SPECTRUM LABORATORIES INC.

MASS SPECTROMETER
CHEMICAL ANALYSIS
ULTRASONIC INSPECTION
NON-DESTRUCTIVE TESTING

524 PELHAM AVE.
PISCATAWAY, NEW JERSEY 08854

P. O. BOX 565

PHYSICAL TESTING
MECHANICAL TESTING
FIELD TESTING
X-RAY

REPORT OF CHEMICAL TESTS

CAPITOL PIPE & STEEL PRODUCTS
301 City Line Avenue
Bala Cynwyd, PA 19004

Date June 13, 1983

Laboratory No. 34730

Attention: Ms. Sue McCart

marked P.O. #L32300-OON

Element	Sample EUPJ	Sample	Sample A-234 Requirements	Sample
Copper				
Tin	R0839443 R0839447			
Lead				
Zinc				
Nickel				
Iron				
Phosphorus	0.009		0.050 max	
Antimony				
Aluminum				
Magnesium				
Manganese	1.31*		.29 - 1.06	
Titanium				
Silicon	0.28		0.10 min.	
Chromium				
Sulfur	0.008		0.058 max	
Carbon	0.24		.35 max	
Cobalt				
Molybdenum	Service was provided under the Quality Assurance System dated January 23, 1980, Rev #2 audited and approved by Capitol Pipe on 9-22-82.			
Columbium				
Tantalum				
Vanadium				
Tungsten				
Boron				

CAPITOL PIPE B-5 APPROVED 7/7/83

Sample Description: A-234

1 pc. EUPJ 6" x 4" S/80 Conc. Red Ht. #L8001 (Drillings)

Test Method

- X-Ray Diffraction
- X-Ray Fluorescent
- Emission Spectro (Vacuum) XXXX
- Emission Spectro (Air)
- Wet Chemistry XXX
- Atomic Absorption
- Infared
- Gas Chromatography

The samples tested in this report were calibrated by use of

National Bureau of Standards No's. 1261/1265

ASTM Test Method: E350, E415

Matrix Method: Wrought

* 1.35% Mn max per Note 1, Table 1

Quality Assurance Inspection System complies with MIL-I-45208 A, ASTM E-548, and ASME Sec. III, Par. NCA-4000.

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

SPECTRUM LABORATORIES INC.

Harold C. Schanck
Director

Garrett C. Schanck
Metallurgist

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice.

CORROSION & METALLURGICAL TESTING
PROFESSIONAL ENGINEERING

(201) 752-1400 Phila. No. (215) 923-7882

SPECTRUM LABORATORIES INC.
524 PELHAM AVE. P. O. BOX 565
PISCATAWAY, NEW JERSEY 08854

CORROSION TESTING
PHYSICAL TESTING
MECHANICAL TESTING
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ULTRASONIC INSPECTION
X-RAY

METALLURGICAL TESTING
PROFESSIONAL ENGINEERING
NON-DESTRUCTIVE TESTING
FIELD TESTING
MASS SPECTROMETER

CAPITOL PIPE & STEEL PRODUCTS
301 City Line Avenue
Bala Cynwyd, PA 19004

Attention: Ms. Sue MacCart

REPORT OF MECHANICAL TESTS

DATE: May 31, 19 83

ORDER No. P.O. #L32300-00N

LABORATORY No. 34730

The following results were obtained from our tests of this material.

Type of sample submitted / Marked as follows: One (1) pc. 6" x 4" S/80 Conc. Reducer, Heat #L8001 Code - EUPJ, ASTM A-234. Sample submitted one (1) rod 4.000" long. Testing specimen (subsize) Fig. 5 of ASTM A-370 (.350" dia).

Service was provided under the Quality Assurance System dated January 23, 1980, Rev. #2, audited and approved by Capitol Pipe on 9-22-82.

Sample No.	Area	Yield Load lbs.	Yield Strength psi 2% offset	Tensile Load lbs.	Tensile Strength psi	4xd % EL	R. A. %
			35,000 min		60,000 min	22.0	
EUPJ	.100	7,310	73,100	8,805	88,050	27.5	

CAPITOL QA B-5 APPROVED 7/1/83

TEST PROCEDURE:-

Sample Size: Fig. 5, ASTM A-370 (.350" dia)
Strain Rate: .0001 in/in. per min.
Stress Strain Diagram Reference: 34730
Test Specification – ASTM E-8

CALIBRATION PROCEDURE:-

Test Instrument: SATEC
Calibration Date: 5-5-83
in accordance with ASTM E-4.
Extensometer: B3M S/N1322
in accordance with ASTM E-83

Quality Assurance Inspection System complies with MIL-I-45208 A, ASTM E-548, and ASME Sec. III, Par. NCA-4000.

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

SPECTRUM LABORATORIES INC.

H. C. SCHANCK, DIRECTOR

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice.

(201) 75[illegible]-1800-1802

SPECTRUM LABORATORIES INC.

MASS SPECTROMETER
CHEMICAL ANALYSIS
ULTRASONIC INSPECTION
NON-DESTRUCTIVE TESTING

524 PELHAM AVE.
PISCATAWAY, NEW JERSEY 08854

PHYSICAL TESTING
MECHANICAL TESTING
PIPE TESTING
X-RAY

REPORT OF CHEMICAL TESTS

CAPITOL PIPE & STEEL PRODUCTS
301 City Line Avenue
Bala Cynwyd, Pennsylvania 19004

Date July 22, 1983

Laboratory No. 34870

Attention Ms. S. McCart

marked Purchase Order L32814-00N

Element	Sample NGYE	Sample NEIC	Sample Requirements ASTM A234 WPB	Sample
Copper				
Tin				
Lead				
Zinc				
Nickel				
Iron				
Phosphorus	0.010	0.012	0.050 Max.	
Antimony				
Aluminum				
Magnesium				
Manganese	0.44	0.58	0.29/1.06	
Titanium				
Silicon	0.24	0.18	0.10 Min.	
Chromium				
Sulfur	0.006	0.007	0.058 Max.	
Carbon	0.15	0.10	0.30 Max.	
Cobalt				
Molybdenum				
Columbium				
Tantalum				
Vanadium				
Tungsten				
Boron				

NGYE
NEIC > RD 839443

Sample Description:
1 pc. 4" Sch. 80 SR90, Code NGYE
1 pc. ~~4" Sch. 80 Tee, Code NEIC~~

TVA Job ~~(Witnessed waived)~~

Test Method

X-Ray Diffraction
X-Ray Fluorescent
Emission Spectro (Vacuum) XXXX
Emission Spectro (Air)
Wet Chemistry XXXX
Atomic Absorption
Infared
Gas Chromatography

The samples tested in this report were calibrated by use of

National Bureau of Standards No's. ~~1261-1265~~

ASTM Test Method: ~~E350, E415~~

Matrix Method: ~~Wrought~~

Quality Assurance Inspection System complies with MIL-I-45208A, ASTM E-548, and ASME Sec. III, Par. NCA-4000.

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

SPECTRUM LABORATORIES INC.

Harold C. Schanck
Director

Garrett C. Schanck
Metallurgist

CAPITOL CO. B-5 6/14/83

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice.

(201) 752-1400

Phila. No. (215) 923-7882

— SPECTRUM LABORATORIES INC.

524 PELHAM AVE.

PISCATAWAY, NEW JERSEY 08854

CORROSION TESTING
PHYSICAL TESTING
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FIELD TESTING
MASS SPECTROMETER

CAPITOL PIPE & STEEL PRODUCTS
301 City Line Avenue
Bala Cynwyd, Pennsylvania 19004

Attention Ms. S. McCart

REPORT OF MECHANICAL TESTS

DATE: July 22, 19 83

Purchase Order
ORDER No. L32814-(?)N

LABORATORY No. 34870

The following results were obtained from our tests of this material.

Type of sample submitted One (1) pc. 4" Sch. 80 Tee

Marked as follows Code NEIC, A-234

Sample No.	Area	Yield Load lbs.	Yield Strength psi .2% offset 35K	Tensile Load lbs.	Tensile Strength psi 60K	% EL. 2" 30.0	R. A. %
NEIC	.20	9,400	47,000	12,275	61,375	32.0%	N/A

CAPITOL OF B-5 APPROVED 8/16/83

TEST PROCEDURE:-

Sample Size Fig. 5, ASTM A-370 (.500" Dia.)
Strain Rate .0001" in/in. per min.
Stress Strain Diagram Reference 34870
Test Specification – ASTM E-8

CALIBRATION PROCEDURE:-

Test Instrument SATEC
Calibration Date 5-5-83
in accordance with ASTM E-4.
Extensometer B3M-S/N 851
in accordance with ASTM E-83

Quality Assurance Inspection System complies with MIL-I-45208 A, ASTM E-548, and ASME Sec. III, Par. NCA-4000.

