

NUCLEAR ENERGY SERVICES
MATERIALS, CODES and INSPECTIONS SECTION
700 Universe Blvd.
Juno Beach, Florida

FINAL REPORT OF INSERVICE INSPECTION
NONDESTRUCTIVE EXAMINATIONS
OF
UNISOLABLE PIPING SYSTEM AND COMPONENTS
FOR POTENTIAL THERMAL STRESS EFFECTS
REFERENCE NRC BULLETIN NO. 88-08

PREPARED BY:
FLORIDA POWER AND LIGHT COMPANY

FOR

TURKEY POINT NUCLEAR POWER PLANT
UNIT NO. 4
P.O. BOX 3088
FLORIDA CITY, FLORIDA 33034

COMMERCIAL SERVICE DATE: PTN-4 7 SEPTEMBER 1973

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RECORD OF REVISION			
REVISION NUMBER	DESCRIPTION OF REVISION REASON FOR THE CHANGE	DATE REVISED	APPROVALS

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ABBREVIATIONS

LISTED BELOW ARE THE ABBREVIATIONS UTILIZED IN THIS DOCUMENT:

ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
B&PV	BOILER AND PRESSURE VESSEL CODE
C&P	CODES AND PROGRAMS GROUP
CH	CHARGING
FP&L	FLORIDA POWER AND LIGHT COMPANY
ISI	INSERVICE INSPECTION
JNS	JUNO NUCLEAR ENERGY - SERVICES
MCI	MATERIALS, CODES AND INSPECTIONS SECTION
NDE	NONDESTRUCTIVE EXAMINATION
NRC	NUCLEAR REGULATORY COMMISSION
PTN-4	TURKEY POINT PLANT UNIT NO. 4
RCS	MAIN REACTOR COOLANT SYSTEM
RC	REACTOR COOLANT

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ABSTRACT

This document describes the Inservice Inspection results of Nondestructive Examinations performed during the 1988 refueling outage which began on 17 September 1988. This document addresses the nondestructive examinations performed, conditions noted and corrective measures recommended or taken as required by ASME Section XI 1980 Edition through the Winter 1981 Addenda, IWA-6220.

This document addresses NRC ACTION ITEM 2 and the reporting requirements as identified in item 4 of the Action Requested by the Nuclear Regulatory Commission.

This report documents the examination activity performed on Florida Power and Light Company Turkey Point Nuclear Power Plant Unit No. 4.

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1.0 INTRODUCTION

1.1 PROGRAM APPLICABILITY

This Report details the Florida Power & Light Company's results of Inservice Inspection, Nondestructive examinations performed at the Turkey Point Nuclear Power Plant, Unit No. 4.

1.1.1 The operating License for Turkey Point Unit no. 4 was issued on April 10 1973, and Florida Power and Light Company is the owner of record.

1.2 INSPECTION INTERVALS

The Second Inservice inspection Interval became effective on April 15, 1984 and ends on April 14, 1994.

1.3 INSPECTION PERIODS

The Inspection Interval is divided into three successive inspection periods as defined by Program "B".

Period	START	END
1	April 15, 1984	April 15, 1987
2	April 15, 1987	April 15, 1991
3	April 15, 1991	April 14, 1994

1.4 APPLICABLE DOCUMENTS

The Nondestructive examination Program performed during this activity was developed after giving due consideration to the following documents:

- ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI, 1980 EDITION THROUGH THE WINTER 1981 ADDENDA, "RULES FOR INSERVICE INSPECTION OF NUCLEAR POWER PLANT COMPONENTS"

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- U. S. NUCLEAR REGULATORY BULLETIN - 88-08 TITLED "THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEMS" DATED; JUNE 22, 1988, SUPPLEMENT 1 DATED: JUNE 24, 1988 AND SUPPLEMENT 2 DATED: AUGUST 4, 1988
- TURKEY POINT UNITS 3 AND 4 (NRC BULLETIN 88-08 THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEM) ENGINEERING DOCUMENT FOR THE IDENTIFICATION OF UNISOLABLE PIPING AND DETERMINATION OF INSPECTION LOCATIONS, DOCUMENT NO: SE&PT-SSAD-7814, DATED: AUGUST 1988

1.5 APPLICABLE CODE EDITIONS AND ADDENDA

As required by Title 10 of the Code of Federal Regulations paragraph 55a (g) (4) Inservice Inspections requirements applicable to nondestructive examination at Turkey Point Unit 4 are based on the rules set forth in the 1980 Edition of Section XI through the Winter 1981 Addenda, hereafter referred to as the Code.

2.0 ENGINEERING RECOMMENDATIONS

Following is the engineering recommendations of areas where NONDESTRUCTIVE EXAMINATIONS were identified for potential thermal stress effects as described in NRC Bulletin 88-08.

The components subject to examination were determined to include portions of the following lines:

2.1 CHARGING PUMP TO PRESSURIZER AUXILIARY SPRAY LINE

The 2 inch weld on the 4" x 4" x 2" reducing tee at the Main Spray Line connection was recommended for examination as identified on isometric drawing 004-A29, and also, the weld at the outlet of valve 4-313.

2.2 CHARGING PUMP TO "C" HOT LEG

All welds from the third to fourth elbow downstream of check valve 4-312B (4 weld locations) and base metal of the fourth elbow downstream of check valve 4-312B as identified on isometric drawing 004-A39.

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3.0 ABSTRACT OF EXAMINATIONS PERFORMED

3.1 APPLICABLE AREAS

Based on the recommendations identified above the following items were scheduled for nondestructive examination.

