"/> A.C. <input type="checkbox"/> OTHER <input type="checkbox"/> D.C.				<input checked="" type="checkbox"/> VERIFIED WITH 18% NEUTRAL GRAY CARD <input type="checkbox"/> ULTRAVIOLET N mW/cm2 at N U.V. METER dB#: 1A CAL DUE: 1A				Surface Temp: 75.2 F Measuring Device dB#: 375 Cal Due: 1-14-95	
ITEM EXAMINED		INDICATION DESCRIPTION		REF. POINT	DIST. REF.	FROM C/L	IND. LENGTH	SAT/UNSAT	REMARKS		MAGNETIZING TECHNIQUE		
- WELD A3 LEFT SIDE		LINEAR		SEE SKETCH	N/A	N/A	1"	UNSAT	START AT TDE OF WELD		<input checked="" type="checkbox"/> YOKE: POLE SPACING: 4-6" <input type="checkbox"/> L-10 COIL <input type="checkbox"/> OTHER		
(DISCHARGE)		SUM N° 587300									REF. NDE REQ# 1457		
- WELD A4 RIGHT SIDE		LINEAR		SEE SKETCH	N/A	N/A	1"	UNSAT	START AT TDE OF WELD		MWR# 033309		
(DISCHARGE)		SUM N° 587200							SOME WELDS ON BUTCH PARTIALT MACHINED AWAY FOR FIT UP TO MACHINE BASE		SKETCH/DETAILS DR-QSIE 175		
- WELD A2 RIGHT SIDE		NRI		N/A	N/A	N/A	N/A	SAT	WELD AS FOUND		LOOKING INTO DISCHARGE END  FILLER WELDS ARE 1/8"		
(SUCTION)		SUM N° 587400									LOOKING INTO SUCTION END  ONE LINEAR IND ON EACH SIDE 1" LONG 1 1/16"		
- WELD A1 LEFT SIDE		LINEAR		SEE SKETCH	N/A	N/A	1"	UNSAT	START AT TDE OF WELD		ONE LINEAR IND 1" LONG		
(SUCTION)		SUM N° 587500							INDICATIONS CIRCLED WITH BLACK FELT TIP MARKER				
IST DWG N°		PCA-SHOP		UNIT N° 1									
E-00434/H		PUMP REMOVED											
EXAMINER:		LEVEL:		DATE:		REVIEWED BY:		LEVEL:		DATE:			
Gary Zwick 6813		II		8-16-94		N/A		N/A		N/A			
EXAMINER:		LEVEL:		DATE:		REVIEWED BY DLCo. REPRESENTATIVE		LEVEL:		DATE:			
Rolla A. Perry		III		8/16/94		Jimmy Kacher 7058		II		8-16-94			
OTHER:		LEVEL:		DATE:		A N I I REVIEW		LEVEL:		DATE:			
N/A		N/A		N/A		R. J. Cimoch		N/A		8/17/94			

AUG 22 '94 02:06PM



此乃一書，其書名曰《論衡》。其書之體裁，與《論衡》之體裁，亦頗有相似之處。其書之內容，亦頗有相似之處。其書之體裁，與《論衡》之體裁，亦頗有相似之處。其書之內容，亦頗有相似之處。