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

SPECTRUM LABORATORIES INC.

H. C. SCHANCK, DIRECTOR

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(201) 752-1400

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SPECTRUM LABORATORIES INC.

524 PELHAM AVE.

PISCATAWAY, NEW JERSEY 08854

CORROSION TESTING
PHYSICAL TESTING
MECHANICAL TESTING
CHEMICAL ANALYSIS
ULTRASONIC INSPECTION
X-RAY

METALLURGICAL TESTING
PROFESSIONAL ENGINEERING
NON-DESTRUCTIVE TESTING
FIELD TESTING
MASS SPECTROMETER

CAPITOL PIPE & STEEL PRODUCTS
301 City Line Avenue
Bala Cynwyd, Pennsylvania 19004

Attention Ms. S. McCart

REPORT OF MECHANICAL TESTS

DATE: July 22, 19 83

Purchase ORDER No. L32814-00N

LABORATORY No. 34870

The following results were obtained from our tests of this material.

Type of sample submitted One (1) pc. 4" Sch. 80 SR90

Marked as follows Code NGYE, A-234

Sample No.	Area	Yield Load lbs.	Yield Strength psi .2% offset 35K	Tensile Load lbs.	Tensile Strength psi 60K	% EL. 2" 30.0%	R. A. %
NGYE	.1616	8,975	55,538	11,050	68,379	10.0%*	N/A
*NOTE:- Elongation not valid as sample broke outside elongation marks even though sample was tapered towards center as required.							

TEST PROCEDURE:-

Sample Size Fig. 4, ASTM A-370 (1/2" wide)
Strain Rate .0001 in/in. per min.
Stress Strain Diagram Reference 34870
Test Specification - ASTM E-8

CALIBRATION PROCEDURE:-

Test Instrument SATEC
Calibration Date 5-5-83
in accordance with ASTM E-4.
Extensometer B3M S/N851
in accordance with ASTM E-83

CAPITOL OK B-5 APPROVED 8/10/83

Quality Assurance Inspection System complies with MIL-I-45208A, ASTM E-548, and ASME Sec. III, Par. NCA-4000.

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

SPECTRUM LABORATORIES INC.

H. C. SCHANCK, DIRECTOR

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice.

(201) 752-1400 Phila. No. (215) 923-7862

- SPECTRUM LABORATORIES INC.

524 PELHAM AVE. PISCATAWAY, NEW JERSEY 08854

CORROSION TESTING
PHYSICAL TESTING
MECHANICAL TESTING
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FIELD TESTING
MASS SPECTROMETER

CAPITOL PIPE & STEEL PRODUCTS
301 City Line Avenue
Bala Cynwyd, PA 19004

Attention Ms. Sue McCart

REPORT OF MECHANICAL TESTS

DATE: September 23, 1983
Purchase ORDER No. L-33254-00N

LABORATORY No. 35198

The following results were obtained from our tests of this material.

Type of sample submitted One (1) 16" x 14" Tee

Marked as follows Heat Number:- FBUA, ASTM A-234, WP-B

CAPITOL QA B-5 APPROVED 9/24/83

Sample No.	Area	Yield Load lbs.	Yield Strength psi 2% offset 35K	Tensile Load lbs.	Tensile Strength psi 60K	% EL. 2" 30%	R. A. % N/A
FBUA	.200	10,100	50,500	14,800	74,000	32%	

TEST PROCEDURE:-

Sample Size .505" Rd.
Strain Rate .0001 in/in. per min.
Stress Strain Diagram Reference 35198
Test Specification – ASTM E-8

CALIBRATION PROCEDURE:-

Test Instrument SATEC
Calibration Date 5-5-83
in accordance with ASTM E-4.
Extensometer MAIB S/N851
in accordance with ASTM E-83

Samples returned upon request only. Held for a period of 30 days maximum. The liability of this laboratory relative to this report shall not exceed the amount of the invoice.

Quality Assurance Inspection System complies with MIL-I-45208 A, ASTM E-548, and ASME Sec. III, Par. NCA-4000.

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

SPECTRUM LABORATORIES INC.

H. G. SCHANCK, DIRECTOR

TVA 64 (08-0-65)

UNITED STATES GOVERNMENT

Memorandum

CSB '830628 303

TENNESSEE VALLEY AUTHORITY

TO : C. A. Chandley, Chief, Mechanical Engineering Support Branch, W7C126 C-K (2)

FROM : Frank Van Meter, Chief, Construction Services Branch, 500 SPT-K

DATE : June 28, 1983

SUBJECT: WATTS BAR NUCLEAR PLANT - PRODUCT ANALYSIS OF CARBON STEEL FITTINGS FURNISHED BY TUBE-LINE, INC.

As requested by a TVA 45D dated May 11, 1983, 15 carbon steel fittings furnished by Tube-Line, Inc., to Watts Bar Nuclear Plant have been evaluated for chemical composition and hardness. Filings for more accurate wet analysis were taken from the weld preparation ends without affecting the usefulness of the fittings. Results, when appearing questionable, were confirmed by repeat analysis. Since the Certified Material Test Report for the heat of steel representing each type of fitting gave chemical values for a limited number of elements, carbon, manganese, and silicon are considered the most useful in comparing our results with Tube-Line's Certified Material Test Report. Sulfur and phosphorus are segregate elements and can show considerable scatter.

The attached chemical analysis test report gives SME's analysis and compares it with Tube-Line's values. In summary, the 6-in. by 4-in. reducers (EUPJ) are from three different heats of steel, neither of which agree with the Certified Material Test Report.

NEIC-5 (4-in. straight tee) and EZLI-7 (6-in. 90° elbow) are suspect on the basis of a disagreement in one or two elements. All others with reasonable confidence can be said to agree with the CMTR's.

The attached table gives the Brinell hardness for each fitting.

Original signed by
Frank Van Meter

Frank Van Meter

PVG:ASY
Attachments
cc (Attachments):
MEDS, W5B63 C-K
W. H. Childres, SME-K
Principally prepared by P. V. Guthrie, extension 2771.

A13178.2

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

TENNESSEE VALLEY AUTHORITY

Attachment 8
SME-QCP-8
Rev. 2

SINGLETON MATERIALS ENGINEERING LABORATORY

CHEMICAL ANALYSIS TEST REPORT

Project: Watts Bar Nuclear Plant

Date: June 10, 1983

Report No.: MQC-83-6-9-1

Reference: 80KA3-825673

Capitol Pipe & Steel Products Co

Lab No.	Item, size, type	Chemical													
		Carbon		Manganese		Phosphorus		Sulfur		Silicon					
		%	Req'd	%	Req'd	%	Req'd	%	Req'd	%	Req'd	%	Req'd	%	Req'd
EZLI-7	6" XS LR 90 elbow	0.20*		0.52		0.024		0.014		0.19	14 & 15 agree reasonably well with CMTR. 7 shows slight excess deviation in C and Si.				
EZLI-14	↓	0.17		0.51		0.024		0.017		0.24					
EZLI-15	↓	0.15		0.50		0.024		0.012		0.25					
	Average of 3	0.17		0.51		0.024		0.014		0.23					
	CMTR value	0.14		0.53		0.019		0.009		0.23					
ESMG-8	6" XS LR 45 elbow	0.17		0.45		0.024		0.016		0.21	All agree reasonably well with CMTR				
ESMG-9	↓	0.15		0.44		0.023		0.011		0.22					
ESMG-11	↓	0.15		0.44		0.024		0.009		0.21					
	Average of 3	0.16		0.44		0.024		0.012		0.21					
	CMTR value	0.16		0.47		0.020		0.008		0.23					

*Average of 2 or more independent analyses.

Dale O. Jeffers — 6-27-83
Tested by — Date

Wendell Keeling — 6-27-83
Analytical Chemist — Date

Paul V. Fulmer, Jr. — 6-27-83
Date

TENNESSEE VALLEY AUTHORITY

Attachment 8
SME-QCP-8
Rev. 2

SINGLETON MATERIALS ENGINEERING LABORATORY

CHEMICAL ANALYSIS TEST REPORT

Project: Watts Bar Nuclear Plant

Date: June 10, 1983

Report No.: MOC-83-6-9-1

Reference: 80KA3-825673
Capitol Pipe & Steel Products Co

Lab No.	Item, size, type	Chemical													
		Carbon		Manganese		Phosphorus		Sulfur		Silicon					
		%	Req'd	%	Req'd	%	Req'd	%	Req'd	%	Req'd	%	Req'd	%	Req'd
EUPJ-1	6x4" XS conc red	0.15*		0.96*		0.025*		0.014*		0.24	All three are from different heats of steel.				
EUPJ-2	↓	0.20*		1.27*		0.027*		0.006*		0.21					
EUPJ-13	↓	0.26*		0.80*		0.012*		0.025*		0.08					
	CMTR value	0.17		0.46		0.22		0.020		0.21					

*Average of 2 or more independent analyses.