3.1.1 AUXILIARY SPRAY LINE DRAWING 004-A29

ZONE	IDENTIFICATION	DESCRIPTION	EXAM METHOD
035	2"-RC-1410-33	VLV 4-313 - PIPE	UT & PT
035	2"-RC-1410-34	PIPE - RED. TEE	UT & PT

3.1.2 CHARGING LINE LOOP C DRAWING 004-A39

ZONE	IDENTIFICATION	DESCRIPTION	EXAM METHOD
045	3"-CH-1401-32	PIPE - ELBOW	UT & PT
	ELBOW	BASE METAL	UT & PT
	3"-CH-1401-33	ELBOW - PIPE	UT & PT
	PIPE	BASE METAL	UT & PT
	3"-CH-1401-34	PIPE - ELBOW	UT & PT
	ELBOW	BASE METAL	UT & PT
	3"-CH-1401-35	ELBOW - PIPE	UT & PT
	PIPE	BASE METAL	UT & PT
	3"-CH-1401-36	PIPE - ELBOW	UT & PT
	ELBOW	BASE METAL	UT & PT
	3"-CH-1401-37	ELBOW - PIPE	UT & PT

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3.2 LIQUID PENETRANT EXAMINATIONS

The Liquid Penetrant examinations performed were conducted in accordance with FP&L NDE procedure 3.3. This procedure complies with the ASME Code. The examinations performed were required by Table IWB-2500-1 and FP&L intends to utilize the examination records for ASME Code credit and are part of the Inservice Inspection Program.

3.3 ULTRASONIC EXAMINATIONS

The ultrasonic examinations were not required by the ASME Code Tables IWB-2500-1 due to the size being 2" and 3". The supplemental examinations were conducted in accordance with standard piping techniques for the 3" charging system. For the 2" Auxiliary Spray system a new NDE procedure and a new calibration block had to be fabricated for the examination of socket weld areas. The procedure and calibration block were qualified and demonstrated to the satisfaction of the Authorized Nuclear Inservice Inspector on January 26, 1989.

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4.0 ABSTRACT OF CONDITIONS NOTED

Described below by component is a summary of conditions noted during the Unit No. 4 examination activity:

4.1 AUXILIARY SPRAY LINE

4.1.1 ZONE 035, 2"-RC-1410-33, VLV 4-313 - PIPE:

A liquid penetrant and ultrasonic examination using a 45 and 70 degree search unit. ONE (1) indication recorded with a amplitude recorded to be less than 20% DAC, determined to be probable beam redirection.

4.1.2 ZONE 035, 2"-RC-1410-34, PIPE - RED. TEE:

A liquid penetrant and ultrasonic examination using a 45 and 70 degree search unit. NO RECORDABLE INDICATIONS NOTED

4.2 CHARGING LINE LOOP C

4.2.1 ZONE 045, 3"-CH-1401-32, PIPE - ELBOW:

A liquid penetrant and ultrasonic examination using a 45 and 60 degree search unit. NO RECORDABLE INDICATIONS NOTED

4.2.2 ZONE 045, ELBOW BASE METAL:

A liquid penetrant and ultrasonic examination using a 45 and 60 degree search unit. NO RECORDABLE INDICATIONS NOTED

4.2.3 ZONE 045, 3"-CH-1401-33, ELBOW - PIPE:

A liquid penetrant and ultrasonic examination using a 45 and 60 degree search unit. Two (2) GEOMETRIC INDICATIONS were noted and determined to be caused by root geometry.

4.2.4 ZONE 045, PIPE BASE METAL:

A liquid penetrant and ultrasonic examination using a 45 and 60 degree search unit. NO RECORDABLE

4.2.5 ZONE 045, 3"-CH-1401-34, PIPE - ELBOW:

A liquid penetrant and ultrasonic examination using a 45 and 60 degree search unit. Two (2) GEOMETRIC INDICATIONS were noted and determined to be caused by root geometry.

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- 4.2.6 ZONE 045, ELBOW BASE METAL:
A liquid penetrant and ultrasonic examination using
a 45 and 60 degree search unit. NO RECORDABLE
INDICATIONS NOTED
- 4.2.7 ZONE 045, 3"-CH-1401-35, ELBOW - PIPE:
A liquid penetrant and ultrasonic examination using
a 45 and 60 degree search unit. NO RECORDABLE
INDICATIONS NOTED
- 4.2.8 ZONE 045, PIPE BASE METAL:
A liquid penetrant and ultrasonic examination using
a 45 and 60 degree search unit. NO RECORDABLE
INDICATIONS NOTED
- 4.2.9 ZONE 045, 3"-CH-1401-36, PIPE - ELBOW:
A liquid penetrant and ultrasonic examination using
a 45 and 60 degree search unit. NO RECORDABLE
INDICATIONS NOTED
- 4.2.10 ZONE 045, ELBOW BASE METAL:
A liquid penetrant and ultrasonic examination using
a 45 and 60 degree search unit. NO RECORDABLE
INDICATIONS NOTED
- 4.2.11 ZONE 045, 3"-CH-1401-37, ELBOW - PIPE:
A liquid penetrant and ultrasonic examination using
a 45 and 60 degree search unit. NO RECORDABLE
INDICATIONS NOTED

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5.0 CORRECTIVE ACTIONS TAKEN OR RECOMMENDED

All indications noted were evaluated in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI (where acceptance criteria exists). There were no indications that exceeded the acceptance criteria of the ASME Code, IWB-3000.

