



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

Report Nos.: 50-335/89-05 and 50-389/89-05

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

Docket Nos.: 50-335 and 50-389

License Nos.: DPR-67 and NPF-16

Facility Name: St. Lucie 1 and 2

Inspection Conducted: February 14, 15, 21-24, and March 1-3, 1989

Inspector: *Hick Economos* 4/3/89
 N. Economos Date Signed

Approved by: *J. J. Blake* 4/3/89
 J. J. Blake, Chief Date Signed
 Materials and Processes Section
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope: This routine, announced inspection was in the areas of Unit-2 refueling outages inservice inspection (ISI) activities including eddy-current (EC), of steam generators tubes, ultrasonic examination (UT) of reactor pressure vessel (RPV) welds and resistance temperature detector (RTD) instrument nozzle replacement, coordinated and supervised NDE VAN activities conducted between February 21 and March 3, 1989. Administrative and work procedure used to control the activities inspected were consistent with code and regulatory requirements. Work was being performed by personnel sufficiently trained for their assigned tasks. Management was actively involved in the administration of the ISI and modification activities. The licensee appeared to be adequately staffed to handled the workload of this outage.

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

Two new inspector followup items were identified relative to personnel policy and procedural matters, paragraph 3.a and 3.b

8904180166 890403
 PDR ADDCK 050003335
 Q PNU

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *G. Alexander, ISI Specialist
- R. Atkinson, Backfit Project Leader
- *G. Boissy, Plant Manager
- G. Boyers, EC Coordinator
- *F. Carr, NDE Supervisor
- K. Getty, Asst. ISI Coordinator
- K. Hughes, Sr., Civil Engineer
- *S. Sienkiewics, ISI Coordinator

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

Other Organizations

Combustion Engineering, Nuclear Power Systems

- J. D. Ford, Manager, Field Quality Operations
- P. Reynolds, Task Manager
- J. F. Sikorski, Senior QA Engineer

Southwest Research Institute (SwRI)

- R. Fougerousse, Project Manager
- F. C. H. Mengden, III, Field Team Supervisor

NRC Resident Inspectors

- *M. Scott, Resident Inspector
- S. Elrod, Senior Resident Inspector

*Attended exit interview

2. Independent Verification of License Nondestructive Examination by NRC's NDE-Van Personnel

In a continuing effort to monitor, by independent verification, licensee nondestructive examination (NDE) programs, the NRC maintains a vehicle (van), equipped with NDE instruments and materials, which it uses to carry out this objective. St. Lucie was selected for independent measurement verification during this refueling outage. The inspector was assigned the responsibility for coordinating and supervising this activity which took place between February 21 and March 3, 1989. The work performed and the results achieved are documented in Report 50-335,-389/89-03.

3. Observation of ISI Work Activities Unit 2 (73753)

a. Eddy Current (EC) Examination of Steam Generator Tubes

ISI activities during the outage included eddy current examination of "A" and "B" Steam Generators (S/Gs). ASME Code Section XI (80W80) with Code Case 401-1, Eddy Current Examination Section XI Division 1, were identified as the applicable code and regulatory requirements. The above code case, permits digitized collection and storage of eddy current test data and periodic calibration of the analog elements of the digital collection and storage equipment. Data acquisition was being performed by Combustion Engineering (CE) under contract with the licensee. Data Analysis was performed by Zetec, CE and licensee personnel. Approved FPL procedure NDE 1.3 Revision 2, "Eddy Current Examination of non Ferromagnetic Tubing with Multi Frequency Techniques MIZ-18," and related references were governing site documents for this work effort. Examination of S/G tubes was being performed using a multifrequency technique in conjunction with the computerized MIZ-18 Examination System to analyze for tube integrity. Discussions with the licensee's cognizant engineer disclosed that as of March 1, 1989 examination results were as follows.

