UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-250/88-33 and 50-251/88-33

Licensee: Florida Power and Light Company
9250 West Flagler Street
Miami, FL 33102

Docket Nos.: 50-250 and 50-251 License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point 3 and 4

Inspection Conducted: October 31 - November 4, 1988

Inspector: R. W. Newsome 11-21-88
R. W. Newsome Date Signed

Approved by: 11-22-88
J. J. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection was conducted onsite in the area of Inservice Inspection (ISI) including a review of the ISI Plan for this outage for Unit 4, review of NDE procedures including Eddy Current and Visual examination procedures, review of personnel qualifications, review of material and equipment certification records, observation of in-process ultrasonic examinations and in-process Eddy Current data collection and data evaluation activities, and a sample of completed examination records were reviewed.

Results: In the areas inspected, violations or deviations were not identified. All areas inspected appeared to be adequately controlled and managed. Licensee ISI personnel were very receptive to any NRC suggestions. The training and qualification of NDE personnel conducting ultrasonic examinations is superior to this type program normally encountered at other nuclear facilities. This is evidenced by the licensee's requirement that all ultrasonic examiners take and pass a practical examination for pipe weld examination prior to being allowed to conduct examinations on pipe welds at the facility.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*E. Anderson, ISI Engineer
*J. Arias, Jr., Regulation and Compliance Supervisor
*R. Atkisson, Juno Beach Staff
*W. Bladow, QA Superintendent
*M. Blew, ISI Coordinator
G. Boyer, Plant Support/Juno Beach Staff
*F. Carr, NDE Supervisor/Juno Beach Staff
*J. Cross, Plant Manager
*R. Earl, QC Supervisor
*K. Gross, Compliance Engineer
*S. Hale, Engineering Manager
*J. Kappe, Maintenance Superintendent
*E. Lyons, Compliance Engineer
*R. Mende, Operations Supervisor
*L. Pearle Operations Superintendent
*F. Southworth, Technical Supervisor

Other licensee employees contacted during this inspection included engineers, mechanics, security force members, technicians, and administrative personnel.

NRC Resident Inspectors

*R. Butcher, Senior Resident Inspector
*T. McElhinney, Resident Inspector

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Inservice Inspection (ISI)

The inspector examined documents, activities, and records, as indicated below, to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements, and licensee commitments. The applicable code for ISI is the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, Section XI 1980 edition with addenda through winter 1981. Nondestructive examinations (NDE) are being conducted by EBASCO with visual examinations being conducted by Southwest Research Institute (SwRI). The Eddy Current examinations of the Unit 4 Steam Generator Tubing utilizes DEC-TECH, Zetec, NDE-Technology, and Westinghouse (W) personnel for the manual eddy current data acquisition and manual eddy current data evaluation activities. The licensee is utilizing an automated eddy current data evaluation system to perform a secondary evaluation of all tube examination data.

a. ISI Program Review, Unit 4 (73051)

The inspector reviewed the below listed documents relating to the ISI program to determine whether the plan had been approved by the licensee and to assure that procedures and plans had been established (written, reviewed, approved and issued) to control and accomplish the following applicable activities: organizational structure including qualifications, training, responsibilities, and duties of personnel responsible for ISI; audits including procedures, frequency, and qualification of personnel; general Quality Assurance (QA), requirements including examination report, deviations from previously established program, material certifications and identification of components to be covered; work and inspection procedures; control of processes including suitably controlled work conditions, special methods, and use of qualified personnel; corrective action; document control; control of examination equipment; quality records including documentation of indications and NDE findings, review of documentation, provisions to assure legibility and retrievability, and corrective action; scope of the inspection including description of areas to be examined, examination category, method of inspection, extent of examinations, and justification for any exception; definition of inspection interval and extent of examination; qualification of NDE personnel; and controls of generation, approval, custody, storage and maintenance of NDE records.

