QA Record

TVA 10697 (DNE-6-86) DNE CALCULATIONS

TITLE Weld Flaw Evaluation for the Vortex Nozzle of the Refueling Water Storage Tank	PLANT/UNIT WBN/Units 1 and 2
PREPARING ORGANIZATION NE M/N	KEY NOUNS (Consult RIMS DESCRIPTORS LIST) Fracture Mechanics, Flaw Evaluation
BRANCH/PROJECT IDENTIFIERS WBP-MTB-001	Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in.

Rev	(for RIMS' use)	RIMS accession number
R0	890825D0040	B26 '89 0630 377
R _		
R _		
R _		

(10)

APPLICABLE DESIGN DOCUMENT(S): ASME Section III, ASME Section XI

SAR SECTION(S): | UNID SYSTEM(S): 63

Revision 0	R1	R2	R3
ECN No. (or indicate Not Applicable) N/A			
Prepared Wayne A. Pavinich			
Checked Patrick A. Walker		—	
Reviewed Patrick A. Walker			
Approved James F. Murdock			
Date 6/30/89 8/11/89			
Use form TVA 10534 if more space required: List all pages added by this revision.			
List all pages deleted by this revision.			
List all pages changed by this revision.			

Safety-related? Yes ☒ No ☐

Statement of Problem

Longitudinal and circumferential welds in the WBN refueling water storage tank vortex nozzle did not received radiographic inspection as required by ASME Section III for class 2 components. These welds are embedded in concrete and cannot be easily inspected.

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☐ No ☒

This calculation documents the flaw evaluation for the subject welds to help evaluate the consequences of not performing radiographic inspection.

This calculation utilizes the pc-CRACK version 1.2 to calculate allowable flaw sizes.

This calculation contains 10 total pages.

☐ Microfilm and store calculations in RIMS Service Center. ☐ Microfilm and destroy.

☒ Microfilm and return calculations to: Mark Wiley, IOB ~~B174~~ A268A WBN Address:

cc: RIMS, SL 26 C-K T R Woods IOB WBN W. Pavinich, WT 10D 202 HK

8909280025 890721
PDR ADOCK 05000390
A PDC

TVA

Title: Weld Flaw Evaluation for the Vortex Nozzle of the Refueling Water Storage Tank

REVISION LOG
WBP-MTB-001

Revision No.	DESCRIPTION OF REVISION	Date Approved
R0	Original Issue	6/30/89 JOC 9/11/89

CALCULATION DESIGN VERIFICATION (INDEPENDENT REVIEW) FORM

WBP-MTB-001 — Calculation No.

R0 — Revision

Method of design verification (independent review) used (check method used):

1. Design Review ✓
2. Alternate Calculation
3. Qualification Test

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

The analysis performed follow the methods detailed in ASME Section XI, IWB-3640, and Code Case N-436 FWW 6-29-99 for calculating the allowable flaw size for welds. As a result of the use of this industry standard + ASME Code, the calculation is considered technically adequate.

Patrick A. Walker
Design Verifier
(Independent Reviewer)

6/29/99
Date

LOG PREP NAME: ____ /
LOG CHECKER NAME: ____ /
LOG VERIF NAME: ____ /

CALCULATION CROSS REFERENCE SYSTEM INPUT FORM

LOG PREPARER ID: ___ - ___ - ____ DATE: __ / __ / __ UPDATE CODE: A

LOG VERIFIER ID: ___ - ___ - ____ DATE: __ / __ / __

A = ADD
C = CHANGE
D = DELETE
R = RENAME CAL
V = VERIFY CAL

	TYPE	PLANT	BRANCH	NUMBER	REV.
CALC ID:	CN	WBN	M/N	WBP-MTB-001	R00

TITLE: WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

UNIT ....
BUILDING ..
SYSTEM ... 063
ROOM ....
ELEVATION
CORD AZMTH ....
PRE RESTART ..

FIRM ....
RESP SUPV .... JFM
PREPARER WAP
REVIEWER PAW
OVERRIDE AS ..... N
CATEGORY

CLASS .. E
RIMS NUMBER ..
STATUS . I
STATUS DATE ... __ / __ / __
EST FIN DATE ... __ / __ / __

RENAMED CALC

	TYPE	PLANT	BRANCH	NUMBER	REV.
CALC ID:					

REMARKS

A/D		A/D	
A	FRACTURE MECHANICS		
A	FLAW EVALUATION		

CROSS REFERENCE INPUT

A/D	PROGRESS	TYPE	PLANT	BRANCH	NUMBER	REV.

WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

WBP-MTB-001

computed NaP date 6/28/89
checked TLH date 6/29/89

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WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

WBP-MTB-001

computed HAP date 6/28/89
checked [illegible] date 6/29/89

1.0 Purpose

The purpose of this calculation is to determine maximum allowable flaws in various WBN Refueling Water Storage Tank Vortex nozzle austenitic shielded metal arc welds (SMAW). This evaluation utilizes conservative fracture mechanics analyses to determine the critical flaw size of the welds.

2.0 Assumptions

This analysis utilizes the procedures contained in ASME Section XI paragraph IWB-3640, Code Case N-436, and Appendix C. All of the welds considered are SMAW joining 304 stainless steel base material using E308-16 filler, and therefore, it is assumed that a limit load analysis is appropriate since austenitic stainless steel will plastically collapse before the onset of stable ductile tearing. Thermal and bending stresses are considered to be zero since concrete and grout will not allow bending of the stainless steel.

3.0 Source of Design Input Information

3.1 PDM Drawing D-10, Transmittal Number 20004, Contract Number 56039, P. O. Number 76K 70-820613.

3.2 PDM Calculation page 5.25, File Number 28437.

3.3 ASME Code Case N-436.

3.4 EPRI NP-4690-SR, "Evaluation of Flaws in Austenitic Steel Piping".

3.5 ASME Boiler and Pressure Vessel Code, Section XI 1986 Ed. paragraph IWB 3640 and Appendix C.

3.6 ASME Boiler and Pressure Vessel Code, Section III 1986 Ed. Appendix I.

WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

WBP-MTB-001

computed NAP date 6/28/89
checked PRW date 6/29/89

4.0 Design Input Data

4.1 Nozzle Section Properties (Reference 3.1)

Radius (inches)	Wall Thickness (inches)
11 11/16	5/16

4.2 Mechanical Properties (Reference 3.6)

S_h = 18800 psi $\sigma_f = 3S_h$ = 56400 psi for 304 SS

4.3 Applied Stress (Reference 3.2)

head pressure = 20.9 psig. SSE pressure increase = 19.6 psig

5.0 Computation/Analysis

5.1 Critical Flaw Size in the Seam Welds

The critical flaw size can be calculated using the equations of Code Case N-436 and EPRI NP-4690-SR as follows.

$M = [1 + (1.61/4Rt)l^2]^{0.5}$

R = mean radius = 11 11/16 + 1/2 x 5/16 = 11.844 inches

l = flaw length

$M^2 = (\sigma_f/SF\sigma_h)^2 = 1 + (1.61/4Rt)l^2$

σ_h = hoop stress. σ_f = flow stress = $3S_h$ = 56.4 Ksi

SF = safety factor

$l^2 = [(\sigma_f/SF\sigma_h)^2 - 1][4Rt/1.61]$

WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

WEP-MTE-001

computed [illegible] date 6/28/89
checked [illegible] date 6/29/89

For Normal/Upset Conditions, SF = 3

The total pressure is the sum of the hydrostatic pressure and the pressure increase due to a seismic event (OBE). The OBE increase in pressure is assumed to half of the SSE increase in pressure of Reference 3.2.

$P_{total} = P_{head} + P_{OBE} = 20.9 + 9.8 = 30.7$ psig

$\sigma_h = P_{total}R/t = (30.7)(11.844)/(0.3125) = 1163.5$ psi

$l^2 = [(3x18.8/3x1.1635)^2 - 1][4x11.844x0.3125/1.61] = 2391.7$

$l = 48.9$ inches

For Emergency/Faulted Conditions, SF = 1.5

The total pressure is the sum of the hydrostatic pressure and the pressure increase due to a seismic event (SSE).