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6.0 EVALUATION CRITERIA

During Inservice Inspection, flaw indications are evaluated against the acceptance standards of the ASME Code as follows:

6.1 CLASS 1

6.1.1 Acceptance standards for class 1 are as follows:

EXAMINATION CATEGORY	COMPONENTS OR PARTS EXAMINED	ACCEPTANCE STANDARD
B-J	DISSIMILAR AND SIMILAR METAL WELDS IN PIPING	IWB-3514

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7.0 INSPECTION SUMMARY TABLES

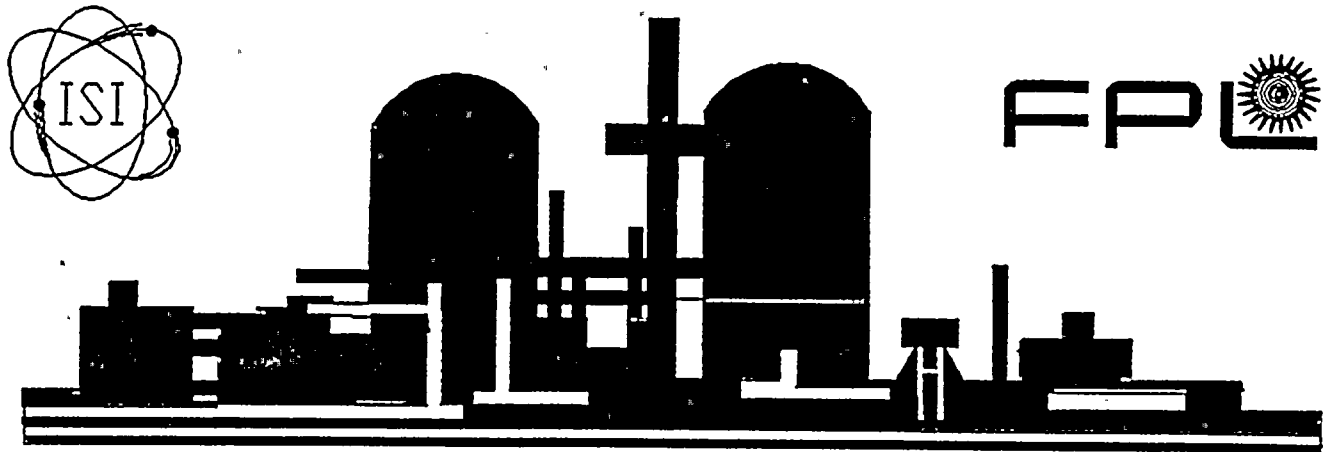
7.1 DESCRIPTION OF TABLES

The TURKEY POINT PLANT UNIT 4 Inservice Inspection tables are summarized by code categories and code item numbers and provides the results of the FP&L examination activity that were performed on the Auxiliary Spray Line and the Charging Line.

7.1.1 SUMMARY PLAN TABLES

The final report tables were developed based on systems and components which are subject to examination and include such information as follows:

- (1) ZONE NUMBER - Components and or systems are divided into zones. Each zone is further subdivided by the following categories:
 - (a) ASME Code Category
 - (b) ASME Code Item Number
 - (c) ZONE Identification Number
 - (d) REFERENCE DRAWING IDENTIFICATION
 - (e) LINE ITEM NUMBER administrative number used for computer identification purposes
 - (f) Examination Area Identification identifies the item or area to be examined
 - (g) INSTRUCTIONS special comments that may be required for a specific item
 - (h) RESULTS divided into four areas:
 1. NOREC no recordable indications
 2. INSIG when indications were observed that were below the recording level
 3. GEOM was applied when indications which have a amplitude equal to or greater than 100% of the DAC curve, and have been documented to be geometric in nature
 4. OTHER are those indications evaluated to be other than insignificant or geometric
 - (i) Examination Method to be used for the examination
 - (j) NDE Examination Procedure to be used for the examination



FLORIDA POWER & LIGHT CO.

TURKEY POINT NUCLEAR PLANT UNIT 4

INSERVICE INSPECTION FINAL REPORT TABLES

RESULTS FOR OUTAGE 1 (1988), SECOND PERIOD, SECOND INTERVAL
SUMMARY NUMBERS 111500 THROUGH 111600

March 20, 1989
REVISION 3

DATE: 03/20/89
REVISION: 3

TURKEY POINT NUCLEAR PLANT UNIT 4
INSERVICE INSPECTION FINAL REPORT TABLES
OUTAGE 1 (1988), SECOND PERIOD, SECOND INTERVAL
CLASS 1 COMPONENTS

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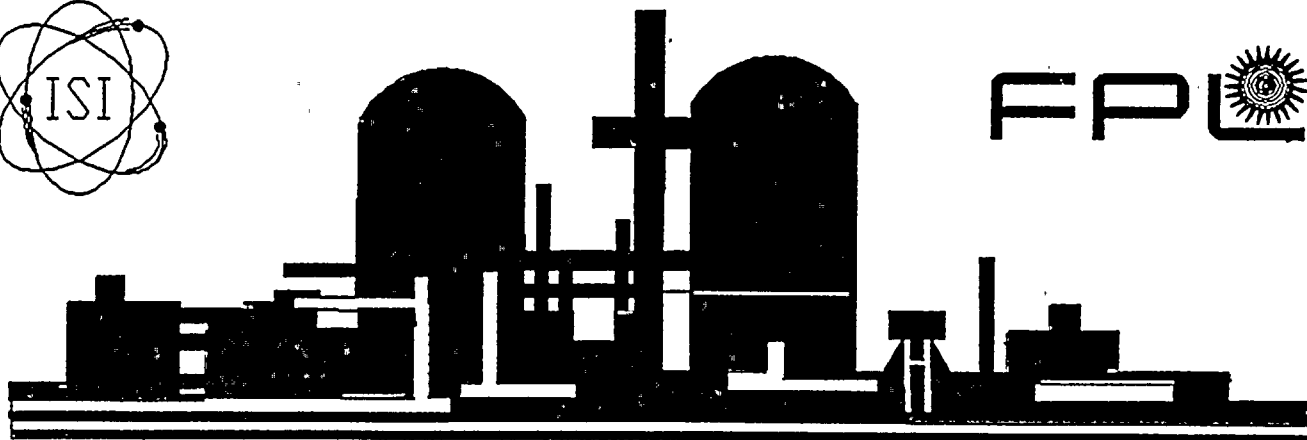
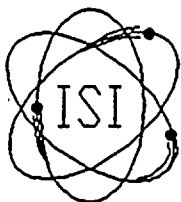
AUXILIARY SPRAY LINE