CASE ELEVATION D-1340

**PACIFIC PUMPS INC.**  
LOS ANGELES, CALIF.

1000 AMSTERDAM, CALIF.

CASE ROOT-DISCH. END

EXPENSE	DATE	TIME
4/27	6:55	11

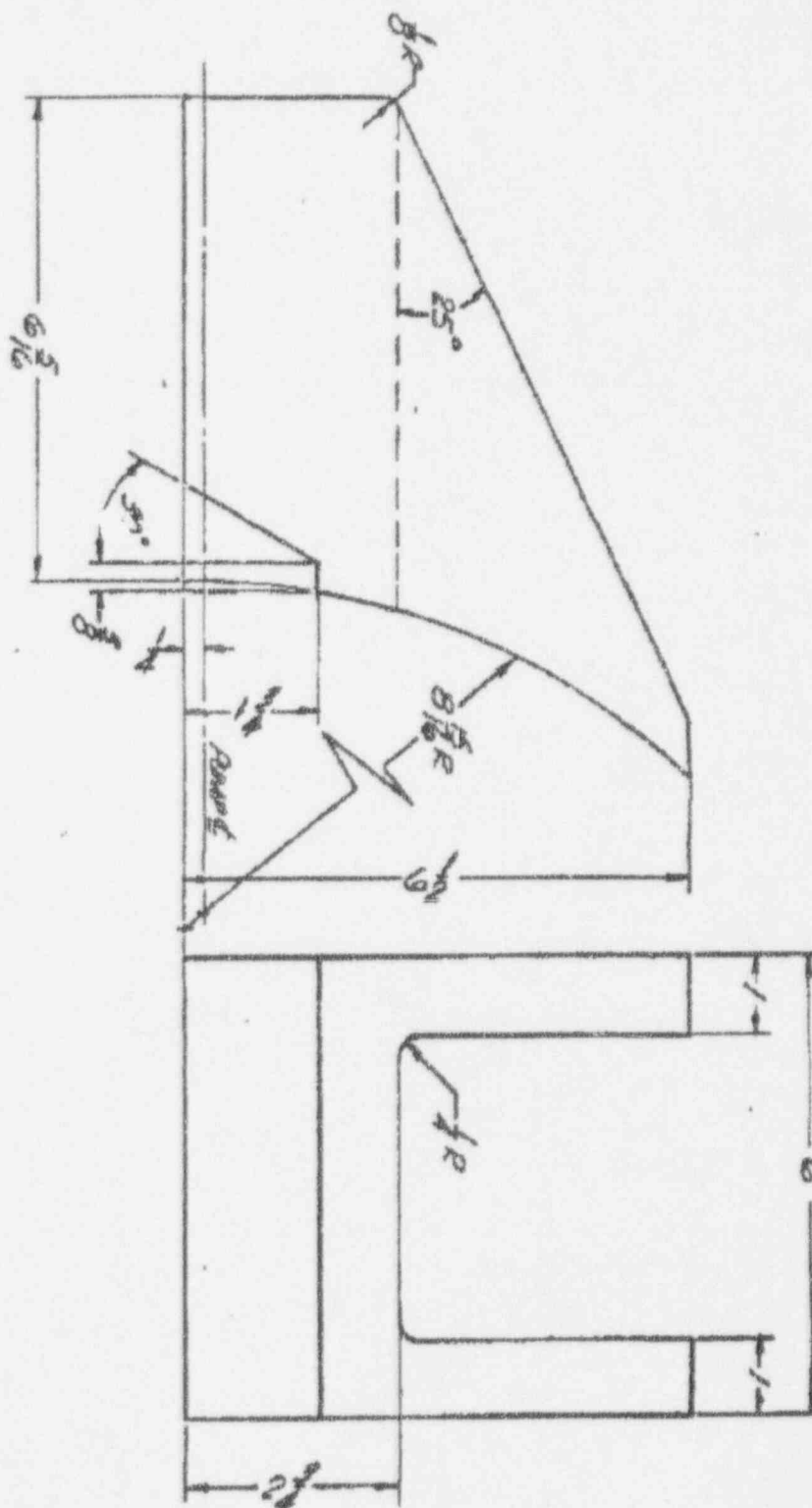
TRACED	SEARCHED	INDEXED

1-EN300

44-38861-10000

A-60398

WORKING CLASSMENT 2004

[illegible]

CASE ELEVATION D-13010

**PACIFIC PUMPS INC.**

LOW AVERAGE GALT

CASE 9007 - SUIC. END

PLA

DATE	6/26/85	TIME	11
------	---------	------	----

1

SCALE 1-5  
PART 10A

110

NO. 1000

100

T

A-60399

THE UNIVERSITY OF CHICAGO PRESS

5536 P.03

01

08-23-1994 09:29AM FROM



RTL #  
A9730J

Duquesne Light

REMARKS/SKETCH/DETAILS

# NDE EXAMINATION REPORT

REPORT NO.