- Turkey Point Nuclear Plant Unit 4 Inservice Inspection Period Schedule Second Period, Second Interval Dated October 15, 1988, Revision 3

- JNS-MCI.QI 2.14 (R3) (Sections 1 thru 18) Nuclear Energy Manual for ASME Section XI Inservice Inspection of Nuclear Power Plant Components

b. Review of NDE Procedures, Units 3 and 4 (73052)

(1) The inspector reviewed the procedures indicated below to determine whether the procedures were consistent with regulatory requirements and licensee commitments. The procedures were also reviewed in the areas of procedure approval, requirements for qualification of NDE personnel, and compilation of required records; and if applicable, division of responsibility between the licensee and contractor personnel if contractor personnel are involved in the ISI effort.

- NDE 1.3 (R1) FCN-A Eddy Current Examination of Non Ferromagnetic Tubing with Multi-Frequency Techniques MIZ-18

- Cal 2 (R1) Calibration of Magnetic Particle Equipment

- NDE 2.2 (R2) Magnetic Particle Examination
- NDE 3.3 (R1) Liquid Penetrant Examination Solvent Removable Visible Dye Technique
- NDE 5.1 (R5) Ultrasonic Examination of Pressure Vessel Welds, Except Reactor Vessels
- NDE 5.5 (R2) Ultrasonic Examination of Primary Coolant Piping Welds (PTP 3&4)
- NDE 5.2 (R4) Ultrasonic Examination of Ferritic Piping Welds
- NDE 5.3 (R2) Ultrasonic Examination of Clad Carbon Steel Piping
- NDE 5.4 (R7) Ultrasonic Examination of Austenitic Piping Welds
- NDE 5.6 (R2) Ultrasonic Examination of Integrally Welded Attachments to Piping
- Turkey Point Unit 3 & 4 Steam Generator ECT Data Analysis Handbook
- NDE 4.1 (R2) (with FC-24) Visual Examination VT-1 Welds/Bolting/ Bushing/Washers
- NDE 4.3 (R1) Visual Examination VT-3/VT-4

(2) The inspector reviewed the Ultrasonic (UT) procedures to ascertain whether they had been reviewed and approved in accordance with the licensee's established QA procedures. The procedures were also reviewed for technical adequacy and conformance with ASME, Section V, Article 5 and other license commitments/requirements in the following areas: type of apparatus used; extent of coverage of weldment; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method for demonstrating penetration; limits for evaluating and recording indications; recording significant indications; and, acceptance limits.

(3) The inspector reviewed the Eddy Current (EC) procedures for technical content relative to: multichannel examination unit, multichannel examination indication equipment is specified, examination sensitivity, material permeability, method of examination, method of calibration and calibration sequence, and acceptance criteria.

(4) The inspector reviewed the Liquid Penetrant (PT) procedure to ascertain whether it had been reviewed and approved in accordance with the licensee's established QA procedures. The procedure was also reviewed for technical adequacy and conformance with ASME, Section V, Article 6, and other licensee commitments/requirements in the following areas: specified method; penetrant material identification; penetrant materials analyzed for sulfur; penetrant materials analyzed for total halogens; acceptable pre-examination surface; drying time; method of penetrant application; surface temperature; solvent removal; surface drying prior to developing; type of developer; examination technique; evaluation techniques; and, procedure requalification.

(5) The inspector reviewed the Magnetic Particle (MT) procedures to ascertain whether they had been reviewed and approved in accordance with the licensee's established QA procedures. The procedures were reviewed for technical adequacy and for conformance with ASME Section V, Article 7, and other licensee commitments/requirements in the following areas: examination methods; contrast of dry powder particle color with background; surface temperature; suspension medium and surface temperature for wet particles; viewing conditions; examination overlap and directions; pole or prod spacing; current or lifting power (yoke); and, acceptance criteria.