$P_{total} = P_{head} + P_{SSE} = 20.9 + 19.6 = 40.5$ psig

$\sigma_h = P_{total}R/t = (40.5)(11.844)/(0.3125) = 1535.0$ psi

$l^2 = [(3x18.8/1.5x1.535)^2 - 1][4x11.844x0.3125/1.61] = 5508.3$

$l = 74.2$ inches

5.2 Critical Flaw Size in the Girth Weld

Following the procedures of ASME Section XI IWB-3640 and Code Case N-436 and EPRI NP-4690-SR the allowable flaw depth to wall thickness ratio for different flaw lengths were calculated. These values were calculated using the IBM-PC computer program pc-CRACK Version 1.2 developed by Structural Integrity Associates, INC. The following options were selected to perform the analysis.

- Option D. Codes and Standards Evaluation of the pc-CRACK Main Menu.

WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

computed [illegible] date 6/28/89
WBP-MTB-001 checked [illegible] date 6/29/89

- Option A, Allowable Flaw Size Evaluation of the Codes and Standards Evaluation Module.

- Option J, Circumferential Crack Using the Source Equations of the Allowable Flaw Evaluation Module.

The source equations in the pc-CRACK program are identical to those contained in ASME Code Case N-436 and EPRI-4690-SR. The relevant dimensions used in this computation are:

a = crack depth, l = crack length

Stresses and safety factors were calculated as follows.

Normal/Upset

The longitudinal membrane stress was calculated to be half of the hoop stress (681.75 psi).

Since the welds are SMAW, the inputs to the source equations were altered to account for the load multiplier, Z. Since the source equation option of pc-CRACK does not provide prompts for input of Z, the safety factor was adjusted to produce results in accordance with IWB-3640.

FS = 2.77 x Z = 4.01, Z = 1.15[1 + 0.013(OD - 4)] = 1.449

Emergency/Faulted

The stresses and safety factor was calculated the same way as the normal/upset condition.

FS = 1.33 x Z = 2.01, Longitudinal membrane stress = 787.5 psi

The results for the allowable flaw depth to wall thickness ratios for various flaw length to circumference ratios are on page 10.

WELD FLAW EVALUATION FOR THE VORTEX NOZZLE OF THE REFUELING WATER STORAGE TANK

WBP-MTB-001

computed [illegible] date 6/28/89
checked [illegible] date 6/29/89

6.0 Results

There are two major results of this calculation.

1) The vortex nozzle can withstand a longitudinal through-wall crack up to 48.9 inches and still meet the ASME safey margins.

2) The vortex nozzle-to-pipe girth weld can withstand a through-wall crack up to 70% of circumference and still meet the ASME safety margins.

```
REFUELING WATER STORAGE TANK  24 INCH NOZZLE WELD FLAW EVALUATION

WALL THICKNESS=     0.3125
MEMBRANE STRESS=  581.7500      SAFETY FACTOR=     4.0100
BENDING STRESS=     0.0000      SAFETY FACTOR=     4.0100
STRESS RATIO=     0.1241
ALLOWABLE STRESS=18800.0000
FLOW STRESS=56400.0000

                                    L/CIRCUM
                 0.00   0.10   0.20   0.30   0.40   0.50   0.60   0.70
ALLOWABLE A/T 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

                 0.80   0.90   1.00
ALLOWABLE A/T 0.3834 0.3756 0.9736


DO YOU WANT TO PERFORM ANOTHER CASE?(Y/N):


WALL THICKNESS=     0.3125
MEMBRANE STRESS=  767.5000      SAFETY FACTOR=     3.0100
BENDING STRESS=     1.0000      SAFETY FACTOR=     3.0100
STRESS RATIO=     0.1421
ALLOWABLE STRESS=18800.0000
FLOW STRESS=56400.0000

                                    L/CIRCUM
                 0.00   0.10   0.20   0.30   0.40   0.50   0.60   0.70
ALLOWABLE A/T 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000

                 0.80   0.90   1.00
ALLOWABLE A/T 0.3893 0.3814 0.9795
```

ENCLOSURE 4

NONDESTRUCTIVE EXAMINATION REPORTS AND FABRICATION CHECKLISTS

Nondestructive Examination Reports

Liquid Penetrant test report Units 1 and 2 - cone subassembly 14A	2167
Liquid penetrant test report Unit 1 - subassembly 8H long seam Unit 1 - subassembly 14A to 8H circ. weld	2771
Liquid penetrant test report Unit 2 - subassembly 8H long seam Unit 2 - subassembly 14A to 8H circ. weld	2168
Vaccuum box test report Units 1 and 2 - cone assembly 14A	2165
Hydrostatic test report - unit 1	56039-34
Hydrostatic test report - unit 2	56039-35