Dave Jeffers — Tested by — 6-27-83 Date

Wendell Keeling — Analytical Chemist — 6-27-83 Date

Paul V. Smith Jr. — Unit Supervisor — 6-27-83 Date

TVA 10123 (CONST-12-80)

WATTS BAR NUCLEAR PLANT

CARBON STEEL FITTINGS

TUBE-LINE FITTING AND FLANGE PROBLEM

HARDNESS MEASUREMENTS

Lab No.	Type Fitting	Brinell Hardness
EZLI-7	6-in. XS LR 90 elbow	135
EZLI-14		139
EZLI-15		142
ESMG-8	6 in. XR LR 45 elbow	142
ESMG-9		132
ESMG-11		142
EYHJ-3	6 in. XS LR 45 elbow	160
EYHJ-10		133
EYHJ-12		145
NEIC-4	4 in. XS str tee	150
NEIC-5		144
NEIC-6		130
EUPJ-1	6 in. x 4 in. XS conc red	136
EUPJ-2		182
EUPJ-13		150

A13178.3

Quantity & Description	TVA PO #	Capital Alloy #	Tube Lot Number	Supplier & PO # to Tubline	Supplier & Heat Number	Our Material Supplier	Heat Code	Mill Heat #	Date of Manufacture	Chemical Results T.L. Min	Chemical Results T.L. Max	Chemical Results Supplier	Chemical Results Our Material	Chemical Results T.L. Min	Chemical Results T.L. Max	Chemical Results Supplier	Chemical Results Our Material
1 pce 6" Std 90 A234 WPB	RDB39047	[illegible]	206[illegible]	[illegible]	090120	NKK	EBL	22042	1/28/81	C .20 Mn .78 P .026 S .023 Si .23	C .20 Mn .85 P .026 S .023 Si .23	C .20 Mn .85 P .026 S .023 Si .23	Y - 49800 T - 69600 E - 40%	Y - 49800 T - 69600 E - 40%	Y - [illegible] T - [illegible] E - [illegible]
1 pce 4" Std 90 A234 WPB	RDB39050	[illegible]	346[illegible]	[illegible]	090209	NKK	EOX	95364	4/2/81	C .20 Mn .51 P .022 S .014 Si .20	C .20 Mn .51 P .022 S .014 Si .20	C .20 Mn .51 P .022 S .014 Si .20	Y - 46,400 T - 68400 E - 40%	Y - 46,400 T - 68400 E - 40%	Y - [illegible] T - [illegible] E - [illegible]
1 pce 6" Std 90 A234 WPB	RDB39362	[illegible]	35287	[illegible]	142503	NKK	RBB	91345	7/22/80	C .21 Mn .69 P .015 S .022 Si .21	C .21 Mn .69 P .015 S .022 Si .21	C .21 Mn .69 P .015 S .022 Si .21	Y - 41,400 T - 70,500 E - 42%	Y - 41,400 T - 70,500 E - 42%	Y - [illegible] T - [illegible] E - [illegible]
4" Std 45 A234 WPB	RDB39443	[illegible]	37216	[illegible]	040714	NKK	EUF	18996	4/2/81 11/10/81 12/11/81	C .20 Mn .54 P .019 S .019 Si .20	C .20 Mn .54 P .019 S .019 Si .20	C .20 Mn .54 P .019 S .019 Si .20	Y - 49,100 T - 69,700 E - 43%	Y - 49,100 T - 69,700 E - 43%	Y - [illegible] T - [illegible] E - [illegible]
same	RDB39447	same	37080	same	same	same	same	same									
10 pce 4"x2" Reducer A234 WPB	RDB39443	[illegible]	37080A	[illegible]	242712	NKK	WEB	36740	9/22/82 10/22/82	C .19 Mn .51 P .027 S .022 Si .24	C .19 Mn .51 P .027 S .022 Si .24	C .19 Mn .51 P .027 S .022 Si .24	Y - 46,800 T - 69,400 E - 41%	Y - 46,800 T - 69,400 E - 41%	Y - [illegible] T - [illegible] E - [illegible]
50 pce 3"x2" Std Con Reducer A234 WPB	RDB39364	[illegible]	34833	[illegible]	143603	NKK	EWE	03748	10/6/81	C .19 Mn .51 P .019 S .024 Si .21	C .19 Mn .51 P .019 S .024 Si .21	C .19 Mn .51 P .019 S .024 Si .21	Y - 48,900 T - 70,600 E - 63%	Y - 48,900 T - 70,600 E - 63%	Y - [illegible] T - [illegible] E - [illegible]
4 pce 6" Std 180° A234 WPB	RDB31660	[illegible]	34902	[illegible]	242667	NKK	EXOS	22896	10/15/81 11/13/81 12/10/81	C .20 Mn .54 P .019 S .019 Si .20	C .20 Mn .54 P .019 S .019 Si .20	C .20 Mn .54 P .019 S .019 Si .20	Y - 48,200 T - 68,300 E - 39%	Y - 48,200 T - 68,300 E - 39%	Y - [illegible] T - [illegible] E - [illegible]
2 pce 18"x16" Std Con Red A234 WPB	RDB39350	[illegible]	34[illegible]	[illegible]	123427	NKK	EXON	22394	11/18/81	C .18 Mn .52 P .015 S .021 Si .23	C .18 Mn .52 P .015 S .021 Si .23	C .18 Mn .52 P .015 S .021 Si .23	Y - 42,400 T - 67,300 E - 91%	Y - 42,400 T - 67,300 E - 91%	Y - [illegible] T - [illegible] E - [illegible]

Carbon Steel Fittings

A. Average
N-K - NBK - Kenjin
[illegible] - Hatsuoka

NKK - Nippon Kokan KK
KAW - Kawasaki Steel

DISPOSITION OF NCR WBN 4727 R0

The disposition of this NCR will consist of three major areas: I. carbon steel (CS), II. stainless steel (SS) welded with filler metal, and III. stainless steel (SS) welded without filler metal.

I. Carbon Steel

1. WBN to determine if any of the fittings and flanges listed in the attached Tables WBN CS-1 and BLN CS-1 are installed in a safety-related piping system(s) (TVA Class A, B, C, or D) at WBN. WBN to prepare a list by size, product type, and heat code to show the quantity which is installed and the safety-related system(s) in which they are installed and send it to MEB by October 26, 1983, (if the installed fittings are cut out as required by 2 below, no list is required).

2. Any fittings and flanges which are found to be installed in a high pressure (greater than 150 lb/in^{2}a design pressure), safety-related system, in a portion of the system which cannot be isolated from the rest of the system by isolation valves, which are from one of the following Tube-Line (T-L) heats: FBLQ, EZLI, EYHI, EYHJ, ESMG, or NGYE (all of these fittings were manufactured by Awaji for T-L and have significant variations in the CMTRs furnished by either the base material manufacturer, Awaji, or T-L which were found as a result of the work required by II of TVA's Program for Resolution of the Carbon Steel Portion of the Tube-Line Fitting and Flange Problem at WBN (CS Program Plan, copy attached)), shall be cut out and replaced with fittings furnished by acceptable manufacturers which fully comply with ASME Section III requirements.

   Any CS fittings which are installed in safety-related, low pressure (less than or equal to 150 lb/in^{2}a design pressure) system which meet all of the other criteria for replacement stated above, shall be hydrotested in accordance with IVa of the SS Program Plan (see III, 3 below). If the fittings pass this hydrotest, they are acceptable for use in the system and do not have to be replaced. If they fail the hydrotest, they shall be replaced with fittings fully complying with ASME Section III requirements.

3. All fittings installed in nonsafety-related systems meeting VI of the CS Program Plan are acceptable and do not have to be cut out and replaced.

II. Stainless Steel Welded With Filler Metal

This portion of the T-L problem was dispositioned by NCR WBN 4866R1 (WBN 830620 103). Please refer to it for further information. If other contractors are identified as having supplied this type of fittings, those fittings shall be dispositioned in the same manner.

2. WBN shall provide to the WBN N-5 group copies of all applicable tables listing T-L fittings and flanges. WBN N-5 group shall, during all future reviews of safety-related systems (TVA Class A, B, C, or D), ensure that none of the listed heat codes are installed in these systems which have not previously been dispositoned as acceptable for installation in that system. Any fittings or flanges identified during this process shall be nonconformed and their disposition determined via the NCR procedure.