(6) The inspector reviewed the Visual (VT) examination procedures to determine whether they contained sufficient instructions to assure that the following parameters were specified and controlled within the limits permitted by the applicable code, standard, or any additional specification requirement: method - direct visual, remote visual or translucent visual; application - hydrostatic testing, fabrication procedure, visual examination of welds, leak testing, etc.; how visual examination is to be performed, type of surface condition available; method or implemented used for surface preparation, if any; whether direct or remote viewing is used; sequence of performing examination, when applicable; data to be tabulated, if any; acceptance criteria is specified and consistent with the applicable code section or controlling specification; and, report form completion.

c. Observation of Work and Work Activities, Unit 4 (73753)

The inspector observed in-process examination activities and reviewed certification records of equipment, materials, and NDE personnel which had been and will be utilized during the required ISI examinations during this outage. The observations and reviews conducted by the inspector are documented below.

(1) The inspector observed calibration activities and the inprocess ultrasonic examinations being conducted on the welds indicated below. The observations were compared with the applicable procedures and the Code in the following areas: availability of and compliance with approved Nondestructive Examination (NDE) procedure; use of knowledgeable NDE personnel; use of NDE personnel qualified to the proper level; type of apparatus used; extent of coverage of weldment; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method of demonstrating penetration; limits of evaluating and recording indications; recording significant indications; and, acceptance limits.

Drawing No.	Weld ID
004-A10	12"-RC-1401-4
004-A32	10"SI-1402-1
004-B56	14"-FWB-2402-11
004-B56	14"-FWB-2402-8
004-B56	14"-FWB-2402-2
004-B55	14"-FWA-2401-1
004-B52	6"-DBA-2404-FW-45
004-B53	6"-DBD-2405-FW-42B

The inspector conducted an ultrasonic verification examination, using EBASCO equipment, on portions of the below listed welds. The examinations were performed in order to evaluate the technical adequacy of the ultrasonic examination procedure being used by the licensee's contractor to perform ultrasonic examinations and to assess the validity of the information being reported by the ultrasonic examiners.

Drawing No.	Weld ID
004-B53	6"-DBD-2405-FW-42B
004-B56	14"-FWB-2402-11
004-A32	10"-SI-1402-1

The verification ultrasonic examinations conducted by the inspector indicated that the procedure being used to conduct the examinations is adequate and that the information being reported by the ultrasonic examiners compared favorably with the verification examinations.

The following listed ultrasonic equipment and materials certification records were reviewed:

Ultrasonic Instruments

Manufacturer/Model		Serial No.
Sonic	MK-1	06446E
K/B	USK-7B	31451-907
K/B	USK-7S	31459-525
K/B	USL-48	213051

The inspector reviewed spectrum analysis data for ultrasonic transducers with Serial Numbers C14455, E24449, F03233, G16577, M07404, 40328, and 57A3053.

Ultrasonic Couplant Batch Numbers 8661, 8764, and 8330.

Ultrasonic Calibration Blocks UT-26, UT-29
UT-37, UT-41, UT-53

(2) The inspector reviewed the below listed liquid penetrant materials certification records to ascertain if the sulfur and halogen content of the material was within acceptable content limits.

Materials	Batch Number
Liquid Penetrant	87L071
Cleaner/Remover	86K029 83F015 87M025
Developer	88E035

(3) The inspector reviewed documentation indicating that a ten pound lift test had been performed on magnetic particle AC yokes 811 and 8950.

(4) The inspector observed the Steam Generator tubing Eddy Current examination activities indicated below. The observations were compared with the applicable procedures and the Code in the following areas: method for maximum sensitivity is applied; method for determining material permeability; method of examination has been recorded; examination equipment has been calibrated in accordance with the applicable performance reference; amplitude and phase has been calibrated with the proper calibration reference and is recalibrated at predetermined frequency; required coverage of steam generator tubes occurs during the examination; acceptance criteria is specified or referenced and is consistent with the procedure or the ASME Code; and, results are consistent with acceptance criteria.