	<u>S/G "A"</u>	<u>S/G "B"</u>
Tubes Examined	8427	8417
Tubes Analyzed/ Evaluated	8427	8417
Tubes with 40%-49% through wall degradation	6	3
Tubes with Loose Part Indication	1	-
Tubes with 50%-59% through wall degradation		1

At this time the inspector selected tape cassette AC064, S/G "A" and BC103 S/G "B" for review, to ascertain equipment operation, examination technique and documentation of results. In addition the inspector reviewed system calibrations performed at the beginning and end of these tapes using calibration standards PSL-1-2 and PSL-1-4 respectively. Other areas reviewed included probe type and identification, probe travel speed during examination, tube location verification and fixture location verification. Quality records reviewed for completeness and accuracy were as follows:

Z-QA-101 Revision 6.AI-1

Zetec, Personnel
Qualification and
Certification Procedure

JNS-QI9.3 Revision 3

FPL, NDE Personnel
Qualification and
Certification

Eddy Current Calibration Standard

S/N - PSL-1-2	3/4 "OD x 0.048" wall, Inconel-600
- PSL-1-4	3/4 "OD x 0.048" wall, Inconel-600

Eddy Current Equipment/Instruments Calibration Records

MIZ-18A RDAU	S/N - 046	4-19-88
	S/N - 124	5-18-88
	S/N - 130	5-18-88
	S/N - 137	5-18-88

Personnel Qualification Records - EC

FPL

G. L. Boyers	Level II, Analyst
W. K. Heise	Level II, Analyst
W. K. Jordan	Level II, Analyst
A. Montalbano Jr.	Level II, Analyst
J. C. Johnson	Level II, Data Acquisition, Bobbin Coil
E. Lake	Level II, Data Acquisition, Bobbin Coil

Combustion Engineer

R. Hastings	Level I, Data Acquisition
C. F. Despaux	Level I, Data Acquisition
D. I. Blazewski	Level I, Data Acquisition
R. Tobin	Level II, Data Acquisition

Zetec

D. J. Calendar	Level III A Data Analyst
W. A. Gray	Level III A Data Analyst

Within these areas, the inspector noted that procedure Z-QA-101 Revision 6 in the Zetec QA Manual, required Zetec employees to submit to a psychological examination once every ten years. Contrary to this requirement, the inspector noted that 1975 was indicated as the last date when one of the examiners had submitted to a psychological test. This discrepancy was communicated to the licensee who contacted Zetec for an explanation. Zetec informed the licensee that the subject procedure had been revised and the psychological examination is now performed only at the time of employment. The licensee stated that Zetec was sending a copy of the revised procedure for incorporation in Zetec's QA Manual on file. The inspector identified an inspector followup item (IFI) to ensure that an adequate review of the revised

procedure is performed during a subsequent inspection. This item is documented as IFI 335/89-05-01 Update Zetec QA Procedure Z-QA-101 Rev. 1 to the Latest Revision.

b. Ultrasonic Examination of Reactor Pressure Vessel (RPV) Welds with Mechanical Remote Control Equipment

At the time of this inspection the licensee had defueled the RPV and was in the processes of performing the ten (10) year, ultrasonic examination of RPV and nozzle welds as required by applicable parts of ASME Code Section XI and V, and regulatory requirements, (i.e., Regulatory Guide 1.150, Rev. 1, Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations). The examination was being performed by SwRI using their procedures which had been reviewed and approved by the licensee. SwRI procedure reviewed for code/regulatory compliance and technical contents, including basic calibration block reflector location/size i.e. side-drilled holes, notches, frequency of system calibration, recording criteria, examination areas including near surface, scan overlaps, scanning speed, recording, sizing and evaluation of indication. The procedures reviewed were as follows:

- ° SwRI-NDT-700-8 Rev. 8 Mechanized Ultrasonic Examination of Ferritic Pressure Piping Welds
- ° SwRI-NDT-700-11 Rev. 11 Mechanized Ultrasonic Examination of Ferritic Vessel greater than 2" in Thickness

In order to facilitate the RPV examination, SwRI established two bases of operation/stations; one situated outside containment, staffed with a level II examiner(s) to observe real-time scanning results on UT instruments and, another station - a console center, on the 62 foot Elevation near the pressurizer missile shield. The console center was staffed with an operator whose function was to index the computer which runs the mechanized UT equipment and to take care of problems as they occur through manual manipulation of the equipment.

