



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report No. 50-389/82-20

Licensee: Florida Power and Light
P. O. Box 529100
Miami, Florida 33152

Facility Name: St. Lucie

Docket No. 50-389

License No. CPPR-144

Inspection at St. Lucie site near Fort Pierce, Florida

Inspector: J. L. Colby
J. L. Colby

6/8/82
Date Signed

Approved by: N. Economos
N. Economos, Acting Section Chief
Engineering Inspection Branch
Division of Engineering and Technical Programs

6/31/82
Date Signed

SUMMARY

Inspection on May 11-14, 1982

Areas Inspected

This routine, announced inspection involved 32 inspector-hours on site in the areas of review of quality records for reactor coolant pressure boundary piping, preservice inspection and independent inspection effort.

Results

Of the three areas inspected, no violations or deviations were identified in two areas; one violation was found in one area (Violation - Failure to follow procedure for marking and inspection of pipe engagement into socket fittings, paragraph 7.b).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *B. J. Escue, Site Manager
- *J. L. Parker, Project QC Supervisor
- *W. F. Jackson, Welding Superintendent
- *G. J. Boissy, Startup Superintendent
- *P. W. Heycock, PSI Site Supervisor-NED
- *F. T. Carr, NDE Supervisor-NED
- *E. W. Sherman, QA Engineer
- *P. P. Carrier, Licensing
- *J. J. Capezza, Resident Engineer
- *R. A. Symes, Supervising QA Engineer

Other licensee employees contacted included construction craftsmen, technicians and office personnel.

Other Organizations

- *J. C. Orłowski, Combustion Engineering, Licensing Engineer

NRC Resident Inspector

- *S. Elrod

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 14, 1982, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the findings listed below. No dissenting comments were received from the licensee.

(Open) Violation 389/82-20-01, Failure to follow procedure for marking and inspection of pipe engagement into socket fittings, paragraph 7.b.

(Open) Inspector Followup Item 389/82-20-02, Undersize fillet welds and improper thickness transition on piping, paragraph 7.c.

(Open) Inspector Followup Item 389/82-20-03, Control of combustible materials, paragraph 5.

(Open) Inspector Followup Item 389/82-20-04, Preservice inspection record for UT of weld joint SI-127-FW-2 appears inadequate, paragraph 8.a.

(Open) Inspector Followup Item 389/82-20-05, Reactor coolant pressure boundary piping not designed for inservice inspection, paragraph 8.b.

3. Licensee Action on Previous Inspection Findings

Not inspected.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Independent Inspection Efforts

Construction Activities

The inspector conducted a general inspection of the reactor building and auxiliary building to observe construction activities such as welding, welding filler material control, material controls, housekeeping and storage. On the second shift, on May 11, 1982 the inspector observed used Kim Wipes and a can of acetone left unattended on scaffolding in the reactor "A" building. A craftsman was grinding on the a reactor coolant loop pipe below where the combustible materials were left unattended. The grinding was producing sparks that could have ignited the combustible materials. On May 13, 1982 the inspector conducted a second inspection of the reactor building and observed similar combustible materials left unattended on scaffolding.

The inspector notified the licensee on both occasions. The licensee pointed out that there are no specific requirements and therefore no site procedures for the control of small quantities of combustible materials. However, the licensee stated that this matter would be addressed and adequate corrective action taken. This item was identified as inspector followup item 390/82-20-03, Control of combustionable materials.

Within the areas examined no violations or deviations were identified.

6. Inspector Followup Item

(Open) Inspector Followup Item 389/82-19-02, Disposition of UT indications in welds RC-112-1, RC-123-1 and RC-121-6. During two previous inspections (see reports 50-389/82-13 and 50-389/82-19) RII inspectors, using RII equipment, identified two UT indications in reactor coolant (RC) loop weld RC-112-1. Based on calculations made on site at the time the indications were found, the indications were thought to be acceptable. Further evaluation by FP&L using standard ASME Section XI sizing and calculation techniques, showed the indications to be rejectable. In addition, at about the same time, FP&L identified a total of 8 (3-weld RC-121-6, 3-weld RC-112-6, and 2-weld RC-123-1) other indications rejectable using standard ASME Section XI sizing and calculation techniques.