3. All T-L fittings and flanges which are not installed or which have to be cut out, shall be returned to the contractor who originally furnished them. The contractor shall, at no cost to TVA, replace the T-L material with material manufactured by manufacturers approved by TVA whose material fully complys with ASME Section III requirements. However, if WBN has already replaced the T-L fittings or flanges with acceptable material, then the contractor shall be required to give TVA credit for the returned T-L material. WBN shall coordinate these efforts with the applicable TVA purchasing agent. WBN shall not rebevel any fittings or flanges which they cut out. They shall cut them out in the area of the TVA circumferential weld and ship them to the contractor as a "square ended" fitting or flange.

4. If WBN determines that all of the fittings or flanges of a given T-L heat which were shipped to WBN are installed in a safety-related piping system in an area(s) which is inaccessible for in-place testing to III of either the CS or SS Program Plan, as applicable, they shall contact MEB so that MEB and the contractor can determine if other material from the same heat is available for testing to III of either the CS or SS Program Plan, as applicable. If material is available for testing, the installed fitting(s) or flange(s) will be allowed to remain inplace provided the criteria in the either the CS or SS Program Plan, as applicable, and in I, II, and III above are met. Otherwise, they will have to be replaced.

Prepared by: Ed Daugherty Date 10/4/83

G63273.06

DISPOSITION OF NCR WBN 4866R1

Note: This NCR covers <u>only</u> welded <u>with</u> filler metal stainless steel T-L fittings.

The disposition of this NCR will be to perform the steps delineated in the Progam for Resolution of the Stainless Steel Portion of the Tube-Line (T-L) Fitting Problem at WBN (SS Program Plan) which is attached to this NCR. Specific additional comments and direction for each step of the SS Program Plan are as follows (the paragraph numbers below correspond to the same paragraph in the SS Program Plan):

WBN to locate all of the T-L fittings shown on the Table WBN SS-1WW (attached) which are installed in a safety-related piping system(s) (TVA Class A, B, C, or D) at WBN. WBN to prepare a list by size, product type, and heat code to show the quantity which is installed and the safety-related system in which it is installed and send it to MEB by October 26, 1983.

III. Coordinate with Singleton Materials Laboratory (SME) to have the accessible installed fittings verified as having the same product analysis as that of the fittings tested at [illegible]. Also, coordinate the pickup and return to WBN of all fittings which were sent to SME to be tested when SME has completed all the required tests and no longer needs the fittings.

IV. a. Perform required hydrotest. It will <u>not</u> be necessary to test the 6" x 4" concentric reducer whose heat code is AACBJ. It will be qualified by the hydrotest on the 6" x 3" concentric reducer whose heat code is AACBJ. This is an acceptable method of qualification as delineated in section 9.3 of ANSI B16.9-1978. Hydrotest all of the other heats listed on the NCR <u>except</u> ADFX of which none were installed.

IV. b. RT the fittings hydrotested in IV a. and RT at least 2 more fittings with the same heat number, size, and product type which are not installed. On certain fittings made by Benkan, see the note in parenthesis in paragraph I of SS Program Plan for numbers of fittings to be RT'd.

On heat ACKAS manufactured by Fuji, it will not be necessary to RT any fittings which are installed unless the WBN RT of the noninstalled fitting(s) shows unacceptable defects. This is because TVA has documentation from Fuji, for this specific heat, of filler metal chemistry and that welders were ASME Section IX qualified. However, if unacceptable defects are found during TVA's RT, it will be necessary to RT at least two installed fittings from heat ACKAS.

IV. c. Permanently mark each of these fittings with a unique identification number consisting of this NCR number and additional digits as required to identify each fitting. Show this number on the weld map for affected portions of the ERCW system and ensure that these marked-up weld maps become a part of the N-5 data package for this system.

IV. d. Make the necessary notations on the N-5 form to comply with this paragraph's instructions.

V. Not applicable to this NCR.

VI. All of the noninstalled, T-L welded with filler metal fittings which have not previously been scrapped are to be returned to Capitol Pipe and Steel Products Company either for credit--if the fittings are no longer required--or for replacement with fittings manufactured by an acceptable manufacturer which fully meet ASME Section III requirements.

It will not be necessary for WBN to rebevel any fittings which have been welded into either the piping system itself or into the hydrotest assembly. They should be returned to Capitol in their as-removed condition. It will be WBN's responsibility to obtain return shipment instructions from Capitol, and to provide MEB with a list of those fittings returned to Capitol. This list should tell the number returned by product type, size, heat number, and RD number on which it was procured. It should state whether they are to be returned for credit or for replacement. MEB will release necessary RDs to obtain the replacement fittings as soon as they are identified to MEB.

WBN shall provide to the WBN N-5 group copies of all applicable tables listing T-L fittings which have been shipped to WBN. WBN N-5 group shall, during all future reviews of safety-related systems (TVA Class A, B, C, or D), ensure that none of the listed heat codes are installed in these systems which have not previously been dispositioned as acceptable for installation in that system. Any fittings identified during this process shall be nonconformed and their disposition determined via the applicable NCR.

Prepared by Earl S. Inghrity Date 10/4/83

G63273.06

IV. c. Permanently mark each of these fittings with a unique identification number consisting of this NCR number and additional digits as required to identify each fitting. Show this number on the weld map for affected portions of the ERCW system and ensure that these marked-up weld maps become a part of the N-5 data package for this system.

IV. d. Make the necessary notations on the N-5 form to comply with this paragraph's instructions.

V. Not applicable to this NCR.

VI. All of the noninstalled, T-L welded with filler metal fittings which have not previously been scrapped are to be returned to Capitol Pipe and Steel Products Company either for credit--if the fittings are no longer required--or for replacement with fittings manufactured by an acceptable manufacturer which fully meet ASME Section III requirements.

It will not be necessary for WBN to rebevel any fittings which have been welded into either the piping system itself or into the hydrotest assembly. They should be returned to Capitol in their as-removed condition. It will be WBN's responsibility to obtain return shipment instructions from Capitol, and to provide MEB with a list of those fittings returned to Capitol. This list should tell the number returned by product type, size, heat number, and RD number on which it was procured. It should state whether they are to be returned for credit or for replacement. MEB will release necessary RDs to obtain the replacement fittings as soon as they are identified to MEB.

WBN shall provide to the WBN N-5 group copies of all applicable tables listing T-L fittings which have been shipped to WBN. WBN N-5 group shall, during all future reviews of safety-related systems (TVA Class A, B, C, or D), ensure that none of the listed heat codes are installed in these systems which have not previously been dispositioned as acceptable for installation in that system. Any fittings identified during this process shall be nonconformed and their disposition determined via the applicable NCR.

Prepared by Earl S. Dougherty Date 10/4/85

G63273.06

APPENDIX B TO FINAL REPORT ON NCR GENMEB8301

Table of Contents

Table WBN SS-1 WW

Table WBN SS-1 WO

Letter from Tube-Line Corporation to TVA dated May 6, 1983, Part 21 Notification

Program for Resolution of the Stainless Steel Portion of the Tube-Line Fitting Problem at Watts Bar Nuclear Plant (Program Plan)

TVA Division of Construction, Watts Bar Nuclear Plant, Hydrostatic Test Package

Memorandum from Frank Van Meter to Guenter Wadewitz dated July 1, 1983, transmitting work done by Singleton Materials Laboratories on stainless steel fittings - Report of Work

Memorandum from Frank Van Meter to Guenter Wadewitz dated October 26, 1983, transmitting lab work done on NCR 4866R1 and 4727, transmitting test results

List of item numbers, heat numbers, etc., for installed fittings headed WBN NCR 4866, R1 (this is a listing of the fittings installed at Watts Bar, the item number is a unique number assigned to each piece)

List of item numbers, heat numbers, etc., for installed fittings headed WBN NCR 4727 (this is welded without filler metal material)

Table WBN SS-1WW, Revision 0

Tube-Line (T-L) Stainless Steel Welded With Filler Metal
Fittings Shipped to WBN by Capitol Pipe and Steel Products

Description	Quantity Shipped	T-L Heat Code	TVA RD#/Contract No.
6" LR 90 Sch 40S	111	AFMG	809115
6" LR 90 Sch 40S	107	ABMH	809115
8" LR 90 Sch 40S	97	ABMI	809115
6" 45 Sch 40S	23	AADAM	809115
6" 45 Sch 40S	14	ABGT	809115
6" 45 Sch 40S	10	ADFX	809115
8" 45 Sch 40S	20	ABLAG	809115
8" Tee Sch 40S	5	AAGK	809115
6" x 4" C. Red Sch 40S	9	AACBJ	809115
6" x 3" C. Red Sch 40S	7	AACBJ	809115
10" x 8" C. Red Sch 40S	9	AACAQ	809115
6" LR90 Sch 40S	25	ACKAS	809117
6" x 3" C. Red Sch 40S	3	AACBJ	809117
8" x 6" C. Red Sch 40S	3	AACAP	809117

*All RDs are on contract 80KA3-825673.