MT94-22

PAGE

1 of 3

PLANT/UNIT:

BURS-1

PROC./REV. (S):

MT 201, Rev 11

APPLICABLE CODE/STANDARD:

ASME SECTION XI 1985 Ed with S'83

SYSTEM:

CHARGING SYS-7

ISO/REV:

8700

EXAM. CAT:

CC

ITEM #:

C03.030

MATERIAL:

CARBON STEEL

THICKNESS:

SIDE PLATE 1"

SURFACE CONDITION:

"MT" EXCAVATION DIMENSIONS

PHOTOGRAPHS TAKEN ON EXCAVATION

WIDTH

DEPTH

A 7/8"

1/4"

B 5/8"

1/4"

C 3/8"

1/8"

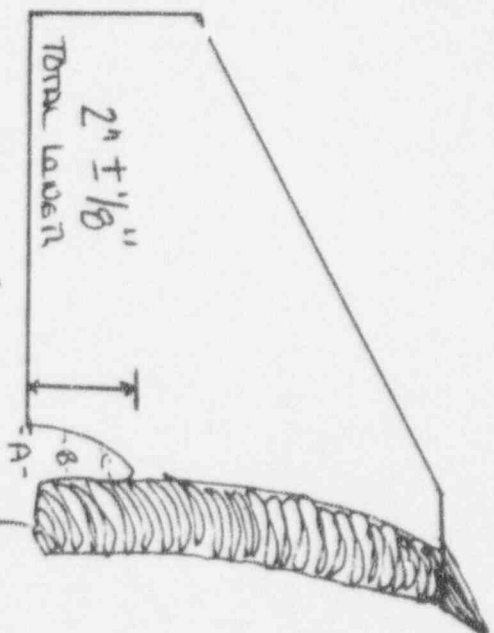
(± 1/16")

(± 1/16")

APPROXIMATE 3/4" INCREMENTS

DEPTH DIMENSIONS TAKEN FROM

SIDE PLATE



ATTACHMENT

A1

REFERENCE

MT94-20 / MT94-21  
MWD 033309  
G51E DE-175  
NDE REG. NO. 1464

EXAMINER

EVALUATED BY

Rory Steel 6815

LEVEL:

II

DATE:

8-24-94

REVIEWED BY:

n/h

REVIEWED BY D.L. CO. REPRESENTATIVE

ANALYST REVIEW

Full a log

LEVEL:

n/h

DATE:

n/h

LEVEL:

III

DATE:

8/24/94

DATE

n/h

LEVEL:

DATE:

n/h

ANALYST REVIEW

Full a log

LEVEL:

DATE:

8/24/94





RTL#  
A97300

Duquesne Light

REMARKS/SKETCH/DETAILS

NDE EXAMINATION REPORT

REPORT NO.

MT94-22

PAGE

2 of 3

PLANT/UNIT:

BVPS-1

PROC./REV.(S):

MT201, Rev 11

APPLICABLE CODE/YEAR/ADDENDA:

ASME SECT III 1983 Ed. with S'83

SYSTEM:

CHARGE 6 SYS-7

LINE:

CH-P-1B

ISO/REV:

8700

EXAM. CAT:

CC

ITEM #:

C03,030

MATERIAL:

CARBON STEEL

THICKNESS:

Side Plate 1"

SURFACE CONDITION:

"MT"

EXCAVATION DIMENSIONS

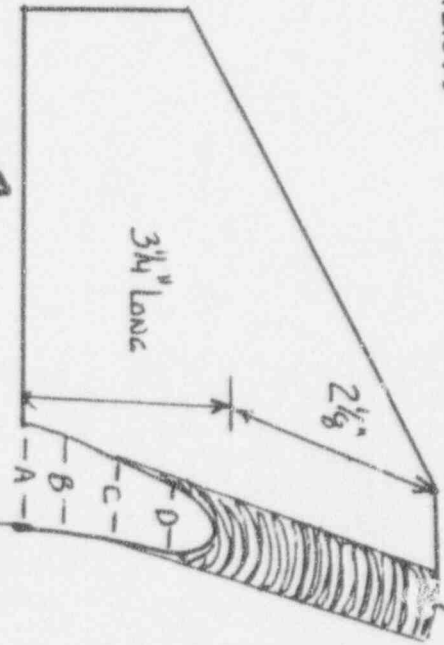
PHOTOGRAPHS TAKEN ON EXCAVATION

DISCHARGE SIDE

MEASUREMENTS IN  $\frac{3}{4}$ " INCREMENTS  
STARTING AT THE BOTTOM

WIDTH	DEPTH
A $1\frac{1}{2}$ "	$1\frac{1}{8}$ "
B $1\frac{1}{2}$ "	1.0"
C $1\frac{1}{4}$ "	$\frac{7}{8}$ "
D 1"	$\frac{1}{2}$ "