Fabrication Checklists

Unit 1	- cone subassembly	14A-1
	- pipe subassembly	8H-1
	- vortex subassembly	8B-1
Unit 2	- cone subassembly	14A-2
	- pipe subassembly	8H-2
	- vortex subassembly	8B-2

2167

Form 1/959

LIQUID PENETRANT TEST

Location: Bham

CONTRACT 56039	DWG. NO. 141	ASSEMBLY SUB-ASSEMBLY 14A1 + 14A2	
TYPE OF MATERIAL 304 SS	MAT'L THICKNESS	PC MARK See below	
SPECIFICATION PT 01 Rev/0		TEST TEMPERATURE 85°	
PRE-TEST CLEANING AGENT SKC-S/5J128		LENGTH OF TIME PENETRANT OF MATERIAL 5	
PENETRANT: TYPE SKL-HF-SKL-S/6B052		MANUFACTURER Spotcheck	
POST-PENETRANT CLEANING AGENT SKC-S/5J128			
DEVELOPER: SKD-S/6L019		MANUFACTURER Spotcheck	
POST-DEVELOPER CLEANING AGENT SKC-S/5J128			
IF APPLICABLE	PRE-WHT ☐	POST-WHT ☐	

Report Page 1 of 1

SEAM NUMBER	LOCATION	WELDER/WELDERS IDENTIFICATION	ACCEPT	REJECT	EVALUATION OF TEST
142	SPLICE	709	✓		
4 Req					

REMARKS:

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1. QA INSPECTOR [signature] Level II PT DATE 7/11/77
2. QA SUPERVISOR [signature] Level II PT DATE 7/13/77
3. CODE INSPECTOR [signature] DATE 2/21/78
4. CUSTOMER REP. [signature] DATE 2-21-78

QUALITY ASSURANCE

2771

PDM

LIQUID PENETRANT TEST

Location: Bham

CONTRACT 56039	DWG. NO. 8	ASSEMBLY SUB-ASSEMBLY 8 B-1	
TYPE OF MATERIAL 304SS	MAT'L THICKNESS 3/8"	PC MARK see below	
SPECIFICATION PT-01/0		TEST TEMPERATURE 80°	
PRE-TEST CLEANING AGENT SKC-S / 78C036		LENGTH OF TIME PENETRANT OF MATERIAL 5 min	
PENETRANT: TYPE SKL-S / 6B052		MANUFACTURER Spot Check	
POST-PENETRANT CLEANING AGENT SKC-S / 78C036			
DEVELOPER: SKD-S / 5M113		MANUFACTURER Spot Check	
POST-DEVELOPER CLEANING AGENT SKC-S / 78C036			
IF APPLICABLE	PRE-WHT ☐ N/A	POST-WHT ☐ N/A	

Report Page 1 of 1

SEAM NUMBER	LOCATION	WELDER/WELDERS IDENTIFICATION	ACCEPT	REJECT	EVALUATION OF TEST
8h to 8h	Full Seam		X		
8h to 14A	inside Seam		↓		
8h to 14A	outside Seam			X	* CAR# 29899
8h to 14A	outside Seam		X		
Repair per CAR# 29899					

REMARKS:

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1. QA INSPECTOR Joel F. Goolsby Level II PT DATE 7/6/78
2. QA SUPERVISOR [illegible] DATE 8/8/78
3. CODE INSPECTOR F.E. Campbell DATE 8/4/78
4. CUSTOMER REP. DATE