Table WBN SS-1WO, Revision 0

Tube-Line (T-L) Stainless Steel Welded Without Filler Metal
Fittings Shipped to WBN by Capitol Pipe and Steel Products

Description	Quantity Shipped	T-L Heat Code	TVA RD#/Contract No.
3" x 2" C. Red 40S	30	ACRO	809117
4" x 2" Tee, 40S	10	ACCL	809117
6" 90LR 40S	1	AATR	809117
6" 90LR 40S	3	AATQ	809117
3" 90LR 40S	2	ABLG	809117
3" 45LR 40S	1	AAEAH	809117
3" x 2" Tee, 40S	1	AADAZ	809117
3" 90LR 40S	68	ABLG	809117
4" 90LR 40S	15	ABLH	809117
6" 90LR 40S	3	AATQ	809117
6" 90LR 40S	6	AATR	809117
2-1/2" 45LR 40S	20	AAGG	809117
3" 45LR 40S	14	AAEAH	809117
4" 45LR 40S	8	AADAL	809117
3" Tee 40S	12	AAEAN	809117
4" Tee 40S	3	AACBA	809117
3" x 2" Tee 40S	15	AADAZ	809117
4" x 2" C. Red 40S	6	AABAP	809117
2-1/2" 90LR 40S	16	ABLE	809115
3" 90LR 40S	52	ABLG	809115
4" 90LR 40S	34	ABLH	809115
6" 90LR 40S	35	AATQ	809115
6" 90LR 40S	4	AATR	809115
8" 90LR 40S	6	AATS	809115
8" 90LR 40S	8	AADAL	809115
2-1/2" 45LR 40S	20	AAGG	809115
4" 45LR 40S	4	AADAL	809115
4" Tee 40S	12	AACAZ	809115
6" Tee 40S	4	ABTU	809115
3" x 2" Tee 40S	20	AADAZ	809115
3" x 2" C. Red 40S	24	ABLX	809115
4" x 2" C. Red 40S	13	AABAP	809115

#All RDs are on contract 80KA3-825673.

TUBE-LINE CORPORATION
170 Tubeway Drive
Carol Stream, Illinois 60187
Tel (312) 690-7000

WAREHOUSE WATTS BAR NUCLEAR

MAY 0 ...

STAINLESS STEEL DIVISION

May 6, 1983

TVA
Watts Barr Nuclear Plant
Near Spring City, Tenn. 37381
ATTN: Wayne Harp

Attention: Quality Assurance Manager

Gentlemen:

We shipped to you pursuant to purchase order issued by you to Capitol Pipe & Steel the stainless steel fittings listed on the attached Appendix A.

We have recently initiated a comprehensive review of our Quality Assurance Program. This review has indicated that the items listed which were made from A-240 plate and which appear to have been welded with filler metal were not manufactured in accordance with all of the requirements of SA-403 and Section III of the ASME Boiler & Pressure Vessel Code. The particular requirements involved concern NPT symbol stamping, verification of welding procedures and welder qualifications, verification of welding work by an authorized inspector, receipt of Data Reports from the manufacturer, and verification of the chemical properties of the weld metal used in the fittings under review. We have initiated steps to determine the chemical properties of the weld metal and whether any of the fittings were welded without filler metal.

We are sending this notice to you pursuant to 10 C.F.R. §21.21(a) and have provided a similar notice to Capitol Pipe & Steel.
We are undertaking this effort to ensure that any potential safety problem is evaluated at the earliest possible time and because we value our reputation as a supplier of high quality products.

Very truly yours,

J.J. Sharkey
Vice-President & General Manager
Tube-Line Corporation

JJS:st
enclosure

May 6, 1983

APPENDIX A

SHIPPED TO: TVA
Watts Barr Nuclear Plant
Near Spring City, Tenn. 37381
ATTN: Wayne Harp

CUSTOMER: Capitol Pipe & Steel
Bala Cynwyd, Pa. 19004

Quanity	Description	Grade	Tube-Line Heat Code	Customer Purchase Order
10	6" 45 40S	316L	ADFX	D24627-OON
2	8X6" CR 40S	316L	AACAP	D24627-OON
12	6" LR 90 40S	316L	ACKAS	D24627-OON
1	8X6" CR 40S	316L	AACAP	D24627-OON
3	6X3" CR 40S	316L	AACBJ	D24627-OON
111	6" LR 90 40S	316L	ABMG	D24245-OON
107	6" LR 90 40S	316L	ABMH	D24245-OON
97	8" LR 90 40S	316L	ABMI	D24245-OON
23	6" 45 40S	316L	AADAM	D24245-OON
14	6" 45 40S	316L	ABJT	D24245-OON
20	8" 45 40S	316L	ABLAG	D24245-OON
5	8" TEE 40S	316L	AAGK	D24245-OON
9	6X4" CR 40S	316L	AACBJ	D24245-OON
9	10X8" CR 40S	316L	AACAQ	D24245-OON

PROGRAM FOR RESOLUTION
OF THE STAINLESS STEEL PORTION OF THE
TUBELINE FITTING PROBLEM
AT
WATTS BAR NUCLEAR PLANT

Purpose: This Program Plan is prepared for the purpose of qualifying, to the criteria contained in section 3b. of NRC IEB 83-06, all of the Tube-Line (T-L) stainless steel fittings which are installed at WBN. The Plan will be used to post facto establish ASME Code equivalence for all manufacturing operations, except NPT stamping and third party inspection, where they are applicable, for all of these fittings.

I. Capitol Pipe and Steel Products Company and TVA will audit the two manufacturers who made the fittings for T-L, which were audited post facto by T-L. The purpose of these audits is to independently verify the results of the T-L audits. The scope of these audits is to verify compliance with the requirements of ASME B&PV Code, Section III, 1971 edition, Summer 1973 Addenda, subarticle NB-2600. In particular, the auditors shall look at the manufacturers' documentation program, their calibration procedures, and test coupon preparation control. They shall establish that no weld repair was performed, that no NDE was required for those fittings which were welded without filler metal, and that the manufacturer of welded <u>with</u> filler metal fittings has a radiographic procedure to meet the requirements of UW-51 of ASME Section VIII (1971 Code, Summer 1973 addenda) so that the criteria of paragraphs 1 through 3 of Code Case N-242-1 can be met by TVA for fittings welded without filler metal.

The audits shall be performed with checklists which will serve to verify that each of the foreign manufacturers have good material control practices to ensure that heat traceability can be maintained during all facets of the manufacturing process, including the marking of the heat number (code) on the fittings, and that these practices were in effect at the time the material in question was manufactured. The procedures for crating of the fittings and marking of heat numbers on the crates which are shipped to T-L will be reviewed and approved (during the audit). The manufacturer's capability of implementing all of these procedures will be thoroughly evaluated during these audits.

Capitol's November, 1982 audit of T-L will be used as the basis for acceptance of T-L's QA program for their portion of the manufacture of these fittings.

The name(s) of Capitol's auditor(s) and their qualifications shall be submitted to TVA for review and approval prior to performing the audits.

If the audits do not result in approval of T-L's vendor qualification, all stainless steel material supplied by Capitol from T-L shall be suspect.

II. All steel manufactured for these fittings must be made to the requirements of TVA's Attachment FS (Special Requirements for Steel Produced in a Foreign Country) except that the third paragraph of the attachment does not apply.

For each heat involved in this problem, T-L shall transmit to TVA a copy of the original mill test report for the base material from which each of the fittings were manufactured; and in addition, T-L shall furnish any other MTR's which are applicable to each of these heats (T-L has already furnished their own CMTR's for these items). All original mill test reports shall be issued by the base material manufacturer, shall be written in English, and shall be on company letterhead, or equivalent. Any other applicable CMTRs shall be issued by the manufacturer doing the work and shall be on company letterhead, or equivalent. These reports shall be the basis for acceptance of the test(s) performed in accordance with section III below.