DEPTH DIMENSIONS TAKEN  
FROM SIDE PLATE



ATTACHMENT  
A3

REFERENCE

MT94-20 / MT94-21  
MWR 033309  
ASME DR-175  
REG N° 1464

APPROXIMATE 1" INCREMENTS  
STARTING FROM BOTTOM

EXAMINER:

Doug Reed 6813

LEVEL:

II 8-24-94

REVIEWED BY:

n/a

LEVEL:

n/a

EXAMINER:

n/a

LEVEL:

n/a

REVIEWED BY DCS REPRESENTATIVE

ANIL REVIEW

LEVEL:

III 8/24/94

OTHER:

n/a

LEVEL:

n/a

ANIL REVIEW

8/24/94

LEVEL:

8/24/94





RIT #  
A9730J

Duquesne Light

# NDE EXAMINATION REPORT

REPORT NO.

MT94-22

PAGE

3 of 3

PLANT/UNIT:

BVPS-1

PROC./REV (S):

MT201, Rev 11

APPLICABLE CODE/NEAR/ADDENDA:

ASME SECT XI 1983 ED WITH S'83

SYSTEM:

CHARGEING

SYS-7

LINE:

CH-P-1B

ISO/REV:

8700

EXAM CAT:

C-C

ITEM #

C03.030

MATERIAL:

CARBON STEEL

THICKNESS:

SIDE PLATE 1"

SURFACE CONDITION:

"MT" EXCAVATION DIMENSIONS

REMARKS/SKETCH/DETAILS

PHOTOGRAPHS TAKEN ON EXCAVATION

DISCHARGE SIDE



Remainder Fillet Weld



REFERENCE

MT94-20 / MT94-21  
MWL 033309  
GSIE DE-175  
NDE REG N° - 1464

DEPTH DIMENSIONS  
TAKEN FROM SIDE PLATE

APPROXIMATE 1" INCREMENTS  
STARTING FROM BOTTOM

	WIDTH	DEPTH
A	1 1/2"	3/4"
B	1"	3/4"
C	3/4"	1/2"
D	3/4"	3/8"
E	1/4"	1/4"

EXAMINER:

Rory Duck 6813

LEVEL:

II

DATE:

8-24-94

REVIEWED BY:

N/A

LEVEL:

N/A

DATE:

N/A

EXAMINER:

N/A

LEVEL:

N/A

DATE:

N/A

REVIEWED BY DISCO REPRESENTATIVE:

old a, de

LEVEL:

III

DATE:

8/24/94

OTHER:

N/A

LEVEL:

N/A

DATE:

N/A

ANIL REVIEW

old a, de

DATE:

8/24/94



## Procedure Qualification Record (PQR)

PQR: 466 Rev. 0

Welding Procedure Specification

Used for Test: 1-HBT-1 Page 1 of 5

Welding Process: SMAW Type: Manual

JOINTS (QW-402)

See page 3.

## BASE METALS (QW-403)

Material Spec: A-36  
Type or Grade: None  
P-No.: 1, Group 1  
Thickness of Test Coupon: 2"  
Diameter of Test Coupon: N/A  
Maximum Pass Thickness: .175"  
Qual Thk Range: Unlimited  
Backing Materials: Integral  
Deposited Thickness: 1.00"

\* PCI # 1616

## PREHEAT (QW-406)

Preheat Temperature: 376°F  
Maximum Interpass Temp.: 445°F  
Other: Verified by chart recorder.

## POST WELD HEAT TREATMENT (QW-407)

Temperature: 500°F + 50°F  
Time: 2 hours  
Other: Prior to welding, base metal was  
heat treated at 1120°F for 10 hours.  
GAS (QW-408)

## FILLER METALS (QW-404)

Weld Metal Analysis A-No.: A1  
Filler Metal F-No.: 4  
SFA Specification: 5.1  
AWS Classification: E-7018  
Supp'l Filler: None  
Supp'l Powdered Filler: None  
Tungs. Electrode: N/A  
Consumable Insert: None  
Other:

\* 3/32" - PCI #1480  
1/8" - PCI #1574  
5/32" - PCI #1297

Purge Gas: None Flow Rate: N/A  
Shield Gas: None Flow Rate: N/A  
Trailing Gas: None Flow Rate: N/A  
Gas Composition: N/A