On February 23, 1989 the inspector entered the containment building to observe ISI and modification activities of interest, including the ongoing UT examination of the RPV. Upon approaching the console center, the inspector observed that the operator was experiencing some difficulty staying awake at a time when the mechanized tool was scanning the RPV inlet nozzle at the 60° azimuth, otherwise identified as scan number 176 on the computer program. The inspector stood by the console and continued to observe the scan to its completion. At that time the operator indexed the computer to run scan number 178 identified as inlet nozzle at the 240° azimuth. The inspector approached the operator, obtained some scan related data, noted his name and left the area after watching scan number 178 for a

short period of time. Following this observation, the inspector contacted the licensee's ISI coordinator and communicated what had been observed. Following a brief discussion, he (FPL's ISI coordinator) summoned the SwRI project manager and informed him of the aforementioned incident. During this meeting the inspector ascertained that 1) FPL Policy Statement to all site personnel, dated June 18, 1987 prohibits individuals from sleeping within the plant boundaries at any time, including break and lunch times, 2) SwRI's work schedule provided for two twelve (12) hour shifts with one hour overlap for a total of thirteen (13) hours a day, seven days a week, 3) there were no provisions for scheduled breaks during working hours except for a 30 minute lunch break.

In discussing this incident with the aforementioned personnel, the inspector stated that based on these working conditions, (thermally hot work area) and the nature of the job (monotonous/tedious, heavily dressed with protective clothing) it was not surprising that the operator was experiencing these kind of difficulties. Therefore, the inspector stated, that the subject incident was not so much the fault of the operator but rather, a problem directly related to work policy practices established by SwRI management. The inspector stated that because the RPV examination was in progress, immediate short term corrective action would have to be implemented which should be followed by long term corrective measures that would prevent the recurrence of similar incidents. Accordingly, the licensee imposed a 15 minute break for every two hours of work to be taken by the console operator beginning with 17:30 hours on February 23, 1989. An Inter-Office correspondence issued by the ISI Coordinator dated February 24, 1989 formalizes this short term corrective action. This memo also stated that subject operator was no longer allowed on site and that this type of behavior was not tolerated at the St. Lucie Plant under any circumstances. Moreover, in response to the inspector's request for timely corrective action, the SwRI Field Supervisor issued a memorandum to the licensee's Plant Manager, dated March 2, 1989 describing the status of SwRI short and long term corrective action. This memorandum is provided as an attachment to this Report. This matter was discussed in detail with Regional Management on February 29, 1989 and it was decided that an inspector followup item be identified to keep track of the proposed short/long term corrective actions. This matter was identified as IFI 389/89-05-02, Corrective Actions to Prevent SwRI Staff From Inattentiveness on the Job.

On March 1, 1989 following the incident the inspector visited the SwRI trailer, situated outside the containment structure, to observe the on-going UT examination of the RPV. At the time of the visit, examination of the lower shell vertical weld at the 225° azimuth, identified as 101-142c was in progress. The weld was being scanned with four different transducers, 0°, 45°, 60° and 57°. The inspector discussed the examination with the level II examiner on

duty and reviewed calibration sheets 570042-46 and EDAS calibration sheet 139014. Laser disk 7A and video tape No. 40 were being used to document examination results.

Discussions with SWRI management relative to the progress of the inspection, disclosed that the examination of welds scheduled for this outage was about complete. Indications recorded on examination number 2, 4 and 5 - weld 101-151/bottom head dome to peel segment, were going to be re-examined for further analysis.

All other examinations have revealed either no recordable indications or indications resulting from geometry. Geometric indications recorded to date are as follows:

<u>Weld No.</u>	<u>Exam Angle(s)</u>	<u>Geometrical Reflector</u>
201-141	45/60	Outside surface taper
103-121A	45	Support lug @ 180
103-121D	45	Support lug @ 180
201-128A	45	Support lug @ 180
201-128D	45	Support lug @ 180
RC-121-6	45	Longseam surface crown

Within the areas inspected, no violations or deviations were identified.