III. For <u>all</u> stainless steel fittings supplied by T-L, TVA will either perform, or have T-L perform at a laboratory approved by TVA, a product analysis on each size, each product form (ell, tee, reducer, etc.), in a heat. The number of fittings tested and the acceptance numbers will be determined in accordance with Table II-C of MIL-STD-105D. The Acceptable Quality Level (AQL) for all sample size codes A-D will be 15 and for all sample size codes E-H will be 25. The number of fittings making up a lot for each heat will be determined by the total number of fittings of a given product type in that heat which are installed. The product analysis of the tested fittings shall be within the tolerances for the original chemistry stated in the applicable ASTM standards. If the product analysis tests for a heat meet the AQL criteria stated above, then that heat shall be considered to meet the requirements of the Code. (Note: For certain heats of welded <u>with</u> filler metal fittings, manufactured by Nippon Benkan, the number of fittings available for test do not meet the above stated requirements. For those heats <u>only,</u> TVA proposes to test only the number of uninstalled fittings available, and use the results of product analysis and proof tests (see IV) for these fittings, along with the fact that TVA's auditor feels that Benkan's QA program was ASME Code equivalent, with the exception of NPT stamping and third party inspection, to accept the fittings as being ASME Code equivalent.) In addition to the product analysis, TVA will do a hardness test on these fittings to determine the approximate tensile strength of the fitting, and an ASTM A262 practice A test will be performed on each of these fittings to ascertain that the fitting was solution heat treated as required by section 6 of ASME SA-403. TVA will then use these tested fittings as a baseline to perform a fluorescent X-ray analysis test, using a CSI model 740 materials analyzer, on each accessible installed fitting of the same heat to serve as a check that all fittings with the same heat number have, within normally accepted limits, the same chemistry as the tested fitting. This inplace test will concentrate on those elements for which the CSI model 740 has been shown to be the most sensitive and accurate.

For welded without filler metal material which is installed and no identical product is available with the same heat number, TVA will do an in-place product analysis for all elements determinable by TVA's test-equipment and will do a hardness test to determine approximate tensile strengths.

Any physical or chemical testing required by the material specification which was not documented by the mills or T-L will be done by TVA or T-L during this program.

IV. For all of the T-L fittings which are welded <u>with</u> filler metal, the following additional tests are to be peformed:

a. One fitting per product type, per size, per manufacturer, and from the same T-L heat as was installed by TVA (11 fittings) will be hydrostatic pressure tested in accordance with the section 9.0 requirements of ANSI B16.9-1978, except that the proof test pressure shall be 1500 psig minimum. However, the fittings shall not exhibit any deformation or indications of failure to withstand this test pressure. Any fitting which does deform or otherwise show indications of failure shall be deemed to have failed the test. Should the fitting fail this test, 2 more identical fittings shall be tested. If they both pass the test, the heat shall be acceptable for use. This test will serve as a confirmation of its pressure retaining capabilities as stipulated in subparagraph NX-3642.2 of the Code, will verify that the fittings will withstand operating pressures in excess of both the system design and hydrostatic test pressures (150 psia and 275 psia, respectively), and that the weld seam is not the weakest portion of the fitting. These tests shall be conducted and documented by TVA personnel at WBN in accordance with procedures written specifically for these tests. The tests may be witnessed, at their option, by the WBN ANI and other interested parties.

b. The original T-L furnished radiographic (RT) film of the seam weld for all fittings tested in (a) will be reviewed by both TVA and the WBN ANI. TVA will RT the seam weld of at least 2 more fittings (when available at WBN) per size, per product type, of the same heats in a. above and compare this film to the original T-L furnished RT film. These RT film reviews, the results of the hydrostatic tests in a. above, and the results of tests in III above will be utilized by TVA to post facto show welder qualification to ASME Section IX criteria.

c. Each of the fittings which are qualified by this Program Plan will be permanently marked by TVA with a unique TVA identification number, which is cross-referenced to T-L's heat code. The fitting's location will be noted on the appropriate TVA weld map for the ERCW system.

d. For all fittings meeting (a), (b), and (c), TVA will note on the ASME Code N-3 and N-5 Data Report Forms for the Unit 1 and common portions of the WBN ERCW system that these fittings were not NPT stamped as required by Sections II and III of the ASME B&PV Code and will make references to the work done as a part of this Program Plan as a basis for acceptance of the fittings as ASME Section III Code equivalent. In addition, the applicable portion(s) of the WBN FSAR will be modified to reflect that these fittings are acceptable in accordance with 10CFR50.55a. This action will not prevent TVA from N-stamping the Unit 1 and common portions of the ERCW system.

V. On the basis of successfull completion of sections I through III above, TVA will, for all fittings welded <u>without</u> filler metal, perform the certification required by paragraph 4 of Code Case N-242-1. Certification by TVA to Code Case N-242-1 does not change our licensing commitment nor does it impact WBN's FSAR except as explicitly stated in IV above.

VI. The following action will be taken for any fittings which cannot meet I through V above for ASME Section III class 2 or 3 systems: if installed, they will be cut out and replaced; if <u>welded with or without filler metal</u> and have not been installed, they will be replaced with fittings complying with ASME Section III requirements. All replacement fittings must be manufactured by a manufacturer approved by TVA.

VII. T-L supplied material is not acceptable for TVA use at Watts Bar Nuclear Plant until their QA program is revised to correct vendor qualification and tracebility procedures to meet ASME Code Section III requirements.

EARL L. DAUGHERTY
REGISTERED ENGINEER
AGRICULTURE
COMMERCIAL
No. 01[illegible]
STATE OF TENNESSEE

Prepared By: [illegible] Date: 8/30/83

Approved By: [illegible] Date: 8/30/83

[illegible]
9411
STATE OF TENNESSEE

E63112.09

No.

TENNESSEE VALLEY AUTHORITY

ATTACHMENT FS

SPECIAL REQUIREMENTS FOR STEEL PRODUCED IN A FOREIGN COUNTRY

Material meeting the requirements of the specified ASTM/ASME specifications may be produced by steel mills in foreign countries and their location is not restricted by the ASTM/ASME specifications.

Foreign-produced steel is acceptable for meeting the requirements of this specification provided the steel is produced to ASTM/ASME specifications by an established and reputable steel mill. Steel produced to foreign standards which by virtue of overlapping chemical and mechanical properties is considered to be "identical" or "similar" to the ASTM/ASME specification and grade, shall not be supplied. Other requirements applicable to surface conditions, cleanliness, and when required, weldability shall be satisfied.

To ensure that foreign-produced steel meets the ASTM/ASME specifications, the Contractor shall provide, at its cost and for each heat of steel, results of product analyses and tension tests performed by a domestic independent commercial laboratory approved by TVA. Such analyses and tests are to be conducted in the presence of a TVA Inspector unless he waives the right to be present. The Contractor shall be responsible technically and financially for quality assurance audits of the product analyses and tension tests. These results shall be attached to the certified mill test reports submitted by the material manufacturer. The certified mill test reports and the results of the product analyses and tension tests shall be submitted with the material at delivery. Subsequent product analyses and tension tests for the purpose of verification may be performed by TVA at its cost, and shall be a basis for rejection of any and all material if the results prove to be significantly different than the results of the supplier furnished product analyses, or if the requirements of the specification have not been met.

The Contractor shall perform sufficient dimensional checks to verify compliance with the tolerances tabulated in ASTM A 530 for pipe, ANSI B16.9 and B16.11 for fittings, ANSI B16.5 for flanges, and ASTM A 568 for sheet steel. TVA may perform subsequent receiving inspection dimensional checks at its cost. These inspections may be a basis for rejection if the results show that the material supplied does not meet the requirements of the specification.

All documents shall be written in the English language. All markings on the material shall meet the requirements of the applicable ASTM/ASME standard listed in the specifications/schedule of prices and shall be written in the English language.

All steel shall be protected during shipment to prevent damage or deterioration and shall meet the other conditions of this specification.