QUALITY ASSURANCE

2168

PDM

ENCLOSURE 4 PAGE 4 OF 13

LIQUID PENETRANT TEST

Location: B'kom

Report #27 Page 1 of 1

CONTRACT 56039	DWG. NO. 8	ASSEMBLY SUB-ASSEMBLY 8B-2
TYPE OF MATERIAL 304-SS	MAT'L THICKNESS	PC MARK see below
SPECIFICATION PT-01 Rev-0		TEST TEMPERATURE 65°
PRE-TEST CLEANING AGENT SKC-S/7K030		LENGTH OF TIME PENETRANT OF MATERIAL 5 min.
PENETRANT: TYPE SKL-S/6B052		MANUFACTURER SPOT Check
POST-PENETRANT CLEANING AGENT SKC-S/7K030		
DEVELOPER: SKD-S/4L107		MANUFACTURER SPOT Check
POST-DEVELOPER CLEANING AGENT SKC-S/7K030		
IF APPLICABLE	PRE-WHT ☐ NA	POST-WHT ☐ NA

SEAM NUMBER	LOCATION	WELDER/WELDERS IDENTIFICATION	ACCEPT	REJECT	EVALUATION OF TEST
1NA to 8h	Full seam	702	x		
8h to 8h	↓	709	x		
8m to 8h	↓	↓	x		

REMARKS:

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1. QA INSPECTOR M. S. Crone Level II PT DATE 2/20/78
2. QA SUPERVISOR [illegible] DATE 2/21/78
3. CODE INSPECTOR F. E. Campbell DATE 2/21/78
4. CUSTOMER REP. Eugene B. Simi DATE 2-21-78

QUALITY ASSURANCE

2165

PDM

VACUUM BOX TEST RECORD

CONTRACT 56039	DWG. NO. 14	SUB ASSEMBLY/ASSEMBLY 14A-1&2
CUSTOMER SPECIFICATION:	PDM PROCEDURE VB-01/0	PC MARKS 14a
LEAK DETECTION SOLUTION: Leak Tec-277		TIME PRESSURE HELD: 20 sec
INSPECTION RATE 3 FT. 1 MIN.	VACUUM PRESSURE: 8 psi	OPERATOR: Goolsby

SEAM NUMBER	LOCATION	ACCEPT	REJECT	TEST RESULTS
14a To 14a	OUTSIDE FACE OF FINAL pass	X		(2 REQD)
(4 seams)				

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REMARKS:

1. Q.A. INSPECTOR Carl F Goolsby Level II VB DATE 2/21/77
2. Q.A. SUPERVISOR [illegible] Level III VB DATE 2/21/78
3. FE Campbell ANI DATE 2/21/78

PITTSBURGH DES MOINES STEEL COMPANY

Hydrostatic Testing Procedure, CHT-1

Contract 56039	REV. 0	DATE 3-7-77

TANK No. 56039-34 UNIT 1

PERSONNEL CONDUCTING TEST: H R Chandler — Q.A. MANAGER; Terry Walker — P.D.M. FOREMAN

WATER TEST LEVELS: 19' 1" — TIME HELD 5-14-78; 38' 2" — TIME HELD 5-16-78

TEST RESULTS: ACCEPTABLE ☑ UNACCEPTABLE ☐

REMARKS:

LIST LEAK CHECKING PERFORMED
(STATE SEAMS CHECKED AND SIGNATURE OF PERSONNEL PERFORMING LEAK CHECK)

All vertical and horizonal seam plus penertions, corner welds inspected by P.D.M. Inspector, TVA Mech. Eng. + ASME code inspector

H R Chandler P.D.M. Q.A Manager

EQUIPMENT-M

TEST ACCEPTED BY

Harold R Chandler — PDM INSPECTOR — 5-16-78 DATE

Jeffrey White TVA-MEU. — CUSTOMER REPRESENTATIVE — 5/16/78 DATE

R.N. Franklin — AUTHORIZED INSPECTOR — 5-16-78 DATE

HYDROTEST FOR S/S TANK

CONTRACT 56040 | REV. 0 | DATE 3-

TANK No. 56039-35 UNIT 2

PERSONNEL CONDUCTING TEST H.R. Chandler P.D.M. R.B. Clover F.M.
Jeff White TVA

WATER TEST LEVELS 19' 1" TIME HELD 10-5-78 10:45 AM
38" TIME HELD 10-9-78 9:00 AM

TEST RESULTS: ACCEPTABLE [X] UNACCEPTABLE [ ]

REMARKS:

LIST LEAK CHECKING PERFORMED
(STATE SEAMS CHECKED AND SIGNATURE OF PERSONNEL PERFORMING LEAK CHECK)