(a) In-process tube data acquisition, including calibration confirmation and tube location verifications were observed for the following steam generator tubes:

SG-C Tube ID		SG-B Tube ID	
Row	Column	Row	Column
38	53	5	73
37	53	4	73
36	53	3	73
35	53	4	74
34	53	6	74
33	53	7	74
32	53	8	74
15	65	9	74
14	65	10	74
12	65	11	74
10	65	17	86
3	66	18	86
10	77	19	86
9	77	20	86
8	77	23	86
3	77	21	87
3	78	20	87
4	78		
5	78		

(b) In-process Eddy Current inspection data evaluation, including calibration confirmation, was observed for the below listed steam generator tubes. Data analysis is accomplished by first having the data evaluated manually by qualified data analysts with this analysis designated as the Primary evaluation. The data is then evaluated by an automated data analysis system, Computerized Data Screening (CDS), with this evaluation designated as the Secondary evaluation. If any differences are noted between the Primary and Secondary evaluations a resolution evaluation is conducted by an independent manual examination of the conflicting evaluations. A qualified analyst is assigned the task of resolving the differences between the Primary and Secondary evaluations and is designated as the Resolution analyst.

PRIMARY ANALYSIS

SG-C		SG-B	
Row	Column	Row	Column
3	59	27	68
3	60	28	68
5	60	29	68
6	60	30	68

(cont'd)

PRIMARY ANALYSIS

SG-C Row	SG-C Column	SG-B Row	SG-B Column
10	60	31	68
24	60	40	67
25	60	31	67
26	60	20	80
32	60	33	78
33	60	32	79
35	60	27	81
29	72	26	81
30	72	25	81

SECONDARY ANALYSIS

SG-C Row	SG-C Column	SG-B Row	SG-B Column
29	72	35	68
28	72	33	68
27	72	32	68
25	59	8	68
24	59	9	68
23	59	10	68
22	59	11	68
21	59	12	68
20	59	13	68
19	59	14	68
32	72	24	81
31	72	23	81
30	72		

RESOLUTIONS

SG-C Row	SG-C Column	SG-B Row	SG-B Column
13	56	12	76
24	56	34	74
20	68	9	75
		13	75
		23	75
		31	75

(c) During the observations of the analysis activities for the above listed tubes, the inspector jointly evaluated a sample of the data with the Primary and Resolution analysts. No significant discrepancies were noted.

(d) Certification records for Eddy Current calibration standards with Serial Numbers Z3455 and Z1544 were reviewed for material type, correct fabrication, and artificial flaw location/size.

(5) The inspector reviewed the qualification documentation for the below listed examiners in the following areas: employer's name; person certified; activity qualified to perform; effective period of certification; signature of employer's designated representative; basis used for certification; and annual visual acuity, color vision examination, and periodic recertification.

		Method-Level								
Company	Examiner	UT	PT	MT	EC	VT	- 1	- 2	- 3	- 4
W	BP	-	-	-	III	-				
DEC-T	DC	-	-	-	III	-				
ZETEC	JD	-	-	-	IIA	-				
ZETEC	GH	-	-	-	IIA	-				
ZETEC	DD	-	-	-	II	-				
NDE-T	TB	-	-	-	III	-				
NDE-T	MM	-	-	-	IIA	-				
NDE-T	JS	-	-	-	IIA	-				
SWRI	JJ	I	I	I	-		I	I	I	I
SWRI	LS	II	II	II	-		II	II	II	II
EBASCO	RB	III	II	-	-		III	III	III	III
EBASCO	RD	II	III	III	-		II	-	II	II
EBASCO	GI	-	I	-	-	-				
EBASCO	JN	I	II	II	-		I	-	-	-
EBASCO	CD	II	II	II	-	-				

d. Inservice Inspection, Data Review and Evaluation, Unit 4 (73755)

(1) Records of completed nondestructive examinations were selected and reviewed to ascertain whether: the method(s), technique and extent of the examination complied with the ISI plan and applicable NDE procedures; findings were properly recorded and evaluated by qualified personnel; programmatic deviations were recorded as required; personnel, instruments, calibration blocks and NDE material (penetrants, couplants) were designated. Records selected for this review are listed below.