TENNESSEE VALLEY AUTHORITY

Division of Construction

WATTS BAR NUCLEAR PLANT

HYDROSTATIC TEST PACKAGE

Prepared in accordance with

WBNP-QCT-4.37 Revision 2

TEST PACKAGE NUMBER: N/A

TITLE: FITTING QUALIFICATION TESTING FOR NCR #4866, R1

	APPROVED FOR USE	RESULTS ACCEPTED	APPROVED FOR USE	RESULTS ACCEPTED
REVISION	0	0		
DATE	08/24/83	09/09/83		
SYSTEM ENGINEER	[illegible]	[illegible]		
TECHNICAL REVIEWER	[illegible] 09/09/83	[illegible]		
QMO REVIEWER	[illegible]	[illegible] 9-9-83		
CONSTRUCTION ENGINEER	[illegible]	[illegible]		
NUCLEAR POWER	N/A [illegible] 08/24/83	N/A [illegible] 09/09/83		
NSSS VENDOR	N/A [illegible] 08/24/83	N/A [illegible] 09/09/83		

Test Number N/A Rev. 0

Title: NCR #4866, R1 Page 1 of 12

ADMINISTRATIVE CONTROL

Construction Test Director J.E HAEY OR DESIGNEE

NUC PR Representative N/A

Construction test personnel ~~and NUC PR operations personnel~~ have been briefed on their responsibilities for the conduct of this test. 08/24/83

Test Director: [signature] Date: 09/02/83

Attendance

Name	Unit
Donald E. Smith	Mech. QC. DES 9-7-83
C. Jeffry Lorenzen	MQC 9-7-83
Earl Haugsby	Engineer MEB
[illegible]	MQC
G Dent	ANI (HSBI+Ico)
W.E. Holland	NRC RI 9/7/83
W.J. Connell	~~[illegible]~~
[illegible]	Craft
[illegible] 9/7/83	MECH. Q.C.
Howard W. Easton 9/7/83	ANI
W.E. Holland	NRC RI 9/7/83

Test Number N/A Rev. 0

Title NCE# 4866, R1 Page 2 of 12

TEST BOUNDARY DESCRIPTION

FABRICATED PER WORK RELEASE# 12036, R1
AND SHOWN ON PAGE 11 OF 12 OF THIS
TEST PACKAGE

Test Number N/A Rev. 0

Title NCR # 4666, E1 Page 3 of 12

SYSTEM DESIGN AND TEST ACCEPTANCE CRITERIA

System Name N/A System No. N/A

TVA Class C Governing Code ASME III Code Class 3

Cleanliness Classification N/A Water Grade Minimum N/A

Hydrostatic Test Identifier Drawing No. N/A Rev. ____

System Design Pressure N/A psi.

Minimum Hydrostatic Test Pressure 1500 psi.

Maximum Hydrostatic Test Presure 1650 psi.

Limiting component within hydrostatic test boundary N/A

Identifier N/A Elevation N/A

Vendor test pressure N/A psi.

Piping—Pressure at 90% yield strength (max.) N/A psi.

High Point Elev N/A Low Point Elev N/A Pressure Gauge El N/A

Test Gauge Pressure Reading; min 1500 psi; max 1650 psi.

Min Test Duration 10 Min. Test Temperature 40 o F

Design Leakage Criteria ONLY VENDOR FITTING WELDS ARE TO BE EXAMINED. LEAKAGE AT TVA WELDS AND TEST APPARATUS IS ACCEPTABLE

Remarks: ____

Test Number N/A Rev. 0

Title: NCR # 4866, R1 Page 4 of 12

TEST SEQUENCE DESCRIPTION

1) VERIFY FABRICATION COMPLETION AND PREREQUISITES CHECKLIST

2) FILL AND VENT SUBASSEMBLIE(S)

3) RAISE PRESSURE TO TEST PRESSURE (1500 PSIG) IN INCREMENTS OF APPROX. 400 PSIG AND EXAMINE FOR LEAKAGE. ABOVE 1200 PSIG, ALL NON-ESSENTIAL PERSONNEL SHOULD BE PROTECTED FROM POTENTIAL FAILURE HAZZARD.

4) HOLD PRESSURE AND EXAMINE VENDOR WELDS.

5) RELIEVE PRESSURE.

Test No. N/A Rev. 0

Title NCR # 4666 Page 5 of 12

PREREQUISITES CHECK LIST

		Verified by/Date
Piping complete to the extent necessary (6.3.2.1) to perform the test.	(TD)	[illegible] 09/02/83
Piping is adequately supported and restrained (6.3.2.2).	(TD)	N/A [illegible] 08/24/83
Piping is uninsulated and exposed (6.3.2.3).	(TD)	N/A [illegible] 08/24/83
Temporary scaffolding or ladders are in place as required (6.3.2.4).	(TD)	N/A [illegible] 08/24/83
Test water grade and quantities (6.3.2.5)	(TD)	N/A [illegible] 08/24/83
Minimum test temperature will be acceptable at time of hydro (6.3.2.6).	(TD)	[illegible] 09/02/83
Hold tags installed as required (6.3.2.7)	(TD)	N/A [illegible] 08/24/83
Permanent relief valves removed or gagged as required (6.3.2.8).	(TD)	N/A [illegible] 08/24/83
Valve lineup and equipment check-list completed.	(Insp)	N/A [illegible] 08/02/83

Additional prerequisites:

NONE [illegible] 08/24/83

All prerequisites have been completed. (TD) [illegible] 09/02/83

DRAWINGS	REV.	DRAWINGS	REV.
N/A [illegible] 08/24/83			

Test No. N/A Rev. 0

Title NCR#4866, R1 Page 6 of 12

VALVE LINEUP

All Valve Nos. Preceded by: N/A [illegible] 05/24/93

VALVE NO.	CONDITION OR POSITION	PRESSURE RATING	INSPECTOR VERIFIED
	N/A [illegible] 05/24/93		

TEST NO. N/A Rev. 0

TITLE NCP #4E6.6, E1 Page 7 of 12

EQUIPMENT CHECKLIST

EQUIPMENT IDENTIFIER	PRESSURE RATING	EQUIPMENT CONFIGURATION	INSPECTOR VERIFIED
		N/A GH 06/29/83	

Test No. N/A Rev. 0

Title NCR # 4866, R1 Page 8 of 12

TEST RESULTS

Refer to attachment D for Acceptance Criteria.

Test Equipment

Type	Unique Identifier	Calibration Date
Pressure Gauge	901053	6-1-83
Pressure Gauge	900123	6-1-83
Relief Value	268	9-2-83
DIGITAL THERMOMETER	462375	DUE: 08/08/84

Water Grade N/A Based on NUC PR Lab results.

Temperature of membrane at start of test 78 oF

Temperature of water at start of test 78 oF

Test pressure 1520 psi min., 1565 psi max., held for 10 minutes followed by system examination at 1540 psi min., 1540 psi max., conducted for 0 hours and 3 minutes.

Description of leakage: TEST APPARATUS LEAKAGE ONLY. NO EVIDENCE OF FITTING LEAKAGE OR FITTING DEFORMATION.

Remarks: SUBASSEMBLY WITH 8" TEE, HT # AAGA 18"X8" CR, HT # AACAG, 8" 45° ELL, HT # ABLAG, AND 8" 90° ELL, HT # ABMI

Test conducted, and accepted in accordance with Rev. C of this test package and Rev. 2 of WBNP-QCT-4.37.

Test Conducted: [signature] Test Director — 09/22/83 Date

Test Accepted: Donald E. Smith Inspector — 9-2-83 Date

Test Witnessed By: G Deal Authorized Nuclear Inspector — 9-2-83 Date

Test No. N/A Rev. 0

Title NCR #4866, R1 Page 9 of 12

TEST RESULTS

Refer to attachment D for Acceptance Criteria.

Test Equipment

Type	Unique Identifier	Calibration Date
Pressure Gauge	901053	6-1-83
Pressure Gauge	900123	6-1-83
Relief Valve	268	9-2-83
Digital Thermometer	462375	Due 8-8-84

Water Grade N/A based on NUC PR Lab results.

Temperature of membrane at start of test 80 °F

Temperature of water at start of test 80 °F

Test pressure 1540 psi min., 1560 psi max., held for 10 minutes followed by system examination at 1535 psi min., 1540 psi max., conducted for 0 hours and 4 minutes.

Description of leakage:

Remarks: SUBASSEMBLY WITH 6" 90° ELL, HT # ABMG, 6" 90° ELL, HT # ABMH, 6" 45° ELL, HT # ABGT, 6" 45° ELL, HT # AADAN

Test conducted, and accepted in accordance with Rev. 0 of this test package and Rev. 2 of WBNP-QCT-4.37.

Test Conducted: [signature] Test Director — 09/07/83 Date

Test Accepted: Donald E. Smith Inspector — 9-7-83 Date

Test Witnessed By: [signature] Authorized Nuclear Inspector — 9/7/83 Date

Test No. N/A Rev. 0

Title NCR # 4866, R1 Page 10 of 12

TEST RESULTS

Refer to attachment D for Acceptance Criteria.

Test Equipment

Type	Unique Identifier	Calibration Date
Pressure Gauge	901053	6-1-83
Pressure Gauge	900123	6-1-83
Temperature Gauge	462375	8-8-83
Relief Valve	268	9-2-83
DIGITAL THERMOMETER	462375	DUE: 08/08/84

Water Grade ~~N/A~~ GFH 09/08/83 Based on NUC PR Lab results.

Temperature of membrane at start of test 80°F °F

Temperature of water at start of test 80°F °F

Test pressure 1530 psi min., 1545 psi max., held for 10 minutes followed by system examination at 1530 psi min., 1530 psi max., conducted for 0 hours and 7 minutes.