ALL WELDED SEAMS AND
Penetrations checked per CHT-2(0)

Information Only

TEST ACCEPTED BY

H.R. Chandler — PDM INSPECTOR — 10-9-78 DATE

[illegible] — CUSTOMER REPRESENTATIVE — 10/9/78 DATE

R.B. Clover — AUTHORIZED INSPECTOR — 10/9/78 DATE

Rev. 0
Form No. 18011

FABRICATION CHECK LIST (FCL)

PACKET PAGE 1 OF 1

CONTRACT 56039 GROUP No. ____ PC. MK. SUB-ASSY ASSEMBLY 14A-1

P.O.-ITEM No. ____ I.D. No. ____ HT. No. ____ SL. No. ____ MATERIAL ____

Procedure Per Dwg. 14

Seq.	Dept.		Clk. No.	Dwg. Rev.	Date	Signature
1	F	FIT Assy 14A-1 PER DWG 14				
		14a	607		7/11/77	
		14a				
2	QA	INSPECT FITTING OF Assy 14A-1		14-0	7-11-77	[illegible]
3	H	WELD Assy 14A-1 PER DWG 14	709	7	7/11/77	
		14a				
		14a				
4	H	GRIND Assy 14A-1 PER DWG 14	857	7/11/77		
5	QA	V.T. Assy 14A-1 PER DWG 14	824	14/0	7/11/77	[illegible]
		Report #1				
6	QA	DPT Assy 14A-1 PER DWG 14	824	14/0	7/11/77	[illegible]
7	QA	LT. Assy 14A-1 PER DWG 14		14/0	7/11/77	[illegible]
		WS-40-16.5 VB-01/0 REPORT # 1290				
8		FORM Assy 14A-1 PER DWG 14				
9	QA	INSPECT FORM OF Assy 14A-1		14/0	7/21/78	[illegible]
10	F	MOVE TO SHOP ONE FOR SUB-ASSY	757		7/21/78	
11	F	OBTAIN FCL Assy BB From SHOP OFFICE	757		7/21/78	

1

Unit 1 Cone Subassembly (14A-1)

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REVIEWED for INSPECTION POINTS: PDM QA [illegible] DATE 6/05/77

PDM

FABRICATION CHECK LIST ADDENDUM (FCA)

CONTRACT NO.	GROUP NO.	PLATE NO.	PIECE MARK	ASSEMBLY	ADDENDUM NO.	PAGE
56039			Sub-assy	8C-1	1	1 OF 1

ORIGINATED BY	DATE	AUTHORIZED BY	DATE	ECRA
Donald Beck	1/24/78	Joel F. Stanley	1/24/78	NONE

REFERENCE → 8-377 PACKET/PAGE NO. 1 OF 20 SEQ. NO. 8

SEQ.	Dept.	OPER.	DESCRIPTION	Clock NO.	Date	Drw. Rev.	Insp.
A	H		Weld plate 8H1 after forming.	650	6/21/78		
B	H		CLEAN for inspection.	857	6/21/78		
C	QA		D.P.T. per dwg.		7/5/78 PT-01/0	8/C	

2

Unit 1

Pipe Subassembly (8h-1)

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CONTINUE FABRICATION PROCEDURE → SEQ. NO. 9 8-377 PACKET/PAGE NO. 2 OF 2

PLANT PLANNING

(FCM) Rev. Form No. 2788

ENCLOSURE 4 PAGE 10 OF 13

8- PACKET PAGE 6 OF 7

FABRICATION CHECK LIST (FCL)