3. Pressurizer and RCS Instrument Nozzle Replacement Unit-2, (37700B)

Six instrument nozzles at St. Lucie Unit 2, located in the reactor coolant system (RCS) were found to be susceptible to intergranular stress corrosion cracking (IGSCC). One of the nozzles is a level sensing nozzle on the lower shell of the pressurizer and the other five are resistance temperature detector (RTD) nozzles in the primary pipe hot legs. Because of the radioactive environment and the original internal weld design, the licensee/CE is replacing the pressurizer and hot leg RTD nozzles from the outside of the pressurizer/pipe. The new design allows the weld joint to be located on the outside surface and provides for a field welded inconel weld buildup pad to be fabricated at each of the pressurizer/pipe penetration sites. Following welding and stress relief, each pad is bored to permit the installation of an inconel sleeve, which is used protect the carbon steel vessel/pipe from the corrosive effects of berated water. The sleeve is expansion rolled into the vessel/pipe wall and seal welded to the vessel/pipe clad surface. To perform this work effort, the licensee contracted Combustion Engineering Power System Group, identified as the Contractor, under purchased order (PO), B88633-90059 dated July 12, 1988. Under this PO, all work was to be qualified and performed per ASME Code Section XI, 1980 Winter '80 addenda requirements. ASME Code Case-N-432, Repair Welding Using Automatic or Machine Gas Tungsten-ARC Welding (GTAW) Temperbead Technique was implemented for the weld buildup pad fabrication. Construction Code, ASME Section III (71W72) was identified as applicable to this work effort. Under the aforementioned PO, the contractor also

provided craft labor, training, supervision, and QC inspection. The entire activity was under the control of a licensee approved QA program.

Within these areas, the inspector reviewed the following documents.

FQD 89-09 Rev. 0	Nuclear QA Plan Rev. 0
QI 10-PR/PSL-8 Rev. 0	Control of Repairs and Replacement
EP-71372-100 Rev. 0	Procedure for Removal and Installation of one Replacement Pressurizer Nozzle
PCM 091-288 Supplement 0	RCS Hot Leg Nozzle Replacement
DSG-88-283	Site Engineering Package
PCM-090-288 Rev. 0	Pressurizer Nozzle Replacement
Weld Procedures and Specifications	
GTAA - 1.43-925 Rev. 0 10/11/88	
GTAA 3.43 - 926 Rev. 0 10/10/88	
GTA 43.43 - 904 Rev. 1 12/6/88	
GTAA 43.43 - 927 Rev. 1 1/13/88	
Replacement Material	
°Nozzles	PO# 48-82433, C15035-37300 Part Nos. 772-104-R1 through 5 Material: 2 3/4" d Bar Stock SB-166 Annealed to SB-166
°Nozzle Sleeves	PO# 49-82010 Code #J-8700-1, PC 144-01 Drug #D-9417-C088-0193 and Drug #D-9417-C088-144-2 Material: 1 1/2 d Bar Stock, Heat #NX5300HG
Consumables	
°Filler Metal	PO# 48-87004 Ht# NX3528D Size .035" diameter

Welders, whose qualifications were reviewed were identified by the following symbols, TCC9848, RP4532, TFG3992, RDV9349 DLJ0521 and LBL9016

In addition, the inspector reviewed, nozzle "A" field traveler No. #616599-001 Rev, 0 to ascertain whether in-process QC inspections including specified hold-points, nondestructive examinations, preheat, interpass temperature and post-weld thermal treatment had been performed and documented as required. In process welding was observed to ascertain

whether welding procedure parameters were being adhered to, approved materials were in use, welding equipment and temperature recorders were working properly and in calibration. The inspector checked completed and inprocess weld buildup pads for physical appearance and workmanship quality, and interviewed welding machine operators to test their knowledge of the operation. Field welds were being fabricated with the automatic gas tungsten arc (GTA) welding process, using the Dimetric Gold Track power source equipment. Within the area inspected no violations or deviations were identified.