## ELECTRICAL CHARACTERISTICS (QW-409)

See pages 3 & 4.  
Tungsten Electrode Size: None

## TECHNIQUE (QW-410)

String or Weave: Both  
Bead Width: 5/8" (maximum 4X Electrode  
core diameter.)  
Multipass or Single (per side): Multipass  
Single or Multipass Electrodes: Single  
Cup Sizes: N/A  
Peening: N/A  
Other: N/A

## POSITIONS (QW-405)

Position of Groove: 1G  
Welding Prog: N/A  
Other: N/A



## PROCEDURE QUALIFICATION RECORD (PQR)

PQR: 466, Rev. 0 Page 2 of 5

Weld Layer	Proc	Filler Metal Class	Diameter	Current Ranges		Volt	Travel
				Pol.	Amp.		Speed Range In/Min.

See pages 4 &amp; 5

TENSILE TEST (QW-150):

Specimen No.	Diameter (in.)	Area (sq.in.)	Ultimate Total Load Lbs.	Ultimate Unit Stress PSI	Type of Failure & Location
466-1	.5081	.2028	15,756	77,700	Weld/Ductile
466-2	.5046	.2000	15,820	79,100	Weld/Ductile

GUIDED BEND TEST (QW-160):

Type & Figure No.	Results
Side Bend QW-462.2	Acceptable
Side Bend QW-462.2	Acceptable
Side Bend QW-462.2	Acceptable
Side Bend QW-462.2	Acceptable

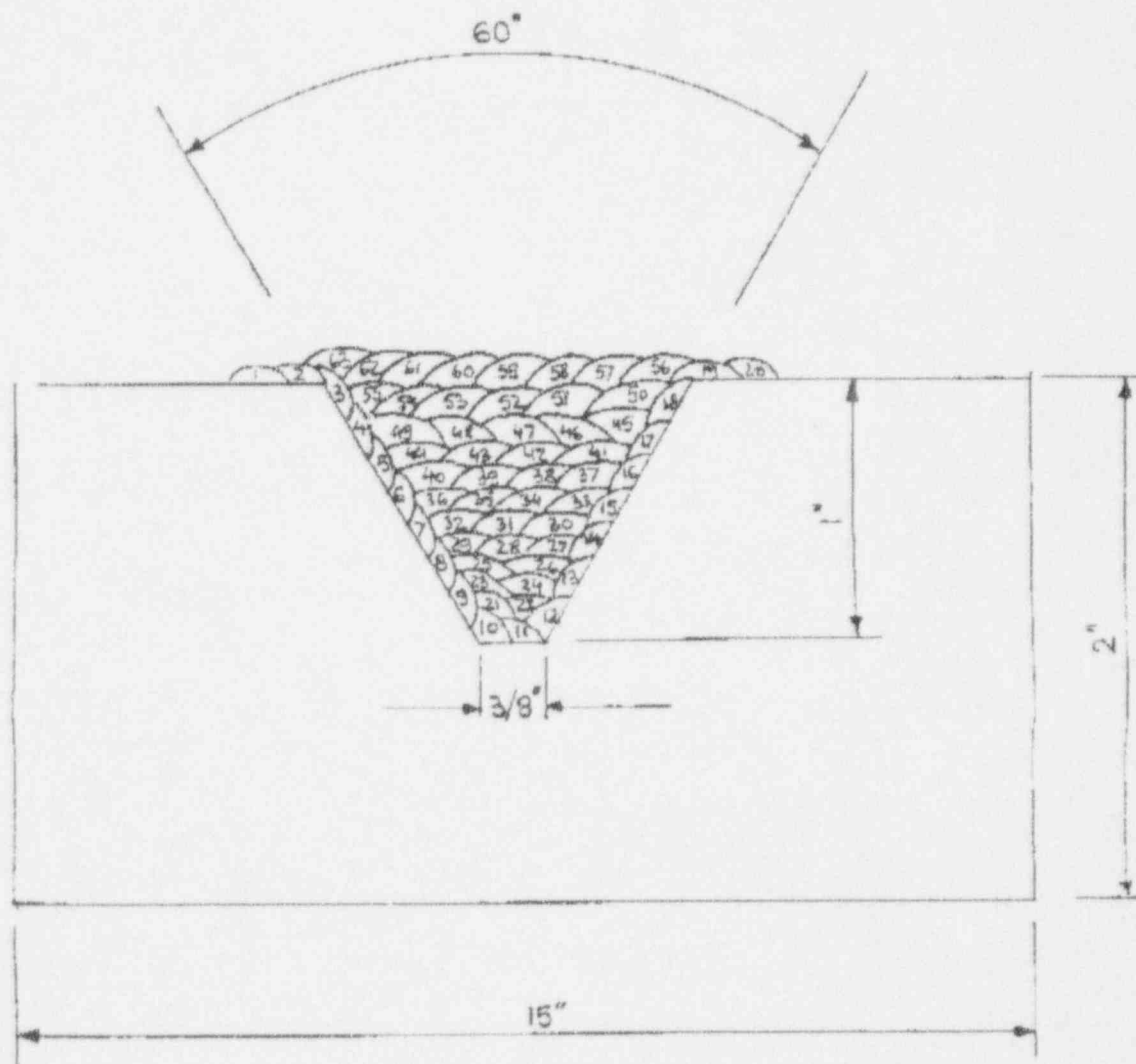
CHARPY V-NOTCH IMPACT TEST (IWA-4512): Acceptable.