Drawing No.	Weld/Item ID	NDE Method
004-B50	6"-BDB-2402-16	MT
004-B50	6"-BDB-2402-18	MT
004-B50	6"-BDB-2402-19	MT
004-B55	18"-FWA-2401-FW-1A	MT
004-B55	18"-FWA-2401-A-1	MT

(cont'd)	Drawing No.	Weld/Item ID	NDE Method
	004-B42	26"-MSC-2406-2	MT
	004-B42	26"-MSC-2403-9LS	MT
	004-B56	14"-FWB-2402-2	MT
	004-B10	10"-RHR-2403-5	PT
	004-B25	8"-SI-2405-1	PT
	004-B2/64	14"-RHR-2403-10	PT
	004-B9/071	8"-RHR-2404-1	PT
	004-B26/088	8"-SI-2406-FW1	PT
	004-B26/088	8"-SI-2406-11	PT
	004-B8/070	10"-RHR-2401-13	PT
	004-A4/010	31"-RCS-1402-6	PT
	004-A4/010	31"-RCS-1402-5	PT
	004-B16/078	10"-SI-2401-1A	PT
	004-A30/036	14"-RHR-1401-5	PT
	004-B7/69	12"-RHR-2402-27	PT
	004-B18/80	10"-SI-2403-4	PT
	004-B1/63	14"-RHR-2401-1LS	PT
	004-A10/016	12"-RC-1401-4	PT
	004-B15	4-SIH-48	VT-3
	004-B20	4-SR-616	VT-3/4
	004-C51	H-190-01	VT-3
	004-C41	H-323-03	VT-3
	004-C50	J	VT-3
	004-C38	SR-667	VT-3/4
	004-B25	4-218-A	VT-3
	004-A33	8073-H-810-01	VT-3
	004-A45	27-773-002	VT-3
	004-B38/100	26"-MSB-2402-7	UT
	004-B38/100	31"-MSB-2402-1A	UT
	004-B19	10"-SI-2407-4	UT
	004-B19	10"-SI-2407-5	UT
	004-B27	8"-SI-2407-1	UT
	004-B27	8"-SI-2407-2	UT
	004-B27/89	8"-SI-2407-1	UT
	004-B27/89	8"-SI-2407-10A	UT
	004-V15	4-LDHX-1	UT
	004-B24	8"-SI-2404-2	UT
	004-A33	8"-RHR-1404-2	UT
	004-B18	10"-SI-2403-1A	UT
	004-B18	10"-SI-2403-4	UT
	004-A2	29"-RCS-1404-4	UT
	004-A5	29"-RCS-1405-4	UT
	004-A1/7	31"-RCS-1401-8	UT
	004-A6/012	27.5"-RCS-1406-BC-18	UT
	004-A4/010	31"-RCS-1402-5	UT
	004-A4/100	31"-RCS-1402-6	UT

(2) While reviewing the completed ultrasonic examination records for the reactor coolant system welds that require examinations from the fitting side (elbows, valves, etc.), the NRC inspector noted that the calibration sheets indicated that the inside diameter (I.D.) notch was not discernable on the calibration block. The calibration block used for this examination is designated as UT-26 and is manufactured from SA351 Gr. CF8M, Centrifugally Cast Stainless Steel material 3" in thickness, and is inherently difficult to penetrate ultrasonically due to the materials large grain structure and grain orientation. The block is constructed so that it has a .300" deep, square groove, I.D. notch, and 3 side drilled holes, 3/16" in diameter, at depths of 1/4, 1/2, and 3/4 material thickness. The side drilled holes were easily detectable, according to the calibration sheets, but without the detection of the I.D. notch there is no absolute assurance that the I.D. of these welds are being examined from the fitting side of the welds. The NRC inspector additionally noted that the ultrasonic equipment used to accomplish these examinations was not the same as what he has observed at other facilities where detection of the I.D. notch in this type material has been possible.

The NRC inspector discussed his concern with knowledgeable ISI personnel with regard to detection of the I.D. notch in the calibration block and whether ultrasonic equipment similar to that used at other facilities was available at this facility. The ISI personnel indicated that they had modified one of their ultrasonic instruments to include a 600 volt pulser which is the same as what has been used at other facilities to inspect this type material. The NRC inspector requested that the modified ultrasonic instrument be used on calibration block UT-26 to see if the I.D. notch could be identified with this instrument.