ZONE NUMBER: 035		ASME	N I O		
		SEC. XI	S O N G T		
SUMMARY EXAMINATION AREA		CATGY	EXAM	T R S E H	
NUMBER	IDENTIFICATION	ITEM NO	METHOD	PROCEDURE	A E I O E REMARKS
					T C G H R **CALIBRATION BLOCK**

REF. DWG. NO. 004-A29

111500	2"-RC-1410-33	B-J	PT	NDE 3.3-342	C C	1-28-89 UT COMPLETE
	VALVE (4-313) - TO - PIPE	B9.21	UT 45 AX	NDE 5.19-1	C	
	75'-0"		UT 70 AX	NDE 5.19-1	C	
						UT-44

111600	2"-RC-1410-34	B-J	PT	NDE 3.3-341	C C	1-28-89 UT COMPLETE
	PIPE - TO - RED. TEE	B9.21	UT 45 AX	NDE 5.19-1	C	
	75'-0"		UT 70 AX	NDE 5.19-1	C	
						UT-44



FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR PLANT UNIT 4

INSERVICE INSPECTION FINAL REPORT TABLES
RESULTS FOR OUTAGE 1 (1988), SECOND PERIOD, SECOND INTERVAL
SUMMARY NUMBERS 154800 THROUGH 155300

March 20, 1989
REVISION 3

DATE: 03/20/89

REVISION: 3

TURKEY POINT NUCLEAR PLANT UNIT 4
INSERVICE INSPECTION FINAL REPORT TABLES
OUTAGE 1 (1988), SECOND PERIOD, SECOND INTERVAL
CLASS 1 COMPONENTS

PAGE: 1

CHARGE LINE RHX TO COLD LEG LOOP C

ZONE NUMBER: 045		ASME			N I O	
		SEC. XI			S O N G T	
SUMMARY EXAMINATION AREA		CATGY EXAM			T R S E H	
NUMBER	IDENTIFICATION	ITEM NO	METHOD	PROCEDURE	A E I O E	REMARKS
					T C G H R	**CALIBRATION BLOCK**

REF. DWG. NO. 004-A39						
154800	3"-CH-1401-32	B-J	PT	NDE 3.3-288	C C	10-19-88 PT COMPLETE: 10-24-88 UT
	PIPE - TO - ELBOW	B9.21	UT 45 AX	NDE 5.4-25	C	COMPLETE
	23'-9"		UT 45 CIRC	NDE 5.4-25	C	
	23'-9"		UT 60 AX	NDE 5.4-25	C	
						UT-44
154850	ELBOW (32-33)	B-J	PT	NDE 3.3-304	C C	10-24-88 UT COMPLETE
	ELBOW-BASE METAL	B9.21	UT 45 AX	NDE 5.4-25	C	10-19-88 PT COMPLETE
	23'-9"		UT 45 CIRC	NDE 5.4-25	C	
	23'-9"		UT 60 AX	NDE 5.4-25	C	
						UT-44
154900	3"-CH-1401-33	B-J	PT	NDE 3.3-287	C C	10-19-88 PT COMPLETE: 10-24-88 UT
	ELBOW - TO - PIPE	B9.21	UT 45 AX	NDE 5.4-25	C	COMPLETE: 2 INDS. (1) 45 AX, 30% DAC,
	23'-9"		UT 45 CIRC	NDE 5.4-25	C	ML=3.7CCW, MW=1.27, MP=1.85, DS: (2) 60
	23'-9"		UT 60 AX	NDE 5.4-25	C	AX, 35% DAC, ML=3.7CCW, MW=.95, MP=.75,
						DS:
						UT-44
154950	PIPE (33-34)	B-J	PT	NDE 3.3-281	C C	10-19-88 PT COMPLETE: 10-24-88 UT
	PIPE BASE METAL	B9.21	UT 45 AX	NDE 5.4-25	C	COMPLETE
	23'-9"		UT 45 CIRC	NDE 5.4-25	C	
	23'-9"		UT 60 AX	NDE 5.4-25	C	
						UT-44
155000	3"-CH-1401-34	B-J	PT	NDE 3.3-286	C C	10-19-88 PT COMPLETE: 10-24-88 UT
	PIPE - TO - ELBOW	B9.21	UT 45 AX	NDE 5.4-25	C	COMPLETE: 2 INDS, (1) 45 AX, 30% DAC,
	23'-9"		UT 45 CIRC	NDE 5.4-25	C	ML=1.4CW, MW=1.31, MP=1.9, US: (2) 60
	23'-9"		UT 60 AX	NDE 5.4-25	C	AX, 20% DAC, ML=1.4CW, MW=.71, MP=.75,
						US:
						UT-44
155050	ELBOW (34-35)	B-J	PT	NDE 3.3-290	C C	10-19-88 PT COMPLETE: 10-24-88 UT
	BASE MATERIAL	B9.21	UT 45 AX	NDE 5.4-25	C	COMPLETE
	23'-9"		UT 45 CIRC	NDE 5.4-25	C	
	23'-9"		UT 60 AX	NDE 5.4-25	C	
						UT-44

REVISION: 3

PAGE: 2

ZONE NUMBER: 045

ASHE

SEC. XI

CATGY

EXAM

ITEM NO

METHOD

PROCEDURE

N I O

SONGT

T R S E H

A E I O E

T C G H R

REMARKS

****CALIBRATION BLOCK****

SUMMARY EXAMINATION AREA

[illegible]