Specimen No.	ABS ENG FT-LBS.	Mils Lat. Exp.	% Shear	Test Temp.
Weld-1	124	91	70	-50°F
Weld-2	103	81	70	-50°F
Weld-3	105	80	70	-50°F
HAZ -1	35	33	40	-50°F
HAZ -2	41	34	30	-50°F
HAZ -3	12	17	30	-50°F
Base-1	5	4	0	-50°F
Base-2	3	1	0	-50°F
Base-3	5	3	0	-50°F



PROCEDURE QUALIFICATION RECORD (PQR)

PQR: 466, Rev. 0 Page 3 of 5





## PROCEDURE QUALIFICATION RECORD (PQR)

PQR: 466, Rev. 0 Page 4 of 5

Weld Layer	Process	Filler Metal Class	Metal Dia.	Current Polar	Current Range	Volts Range	Travel Speed Range (IPM)	Preheat Interpass Temp. °F
<u>Butter</u>								
1	SMAW	E7018	3/32"	DCRP	95	23	11.2	376°F
2	SMAW	E7018	3/32"	DCRP	95	23	12.6	400°F
3	SMAW	E7018	3/32"	DCRP	95	23	12.2	410°F
4	SMAW	E7018	3/32"	DCRP	95	23	11.2	410°F
5	SMAW	E7018	3/32"	DCRP	95	23	10.2	431°F
6	SMAW	E7018	3/32"	DCRP	90	22	10.5	430°F
7	SMAW	E7018	3/32"	DCRP	90	22	9.7	436°F
8	SMAW	E7018	3/32"	DCRP	90	22	10.6	405°F
9	SMAW	E7018	3/32"	DCRP	90	22	5.9	420°F
10	SMAW	E7018	3/32"	DCRP	95	23	7.2	425°F
11	SMAW	E7018	3/32"	DCRP	95	23	4.6	420°F
12	SMAW	E7018	3/32"	DCRP	95	23	6.7	420°F
13	SMAW	E7018	3/32"	DCRP	95	23	8.6	431°F
14	SMAW	E7018	3/32"	DCRP	95	23	10.2	433°F
15	SMAW	E7018	3/32"	DCRP	95	23	10.5	438°F
16	SMAW	E7018	3/32"	DCRP	95	23	10.1	400°F
17	SMAW	E7018	3/32"	DCRP	95	23	9.2	410°F
18	SMAW	E7018	3/32"	DCRP	95	23	11.0	420°F
19	SMAW	E7018	3/32"	DCRP	95	23	11.1	425°F
20	SMAW	E7018	3/32"	DCRP	95	23	10.6	435°F
<u>Fill and Reinforcement</u>								
21	SMAW	E7018	1/8"	DCRP	135	24	8.3	385°F
22	SMAW	E7018	1/8"	DCRP	135	24	6.5	420°F
23	SMAW	E7018	1/8"	DCRP	135	24	6.5	410°F
24	SMAW	E7018	1/8"	DCRP	135	24	6.9	430°F
25	SMAW	E7018	1/8"	DCRP	130	24	8.2	404°F
26	SMAW	E7018	1/8"	DCRP	130	24	9.0	430°F
27	SMAW	E7018	5/32"	DCRP	175	24	10.9	410°F
28	SMAW	E7018	5/32"	DCRP	175	24	11.2	430°F
29	SMAW	E7018	5/32"	DCRP	175	24	9.0	395°F
30	SMAW	E7018	5/32"	DCRP	195	24.5	9.7	435°F
31	SMAW	E7018	5/32"	DCRP	195	24.5	10.0	431°F
32	SMAW	E7018	5/32"	DCRP	195	24	7.9	405°F
33	SMAW	E7018	5/32"	DCRP	195	24.5	9.7	375°F
34	SMAW	E7018	5/32"	DCRP	195	24.5	12.0	400°F
35	SMAW	E7018	5/32"	DCRP	195	24.5	13.6	430°F
36	SMAW	E7018	5/32"	DCRP	195	24.5	7.9	440°F
37	SMAW	E7018	5/32"	DCRP	185	24	9.8	432°F
38	SMAW	E7018	5/32"	DCRP	190	24	8.6	444°F
39	SMAW	E7018	5/32"	DCRP	190	24	8.3	355°F
40	SMAW	E7018	5/32"	DCRP	190	24	6.9	367°F
41	SMAW	E7018	5/32"	DCRP	190	24	8.4	389°F
42	SMAW	E7018	5/32"	DCRP	190	24	8.3	395°F
43	SMAW	E7018	5/32"	DCRP	190	24	9.2	425°F