The NRC inspector and two Ultrasonic level III qualified ISI personnel calibrated the modified ultrasonic instrument on block, UT-26 using the 3 side drilled holes as reflectors but the I.D. notch was not discernable from the general back ground signals caused by the grain structure of the calibration block. Several attempts were made to positively identify the I.D. notch, including excessive gain settings and various other techniques, but none were conclusive even though a signal could be seen, on occasion, at the proper location on the CRT of the instrument.

The NRC inspector concluded that this particular calibration block, is much more difficult to penetrate ultrasonically than similar blocks at other facilities and suggested that a new notch, placed at a different location in the block, might yield better ultrasonic identification of the I.D. notch if the current location of the notch is in an unusually grainy portion of this particular block. The NRC inspector also suggested that obtaining a new calibration block, that still meets the requirements of the ASME code, might be pursued. At this point the NRC

inspector was informed that the plant had been granted relief by NRR to allow the use of this calibration block because the block has been used since the plant was built and its continued use would tend to provide consistent results. The ISI personnel indicated that they would consider the above suggestions and in addition were continuing to seek new ultrasonic technology advancements that might enhance the examination of this type material.

The NRC inspector then interviewed the qualified ultrasonic examiner that had conducted the examinations on these welds. This interview was conducted in order to determine if it was possible to determine if the ultra-sound was penetrating to the I.D. of the item during the examinations. The UT examiner indicated that low amplitude signals, well below recording level at the I.D. position of these welds, had been observed during the examinations and this would tend to indicate that at least some sound was penetrating to the I.D. of the fittings.

Because there is an adequate ultrasonic examination of these welds conducted from the pipes forged stainless steel base material side, and since forged material is relatively easy to examine ultrasonically, and an examination from at least one direction is assured, which is the case in many instances where an items geometric configuration will not permit examinations from both sides of a weld, and because of the ultrasonic examiners favorable observations during the actual examinations, the NRC inspector has concluded that in all probability an adequate inspection of these pipe to fitting welds has occurred even though the I.D. notch on calibration block UT-26 could not be verified during the ultrasonic equipment calibration process.

(3) Eddy Current Examination of Steam Generator Tubing

(a) The inspector reviewed a sample of the associated records of the steam generator tubing eddy current examinations. The reviews were compared with the applicable procedures and the code in the following areas: the multichannel eddy current examination equipment has been identified; material permeability has been recoded; method of examination has been recorded; and, results are consistent with acceptance criteria.

(b) By the conclusion of the NRC inspection all EC examinations had not been completed. The final examination results will be reported to the NRC in accordance with the TECH SPEC requirements. The status for the Unit 4 steam generators is listed below. Examination of steam generator A had not started.

	SG-B	SG-C
Tubes to be examined	3214	3219
Tubes Completed	2830	2690

In the areas inspected, violations or deviations were not identified.

3. Exit Interview

The inspection scope and results were summarized on November 4, 1988, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

4. Acronyms and Initialisms

AC	-	Alternating Current
ASME	-	American Society of Mechanical Engineers
B&PV	-	Boiler and Pressure Vessel
CDS	-	Computerized Data Screening
CRT	-	Cathode Ray Tube
DAC	-	Distance Amplitude Curve
DEC-T	-	DEC-TECH
DPR	-	Demonstration Power Reactor
EC	-	Eddy Current
FCN	-	Field Change Notice
ID	-	Identification
I.D.	-	Inside diameter
ISI	-	Inservice inspection
MT	-	Magnetic particle
NDE	-	Nondestructive Examination
NDE-T	-	NDE Technology
No.	-	Number
NRC	-	Nuclear Regulatory Commission
NRR	-	Nuclear Reactor Regulation
PT	-	Liquid penetrant
QA	-	Quality Assurance
R	-	Revision
SG	-	Steam Generator
SwRI	-	Southwest Research Institute
UT	-	Ultrasonic
VT	-	Visual
W	-	Westinghouse Electric Corporation