REF. DWG. NO. 004-A39

155100 3"-CH-1401-35
 . ELBOW - TO - PIPE
 23'-9"
 : 23'-9"

8-J PT NDE 3.3-285
89.21 UT 45 AX NDE 5.4-25
UT 45 CIRC NDE 5.4-25
UT 60 AX NDE 5.4-25

C C
C
C
C

10-19-88 PT COMPLETE: 10-24-88 UT
COMPLETE

****UT-44****

155150 PIPE (35-36)
PIPE BASE METAL
23'-9"
23'-9"

B-J PT HDE 3.3-291
89.21 UT 45 AX HDE 5.4-25
UT 45 CIRC HDE 5.4-25
UT 60 AX HDE 5.4-25

C C
C
C
C

10-19-88 PT COMPLETE: 10-24-88 UT
COMPLETE

★★UT-44★★

155200 3"-CH-1401-36
PIPE - TO - ELBOW
25'
25'

B-J PT NDE 3.3-284
89.21 UT 45 AX NDE 5.4-25
UT 45 CIRC NDE 5.4-25
UT 60 AX NDE 5.4-25

C C
C
C
C

10-19-88 PT COMPLETE: 10-24-88 UT
COMPLETE

★★UT-44★★

155250 ELBOW (36-37)
BASE MATERIAL
25'
25'

B-J PT NDE 3.3-289
B9.21 UT 45 AX NDE 5.4-25
UT 45 CIRC NDE 5.4-25
UT 60 AX NDE 5.4-25

C C
C
C
C

10-19-88 PT COMPLETE: 10-24-88 UT
COMPLETE

★★UT-44★★

155300 3M-CH-1401-37
ELBOW - TO - PIPE

B-J PT NDE 3.3-283
B9.21 UT 45 AX NDE 5.4-25
UT 45 CIRC NDE 5.4-25
UT 60 AX NDE 5.4-25

C C
C
C
C

10-19-88 PT COMPLETE: 10-24-88 UT
COMPLETE

UT-44

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8.0 RECORDS

8.1 GENERAL

Records of Inservice Inspections Plans, Outage schedules, Calibration standards, examination and test procedures, results of activities, final reports, certifications, corrective actions taken or recommended will be developed and maintained in accordance with IWA-6000 of the ASME Boiler and Pressure Vessel Code.

8.2 INSERVICE INSPECTION SUMMARY REPORTS

Ninety days (90) following the units return to service MCI shall forward a summary report (NIS-1) of the ISI activity to the Nuclear Regulatory Commission in accordance with IWA-6220.

8.3 SPECIAL REPORTS

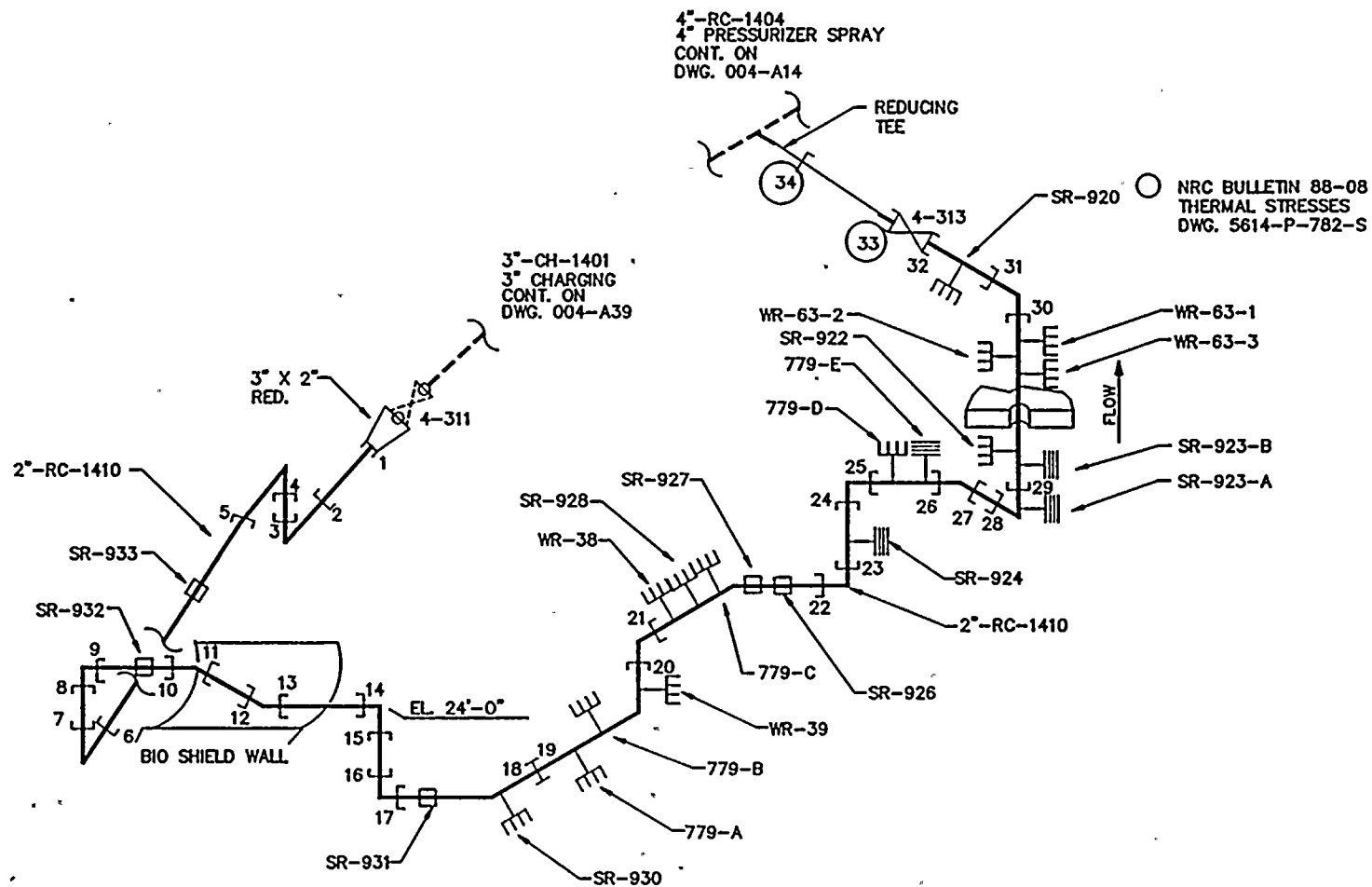
This report is prepared to meet the reporting action required by the bulletin and satisfy the FP&L requirements.