\*\* TOTAL PAGE 12 \*\*



## PROCEDURE QUALIFICATION RECORD (PQR)

PQR: 466, Rev. 0 Page 5 of 5

Weld Layer	Process	Filler Metal Class	Filler Metal Dia.	Current Polar	Current Range	Volts Range	Travel Speed Range (IPM)	Preheat Interpass Temp. °F
Pass								
44	SMAW	E7018	5/32"	DCRP	190	24	9.3	440°F
45	SMAW	E7018	5/32"	DCRP	190	24	10.2	378°F
46	SMAW	E7018	5/32"	DCRP	190	24	7.7	395°F
47	SMAW	E7018	5/32"	DCRP	190	24	7.0	415°F
48	SMAW	E7018	5/32"	DCRP	190	24	7.6	430°F
49	SMAW	E7018	5/32"	DCRP	190	24	8.2	445°F
50	SMAW	E7018	5/32"	DCRP	190	24	12.1	354°F
51	SMAW	E7018	5/32"	DCRP	190	24	10.5	370°F
52	SMAW	E7018	5/32"	DCRP	195	24.5	11.5	392°F
53	SMAW	E7018	5/32"	DCRP	195	24.5	10.4	400°F
54	SMAW	E7018	5/32"	DCRP	195	24.5	9.4	418°F
55	SMAW	E7018	5/32"	DCRP	195	24.5	8.9	441°F
56	SMAW	E7018	5/32"	DCRP	195	24.5	16.4	378°F
57	SMAW	E7018	5/32"	DCRP	180	24.5	15.2	395°F
58	SMAW	E7018	5/32"	DCRP	180	24	16.1	406°F
59	SMAW	E7018	5/32"	DCRP	180	24	13.6	414°F
60	SMAW	E7018	5/32"	DCRP	180	24	14.5	425°F
61	SMAW	E7018	5/32"	DCRP	180	24	15.0	433°F
62	SMAW	E7018	5/32"	DCRP	180	24	15.3	440°F
63	SMAW	E7018	5/32"	DCRP	180	24	18.7	445°F

Welder's Name: D. Newman Stamp No.: M198Tests conducted by: Taussig Assoc., Inc. Test No.: 117997

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX and Section XI, 1989 Edition, 1990 Addenda of the ASME Code.

Date: September 7, 1994

PCI Energy Services

Manager, Weld Engineering



PCI ENERGY SERVICES  
LAKE BLUFF, ILLINOIS

[illegible]



WELDING PROCEDURE SPECIFICATION  
NUMBER ONE-HBT-ONE  
(MANUAL)

Rev. 0  
September 7, 1994  
Page 1 of 3

Supporting Procedure Qualification Records: 466.

1.0 SCOPE

Manual shielded metal arc welding of P-No. 1, Group 1, carbon steel materials with Post Weld Heat Treatment using the Half Bead Temper (HBT) Technique, with impact testing.

2.0 JOINTS (QW-402):

Design: U Groove and repairs.