Description of leakage: TEST APPARATUS LEAKAGE ONLY. NO EVIDENCE OF FITTING LEAKAGE. 6"X3" C.R. HT# AACBJ ~~DEFORMATION~~ FLAT SPOT GFH 09/08/83 AS SHOWN ON INCLUDED SKETCH

Remarks: SUBASSEMBLY WITH 8"X6" CR, HT. # AACA, 6" 90° ELL, HT# ACKAS, AND 6"X3" CR, HT# AACB

Test conducted, and accepted in accordance with Rev. 0 of this test package and Rev. 2 of WBNP-QCT-4.37.

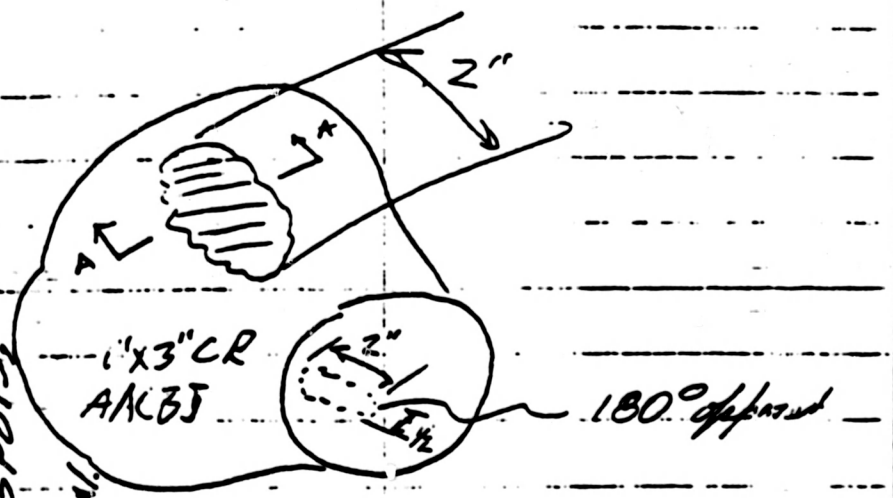
Test Conducted: [signature] Test Director — 09/07/83 Date

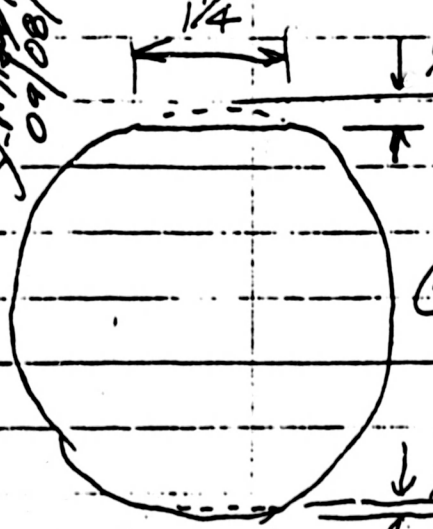
Test Accepted: Donald E. Smith Inspector — 9-7-83 Date

Test Witnessed By: Howard D. Haston Authorized Nuclear Inspector — 9/7/83 Date

HYDROSTATIC TEST FOR NCR# 4866, R1

Flat Spot





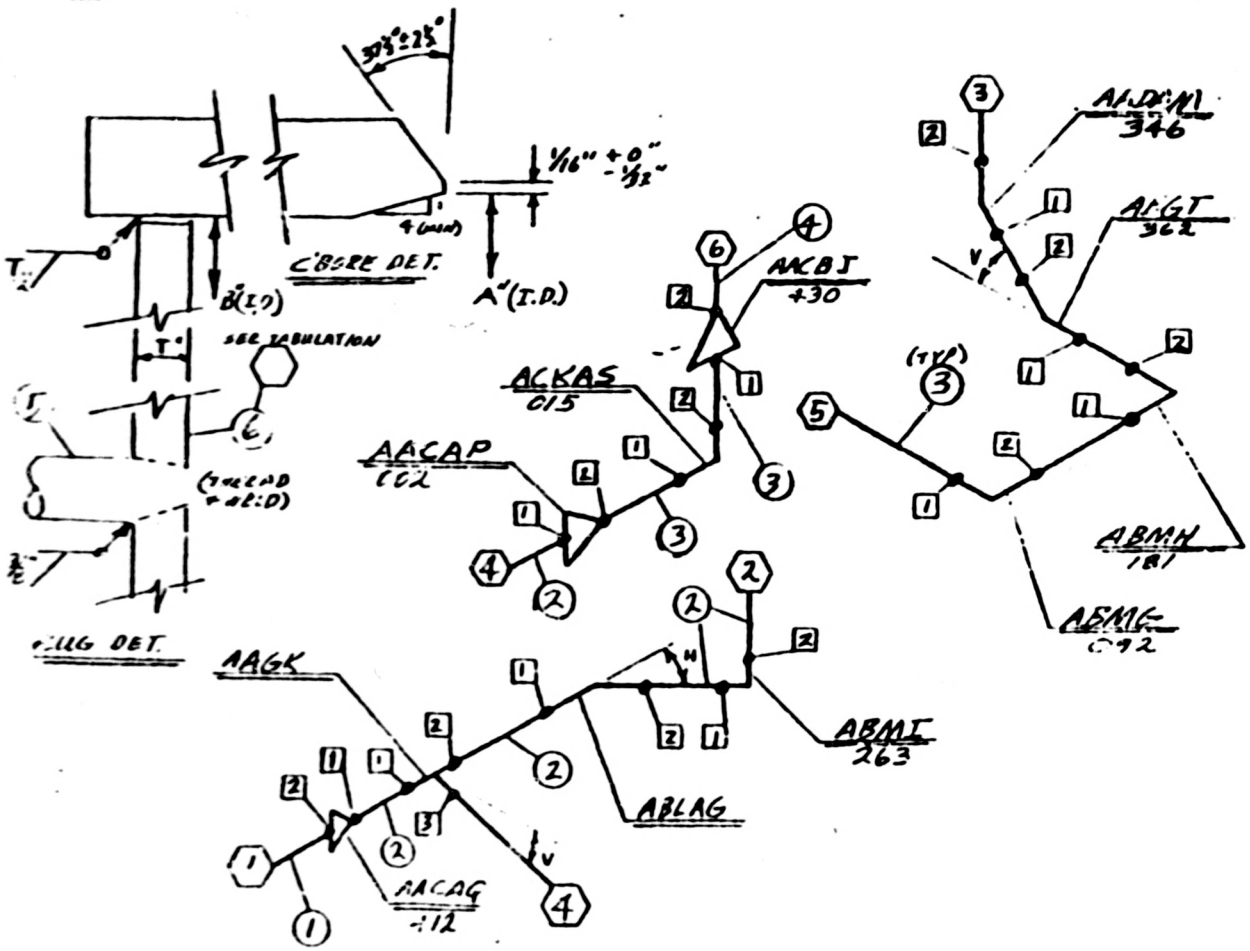
@ 1530 PSIG

SEC A-A

MY INSPECTION & as Identified FITTINGS WHICH ARE INSTALLED REVEALED IDENTICAL FLAT SPOTS, CONFIRMING THAT TESTING DID NOT INDUCE DEFORMATION!

09/08/83

09/07/83



1	12"	CTR. CLAMP [illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]
4	[illegible]	[illegible]
5	[illegible]	SCT. [illegible]
6	[illegible]	PLATE, FOR TABULATION BELOW, S/S

PLUG TABULATION

	T	B	TEST PLUG	QTY
Q	1.50	2.30	NO	1
G	1.25	2.00	YES	1
[illegible]	1.00	1.75	YES	1
[illegible]	1.25	2.00	NO	2
[illegible]	1.00	1.75	NO	1
[illegible]	0.5	2.70	YES	1

NOTES:

1) TEST PRESSURE IS 1500 PSIG, 1650 PSIG MAX.
2) [illegible] TO FITTINGS TO BE FOR CTIE-G-1, WITH FITUP INSPECTION, FINAL VT, AND FINAL PT.
3) ALL OTHER WELDS REQUIRE FINAL VT (WITH GA)
4) PRESSURE TEST IS TO VERIFY INTEGRITY OF FITTINGS (NOT [illegible]
5) TEST LEAKAGE TO BE SEEN MAY BE SEEPAGE OR CLAMBERAT
6) [illegible] SHALL BE COMPLETELY VENTED OF AIR
7) VALVES IN TEST APPARATUS SHALL BE EQ. C/S OR STELLITE
8) TENSION CRACK PIPE PIECES SHALL BE 12" MINIMUM.

WORK RELEASE # 12036, R1

REF. DWG. NCR # 4866, R1

SYSTEM 67, ERCW

DATE AUG 23 1993

HYDROSTATIC TEST PACKAGE

FOR NCR # 4866, R1 PAGE 11 OF 12