**FINAL REPORT OF INSERVICE INSPECTION
NONDESTRUCTIVE EXAMINATIONS
OF
UNISOLABLE PIPING SYSTEM AND COMPONENTS
FOR POTENTIAL THERMAL STRESS EFFECTS
REFERENCE NRC BULLETIN NO. 88-08**

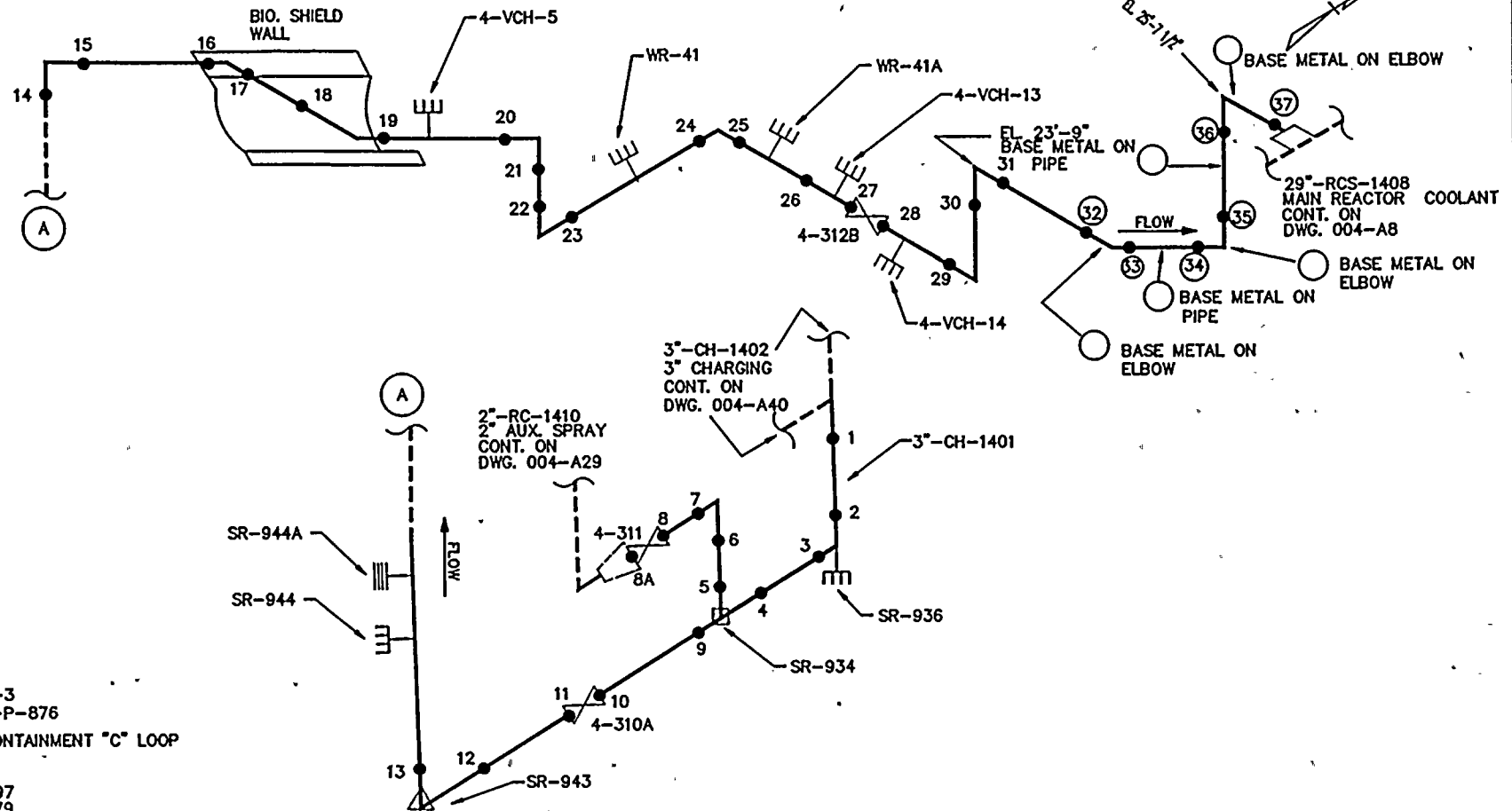
**APPENDIX A
REFERENCE DRAWINGS**

DRAWING NUMBER	REV. NO.	TITLE
004-A29	3	2" AUXILIARY SPRAY LINE
004-A39	3	3" CHARGING LINE



REFERENCE DRAWINGS	PRESSURE & TEMPERATURE STATS	MATERIAL SPECS		FPL	CODES & PROGRAMS GROUP	
		SIZE	SCH		TURKEY POINT UNIT 4	
5177-102-SK-P-875 REV. C 5610-TE-4501 SHT. 1 OF 1 5610-M-410-214 SHT. 3 OF 3 5610-M-410-202 SHT. 2 OF 2	DESIGN PSIG: 2485 TEMP(F): 650 OPERATING PSIG: 2235 TEMP(F): 550 HYDROSTATIC PSIG: 2335 TEMP(F): 547	2"	160	A376-TP316 SMLS	TITLE: 2" AUX. SPRAY LINE	
UT CALIBRATION BLOCK: N/A				DATE: 26 SEPT. 1988	ZONE: 35	
				REVISION 3	APPROVED BY: E. L. ANDERSON	DRAWING NUMBER: 004-A29