CONTRACT 56039 GROUP No. _____ PC. MK. Sub-ass'y ASSEMBLY 8B-1

P. ITEM No. _____ I.D. No. _____ HT. No. _____ SL. No. _____ MATERIAL _____

Procedure Per Dwg. 8

Seq.	Dept		Clk. No.	Dwg. Rev.	Date	Signature
		Sub-ass'y #1				
9	QA	Inspect fitting. 8h to 14A [signature] 6/11/78		8/c T13	7/12/78	[signature]
10	H	Weld per dwg.				
		Unit 1				
		Cone subassembly → 14A-1 Vortex Orifice	650		6/31/78	
		8h-1	↓			
		Pipe subassembly → 8k-1	832		8-2-78	
		8k-1				
		8k-1				
		8m-1				
		8m-1	↓		↓	
		8t-1	733		8-2-78	
		8t-1				
		8t-1				
		8t-1				
		8t-1				
		8t-1				
		8v-1	↓		↓	
		Sub-ass'y #1				
11	H	Clean for inspection.	675		8-4-78	
12	QA	V.T. per dwg. 14A to 8h [signature] 7/13/78 PT-01/0		8/c PT-01/0	8/4/78	M
13	QA	D.P.T. per dwg. 14A to 8h [signature] 7/10/78 PT-01/0		8/c PT-01/0	8/4/78	M
14	J	Move outside.	474		8-4-78	
15	QA	Fill du[illegible]			8/4/78	[signature]

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3

Unit 1 Vortex Nozzle Assembly (8B-1)

REVIEWED for INSPECTION POINTS: [signature] DATE 8/15/78 [signature] DATE 8/15/78

PDH Rev. 0
Form No. 18011

FABRICATION CHECK LIST (FCL)

PACKET/PAGE 1 OF 1

ACT 56039 GROUP No. — PC. MK. SUB-ASSY ASSEMBLY 14A-2

ITEM No. I.D. No. HT. No. SL. No. MATERIAL

Dept	Procedure Per Dwg. 14	Clk. No.	Dwg. Rev.	Date	Signature
F	FIT Assy 14A-2 PER DWG 14	[illegible]		7/11/77	
	14a				
	14a 2208	8			
QA	INSPECT FITTING of Assy 14A-2		14/0	[illegible]	[illegible]
H	Weld Assy 14A-2 PER DWG 14				
	14a	789		7/11/77	
	14a				
H	GRIND Assy 14A-2 PER DWG 14	857		7/11/77	
QA	VT. Assy 14A-2 PER DWG 14	824	14/0	7/11/77	[illegible]
		Report #1			
QA	DPT Assy 14A-2 PER DWG 14	824	14/0	7/11/77	[illegible]
QA	LT. Assy 14A-2 PER DWG 14		14/0	7/21/77	[illegible]
		Report # 290			
	WB 40-16.5	UB-01/0			
	Form Assy 14A-2 PER DWG 14	676		7/22/77	
QA	INSPECT Form of Assy 14A-2		14/0	7/22/77	[illegible]
F	MOVE TO SHOP ONE FOR SUB-ASSY	757		2/8/77	
F	OBTAIN FCL Assy 8B From SHOP OFFICE	757		2/11/78	

4 Unit 2 Cone Subassembly (14A-2)

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REVIEWED for INSPECTION POINTS: PDM QA [illegible] DATE [illegible] DATE [illegible]

2202

Rev. 0
Form No. 18011

FABRICATION CHECK LIST (FCL)

PACKET PAGE 2 OF 2

CONTRACT 56039 GROUP No. PC. MK. Sub-assy ASSEMBLY 8B-2

M No. I.D. No. HT No. SL. No. MATERIAL

Procedure Per Dwg. 8

Seq.	Dept.		Clk. No.	Dwg. Rev.	Date	Signature
		Sub-assy #1				
9	GA	Inspect fitting e/aluding sub-assy #1		8/4	8/13/78	
10	H	Weld per dwg.				
		Unit 2 Cone Subassembly → 14A-2 Vortex Orifice.				
		Pipe Subassembly → 8h-2				
		8k-2				
		8k-2				
		8k-2				
		8m-2				
		8m-2				
		8t-2				
		8t-2				
		8t-2				
		8t-2				
		8t-2				
		8t-2				
		8v-2				
		Sub-assy #1				
11	H	Clean for inspection.				
12	GA	V.T. per dwg.				
13	GA	D.P.T. per dwg.				
14	J	Move outside				
15	GA	Fill out				

6

Unit 2 Vortex Nozzle Assembly (8B-2)

REVIEWED for INSPECTION POINTS

DATE 8/15/78

ENCLOSURE 5

LIST OF COMMITMENTS

TVA will add a paragraph in the Watts Bar Final Safety Analysis Report (FSAR) Section 9.2.7 to document TVA's deviation from ASME Section III and to provide justification for acceptance of this condition.