Root Spacing: Open Butt: None.  
Backing ring: None.  
Backgouge: None.

Root Condition: Base metal temperbead groove.

Backing Material: Integral.

Details: Per design documents or WCP-6 Joint Design.

3.0 BASE MATERIALS (QW-403):

Materials: P-No. 1, Group 1 to P-No. 1, Group 1.

Thickness Range

Base Materials:

SMAW: Groove welds (t): Unlimited.

Deposited Weld Metal (Maximum):

SMAW: Repair welds (depth of repair): 2".

Pipe diameters: N/A

4.0 FILLER MATERIALS (QW-404):

SMAW: P-No. 4, A-No. 1, SFA-No. 5.1, AWS No. E7018 - 3/32",  
1/8" or 5/32" diameter.



WPS1-HBT-1 (Manual)  
Revision 0  
September 7, 1994  
Page 2 of 3

5.0 POSITIONS (QW-405):

Repair welds: Flat.  
Weld progression: N/A

6.0 PREHEAT (QW-406):

Minimum preheat requirements: 350°F  
Maximum interpass temperatures: 450°F.  
Preheat maintenance: Flame, radiant or electric.

7.0 POSTWELD HEAT TREATMENT (QW-407):

Temperature range: 450°F-550°F  
Time range: 2 hours minimum.  
Heating/Cooling Rates: 225°F per hour maximum.

8.0 GAS (QW-408): None

Shielding Gas:	None	Flow Rate:	N/A
Purge Gas:	None	Flow Rate:	N/A
Trailing Gas:	None	Flow Rate:	None
Gas Composition:	N/A		

9.0 ELECTRICAL CHARACTERISTICS (QW-409):

Weld Layer	Process	Filler mat.		Current		Volt Range	Travel Speed IPM
		Class	Dia.	Type Polar	Amp. Range		
1	SMAW	E7018	3/32	DCRP	70-130	19-23	4.6 min.
See Note							
2	SMAW	E7018	1/8	DCRP	90-160	20-24	6.5 min.
*	SMAW	E7018	5/32	DCRP	120-200	20-25	6.9 min.

\* Fill & Cap: Use 3/32", 1/8" or 5/32".  
Repairs: All the above:

NOTE: Layer 1 - (Butter Bead), only 3/32" electrode, shall be utilized.

Layer 2 - (Temper Bead), only 1/8" electrode, shall be utilized.

Layer 3 thru cap shall utilize 3/32", 1/8" or 5/32" electr.



WPS1-HBT-1 (Manual)  
Revision 0  
September 7, 1994  
Page 3 of 3

#### 10.0 TECHNIQUE (QW-410):

String or weave:	Both.
Orifice or gas cup:	None.
Peening:	Not permitted unless authorized by the Manager of Weld Engineering.
Passes per side:	Multiple for the SMAW process.
Number of electrodes:	Single.
Maximum bead width:	4X wire core diameter maximum.
Initial, Interpass & Final Cleaning:	Wire brushing, grinding, filing, deburring and/or chipping.
Method of backgouge:	Mechanical and/or thermal.
Pulsed current:	None.

#### 11.0 NOTES:

1. Covered electrodes shall be baked and maintained in accordance with the manufacturer's recommendations. After baking and before the electrodes are allowed to cool below 225°F, they shall be transferred to holding or drying ovens operating between 225°F and 350°F. During the repair, electrodes removed from the holding ovens for a period in excess of 8 hr shall be rebaked. Electrodes shall not be rebaked more than once.
2. The weld bead crown surface of the butter layer shall be removed by grinding or machining before depositing the second layer. The completed weld shall have at least one layer of weld reinforcement deposited and then this reinforcement shall be removed by mechanical means, making the finished surface of the repair substantially flush with the surface surrounding the repair.
3. The weld area shall be maintained at a temperature of 450°F-550°F for a minimum of 2 hr after completion of the weld repair.
4. Maximum layer thickness shall be 1/2" for the SMAW process. Filler metal shall be added on each pass.
5. This Welding Procedure Specification shall be used in conjunction with project design documents, the PCI Quality Assurance Manual, as applicable and the following Welding Control Procedures and/or standards:  
  
GWS-1 "General Welding Standard for ASME and ANSI Applications".  
WCP-6 "Welding Control Procedure for Joint Design".