○ NRC BULLETIN 88-08
THERMAL STRESSES
5614-P-782-S



NOTE:

3"-RC-2501R-3
5177-102-SK-P-876
LOCATION: CONTAINMENT "C" LOOP
HOT LEG
E-2389-1C-297
E-2389-1C-479

REFERENCE DRAWINGS	PRESSURE & TEMPERATURE STATS	MATERIAL SPECS		FPL	CODES & PROGRAMS GROUP TURKEY POINT UNIT 4
		SIZE	SCH		
5177-102-SK-P-876 REV. C 5177-102-SK-P-875 REV. C 5610-TE-4501 5610-M-420-214 SHT. 3 OF 3 E-2389-1C-284	DESIGN PSIG: 2485 TEMP(F): 650 OPERATING PSIG: 2235 TEMP(F): 550 HYDROSTATIC PSIG: 2335 TEMP(F): 547	3"	160	A-376, TP316 SMLS	TITLE: 3" CHARGING LINE
UT CALIBRATION BLOCK: SOCKET WELD MOCKUP				DATE: 26 SEPT. 1988	ZONE: 45
				REVISION 3	APPROVED BY: E. L. ANDERSON
				DRAWING NUMBER: 004-A39	

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APPENDIX B
PERSONNEL CERTIFICATIONS

EXAMINERS NAME	LEVEL	METHOD	EYE EXAM DATE
BAKER, ROGER	II I	PT UT	10-11-88
BRILEY, ROBERT	I	UT/PT	11-10-87
DUBREUIL, RICHARD	III	UT/PT	4-13-88
LAFLEUR, RUSSEL	IT	UT/PT	6-27-88
LAKE, EDWARD	II	UT/PT	5-23-88
MC CABE, WILLIAM	II	PT	6-30-88
NOWAKOWSKI, DAN	II	UT/PT	4-26-88

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APPENDIX C
EQUIPMENT CERTIFICATIONS
ULTRASONIC EQUIPMENT

SERIAL NUMBER	MANUFACTURER	DESCRIPTION
06446E	SONIC MARK I	ULTRASONIC FLAW DETECTOR
784519	SONIC MARK I	ULTRASONIC FLAW DETECTOR

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APPENDIX D
EQUIPMENT CERTIFICATIONS
ULTRASONIC SEARCH UNITS

SERIAL NUMBER	MANUFACTURER	SIZE	FREQUENCY	DESCRIPTION
021692	AEROTECH	.25"	2.25	ROUND
021729	AEROTECH	.25"	2.25	ROUND

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APPENDIX E
EQUIPMENT CERTIFICATIONS
ULTRASONIC COUPLANT

BATCH NUMBER	MANUFACTURER	DESCRIPTION
8764	ECHO LABS	ULTRAGEL II
8872	ECHO LABS	ULTRAGEL II

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APPENDIX F
EQUIPMENT CERTIFICATIONS
SURFACE THERMOMETERS

SERIAL NUMBER	MANUFACTURER	DESCRIPTION
1191	PTC	SURFACE THERMOMETER
1197	PTC	SURFACE THERMOMETER
87-04	PTC	SURFACE THERMOMETER

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APPENDIX G
EQUIPMENT CERTIFICATIONS
PENETRANT MATERIAL

BATCH NUMBER	MANUFACTURER	DESCRIPTION
87M025	MAGNAFLUX CLEANER	SKC-NF-ZC-7B
87L071	MAGNAFLUX PENETRANT	SKL-HF/S
88E035	MAGNAFLUX DEVELOPER	SKD-NF/ZP-9B

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APPENDIX H
EXAMINATION PROCEDURES

PROCEDURE NUMBER	REVISION NUMBER	FIELD CHANGE	TITLE
NDE 3.3	2	N/A	LIQUID PENETRANT EXAMINATION SOLVENT REMOVABLE VISIBLE DYE TECHNIQUE
NDE 5.4	7	N/A	ULTRASONIC EXAMINATION OF AUSTENITIC PIPING WELDS
NDE 5.19	0	N/A	ULTRASONIC EXAMINATION OF SOCKET WELDS IN PRESSURIZER AUXILIARY SPRAY LINE (PTN 3&4)

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APPENDIX I
CALIBRATION BLOCK

CALIBRATION BLOCK NUMBER	DESCRIPTION	DRAWING NO.
UT-44	.438 INCH THICK, 3.0 INCH DIA	C-4174-019
UT-52	2.0 INCH DIA. SOCKET WELDED MOCK-UP	

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APPENDIX J
LIQUID PENETRANT DOCUMENTATION LOG

DATA SHEET NUMBER	IDENTIFICATION NUMBER	DESCRIPTION
3.3-288	3"-CH-1401-32	PIPE TO ELBOW
3.3-304	ELBOW	BASE METAL
3.3-287	3"-CH-1401-33	ELBOW TO PIPE
3.3-281	PIPE	BASE METAL
3.3-286	3"-CH-1401-34	PIPE TO ELBOW
3.3-290	ELBOW	BASE METAL
3.3-285	3"-CH-1401-35	ELBOW TO PIPE
3.3-291	PIPE	BASE METAL
3.3-284	3"-CH-1401-36	PIPE TO ELBOW
3.3-289	ELBOW	BASE METAL
3.3-283	3"-CH-1401-37	ELBOW TO PIPE
3.3-342	2"-RC-1410-33	VLV. 4-313 TO PIPE
3.3-341	2"-RC-1410-34	PIPE TO RED. TEE