4. Exit Interview

The inspection scope and results were summarized on March 3, 1989, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

Two inspector followup items (IFI) were identified.

IFI 335/89-05-01, Update Zetec QA Procedure, Z-QA-101 Rev. 6 to the Latest Revision; Paragraph 3.a.

IFI 335/89-05-02, Corrective Actions to Prevent SwRI Staff from Inattentiveness on the Job, Paragraph 3.b.

Attachment



ATTACHMENT

MEMORANDUM

March 2, 1989

TO: Mr. Gill Boissy
St. Lucie Plant Manager
c/o Scott Sienkiewicz
ISI Coordinator

FROM: Fred Mengden
SwRI Field Supervisor

SUBJECT: Status of SwRI Corrective Action

Following the verbal report by Mr. Nick Economos, NRC Representative, that an SwRI staff member was nodding off in the St. Lucie Power Plant containment building during the reactor vessel ISI on February 23, SwRI has implemented short and long term corrective actions. In response to a request by Mr. Economos for a preliminary written status of the corrective action being taken concerning this incident, this report is submitted to you.

Short Term Response

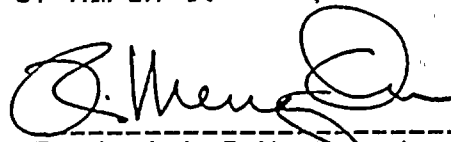
1. A mandatory 15 minute break at 2 hour interval policy was initiated at about 19:00 on February 23. All SwRI personnel from both shifts were individually informed of this policy by 20:30 on February 23.
2. On Feb 23, the SwRI staff member was told not to report for work on Day Shift of Feb. 24.
3. SwRI management in San Antonio was informed of the reported incident before midnight on Feb. 23.
4. (FPL then denied the SwRI staff member access to site on Feb. 24.) Anticipating this possibility, SwRI management insured continued, uninterrupted success of the job by having a replacement staff member available and in Florida before midnight that same day, Feb. 24.
5. The SwRI on site supervisor held a meeting with all SwRI team members at 20:00 on Feb. 24 to reiterate the policy to be as follows:
 - a. Personnel working in containment will take a break or be relieved every 2 hours for 15 minutes. This is a mandatory break.

- b. Personnel on site will report drowsiness to the shift supervisor at any time and will be relieved or take a break.
 - c. Personnel will be observed for even the appearance of being asleep.
6. Mr. David Rosow, Acting Director, and Mr. Amos Holt, Vice President, met with the SwRI team on locations on Feb. 28 and discussed the events and policies being enacted by SwRI to preclude a recurrence of this type.
7. Mr. Rosow, Mr. Holt, the on site Project Engineer, and the Field Team Supervisor met with Mr. Gill Boissy, St. Lucie Plant Manager, on March 1 to assure him of SwRI's continuing support of St. Lucie Plant policies and to identify short term and long term action being taken by SwRI.
8. Since enacting the mandatory break policy at St. Lucie, the following action has been taken on site:
 - a. The SwRI Supervisor and Project Engineer have monitored the frequency of breaks/relief of the personnel working in containment. I am confident that the 2 hour break interval is being adhered to on both shifts.
 - b. The SwRI supervisor has formally reminded each crew member at every shift change of the break policy and of the increased surveillance by the SwRI supervisor and by FPL for evidence of fatigue or sleepiness.
 - c. The SwRI supervisor has performed randomly timed and unannounced tours of the work areas and have found no evidence of fatigue problems.

Long Term Action

1. Long Term Action under consideration by SwRI management is the possibility of fully remoting the operation of the PaR Device Scanner such that physically inactive tasks are not performed in the hot and noisy environment of the containment.
2. SwRI management will review the work environment of this crew position (and others as appropriate) with human factors engineering experts to determine the steps which can be taken to assist personnel who necessarily work in harsh conditions. Emphasis will be placed on activities which require mental alertness combined with minimal physical activity over long periods of time.

3. SWRI management is continuing to review other possible actions and will report any additional findings as we discussed during our meeting of March 1.



Frederick C.H. Mengden III
SwRI Field Team Supervisor