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APPENDIX K
ULTRASONIC EXAMINATION DOCUMENTATION LOG

DATA SHEET NUMBER	IDENTIFICATION NUMBER	DESCRIPTION
5.4-25	3"-CH-1401-32	PIPE TO ELBOW
	ELBOW	BASE METAL
	3"-CH-1401-33	ELBOW TO PIPE
	PIPE	BASE METAL
	3"-CH-1401-34	PIPE TO ELBOW
	ELBOW	BASE METAL
	3"-CH-1401-35	ELBOW TO PIPE
	PIPE	BASE METAL
	3"-CH-1401-36	PIPE TO ELBOW
	ELBOW	BASE METAL
	3"-CH-1401-37	ELBOW TO PIPE

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APPENDIX K
ULTRASONIC EXAMINATION DOCUMENTATION LOG

DATA SHEET NUMBER	IDENTIFICATION NUMBER	DESCRIPTION
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5.19-1	2"-RC-1410-33	VLV. 4-313 TO PIPE
	2"-RC-1410-34	PIPE TO RED. TEE

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**APPENDIX L
ENGINEERING RECOMMENDATIONS**

DOCUMENT NO. SE&PT-SSAD-7814

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**APPENDIX M
NRC BULLETIN NO. 88-08**

**NRC BULLETIN NO. 88-08
THERMAL STRESSES IN PIPING CONNECTED
TO REACTOR COOLANT SYSTEMS**

ATTACHMENT 2

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
NRC Bulletin 88-08
Thermal Stresses in Piping
Connected to Reactor Coolant Systems

ITEM 3: Plan and implement a program to provide continuing assurance that unisolable sections of all piping connected to the RCS will not be subjected to combined cyclic and static thermal and other stresses that could cause fatigue failure during the remaining life of the unit.

Response:

FPL identified two flowpaths where the concern profile of NRC Bulletin 88-08 is applicable:

- o Charging pumps to pressurizer auxiliary spray
- o Charging pumps to C Hot Leg.

1. Flow Evaluation and Comparison

A detailed review of the unisolable piping in the two inch auxiliary spray and the three inch charging to the C Hot Leg flowpaths, shows that thermal transients from in-leakage are unlikely to occur for the following reasons:

- a) The differential pressure across isolation valves 310B and 311 is approximately 50 psi, compared to approximately 320 psi across the leakage valve of NRC Bulletin 88-08.
- b) The auxiliary spray and charging flow is delivered, through the regenerative heat exchanger, at 493°F for steady state conditions. For sufficiently large leakage flow (approximately .5 gpm or more), the flow is expected to remain hot. Therefore, stratification will not significantly occur as the difference in temperatures between the two fluids will be relatively small.
- c) The piping configurations at Turkey Point Units 3 and 4 for the two flowpaths under consideration tend to minimize the potential for pipe failure related to the phenomenon described in NRC Bulletin 88-08. For the three inch charging line this is due to the upward routing of the line into the RCS, as opposed to the

Farley and Tihange piping routing described in the bulletin which are routed downward towards the RCS. In addition, flow stratification would be less severe in the smaller lines (two and three inch vs. the six inch pipe reported in the bulletin) due to larger heat transfer around the pipe circumference.

In an effort to further substantiate the above, FPL contracted with Westinghouse to perform a hydrodynamic test of actual plant specific geometries. This test is described below.

2. Hydrodynamic Testing

Westinghouse performed hydrodynamic tests in order to assess the potential for the concerns of NRC Bulletin 88-08 at Turkey Point Units 3 and 4. The hydrodynamic test simulated the thermal-hydraulic conditions in the flowpaths under review at Turkey Point Units 3 and 4. The test utilized clear piping, dyed water, and actual plant dimensions. Temperature differences were simulated by specific gravity variations in water (hot fluid) and sodium bicarbonate (cold fluid).

The geometries for both the two inch and three inch flowpaths were modeled.

The results of the flow tests show that although stratification can occur, no mixing mechanism is present for the configuration at Turkey Point. Hence, there is an absence of thermal cycling. Without thermal cycling, pipe failure is not a concern.

3. Inspections and Operating Experience

- a) The recently completed NDE, showed no indication of cracks in the most susceptible locations of the unisolable sections of the two inch auxiliary spray and three inch charging lines.
- b) Turkey Point Units 3 and 4 each have over fifteen years of operating experience to date and no failures of the type described in NRC Bulletin 88-08 have occurred.
- c) NDE will also be completed during the next refueling outage for each unit to provide additional support to the conclusions reached by the hydrodynamic testing.

CONCLUSION

The applicable flowpaths were examined and the locations most susceptible to in-leakage induced thermal fatigue were identified.

NDE was performed in these areas and no cracks were discovered. The NDE technique utilized accounts for the observations and enhancements implemented at Farley. Volumetric examinations were done on both the two inch and three inch piping sections. A special calibration specimen and procedure were developed to implement the volumetric NDE of the two inch piping section.

Based on the flow evaluation performed, thermal transients from in-leakage are unlikely to occur even if the globe valve leaks. This is based on the fact that a mixing mechanism to cause thermal cycling does not exist as indicated by the results of the hydrodynamic testing.

The flow evaluation conclusions, in conjunction with the NDE performed on the subject flowpaths, provide assurance that the concerns of NRC Bulletin 88-08 are satisfactorily addressed. No further actions are required, but NDE will be performed during the next refueling outage for each unit to provide additional support to the conclusions reached by the hydrodynamic testing.