FP&L excavated all but two (one in weld RC-123-1 and one in weld RC-121-6) of the eight indications identified by FP&L. These six excavated indications were near the O.D. surface and were removed without violating minimum wall thickness. In order to better define the location and size of the indications, prior to excavation, four of the indications were located and sized using a 70°, 5.0 MHZ transducer. In addition, for all six of the indications, FP&L made beam spread corrections to the original 45°/60° results using the beam spread plots developed in accordance with ASME Section V, Article 4. The beam spread corrected 45°/60° results and the 70° results indicated that the indications were located deeper from the O.D surface and had less thru-wall thickness than indicated with the uncorrected 45°/60° inspections. The six indications were excavated, closely monitoring the grinding and carefully measuring the actual depth and thru-wall thickness of the defects. FP&L noted good correlation between the actual defect dimensions (depth and thru-wall) and the dimensions predicted with the 70° inspection and the beam spread corrected 45°/60° inspections.

Based on the above results, FP&L applied beam spread correction data to the results for the two indications identified by NRC in weld RC-112-1 and the indications not excavated in welds RC-123-1 and RC-121-6. In addition, the indications in welds RC-123-1 and RC-121-6 were evaluated using the 70° method. Using these methods of evaluation, FP&L considers all four indications to be acceptable.

FP&L's Level III examiner also issued a report describing how he made the determinations of reflector size and location utilizing ultrasonic search unit beam spread. In this report the examiner made the following conclusions using the relationship established between the beam profile width at the maximum amplitude position, the half amplitude forward and backward positions and the metal paths:

- a. When all three points converge at the same location, the indication is certain to be a very small spot and of no consequence.
- b. Where two of the points either converge or are quite close, while the third is some distance away, the two close points represent the true location and the third either will be erroneous or may be indicative of still another smaller adjacent reflector.
- c. The primary beam point and the forward half amplitude point generally yield the most accurate information.
- d. Spherical reflectors typically exhibit beam lines that cross paths before termination.
- e. Aligned points with beam paths that do not cross are indicative of planar reflectors.

Region II has reviewed data presented and has concluded that a linear relationship does exist that can aid in establishing actual defect size. However, as noted in item b. of the licensee's conclusions the relationship between defect size, beam profile and the metal paths are not always linear. This non linear function was dismissed by the license in item b. as "erroneous or may be indicative of still another smaller adjacent reflector." In addition different equipment such as transducer frequency, size, shapes, damping and instrument bandwidth give different results adding to the unreliability of this sizing. For instance the following is an exert from NUREG/CR-2485, entitled, "Ultrasonic Beam Spread Measurements in Thick Pressure Vessel Type Steel." The research addressed in this document was performed by Oak Ridge National Laboratory (ORNL) for NRC. The publish date for this document is February 1982.

"The results of this study indicate that for the 12.7 by 25.4 mm (1/2 by 1 in.) rectangular transducer, the forward and vertical beam spreads are generally not linear functions of beam path. The fact that the forward beam spread is much greater than the lateral beam spread indicates the desirability of this type of search unit for flaw detection and undesirable nature of the search unit for flaw sizing. In addition the lateral beam spread for the rectangular search unit has been shown to be comparatively small."

The transducer used by NRC and the licensee on Weld RC-112-1 was a 1/2" X 1" Transducer. Therefore, Region II considers that the following conditions are necessary for using the licensee's method of sizing indications.

All indications in welds RC-112-1, RC-123-1 and RC-121-6 shall be evaluated in preservice using a 70° probe from the surface nearest the indication (70° scans have already been performed on RC-123-1 and RC-121-6) to insure that a linear relationship does exist between the size of the defect when using the 70° near surface inspection and size of the defect using the licensee sizing method. All future evaluations of the specific indications in the above welds during inservice can be calculated using the licensee's sizing method. Subsequent to this inspection on May 24, 1982 FP&L's level III examiner was notified by telcon of Region II's concern and agreed to perform a 70° near surface examination on the indications found by NRC in weld RC-112-1. The results of this examination will be reviewed on a subsequent inspection.

7. Reactor Coolant Pressure Boundary Piping (RCPB)

The inspector reviewed quality assurance records and observed work activities for the RCPB piping as described below to determine whether these records reflect work accomplishment consistent with NRC requirements and SAR commitments. The applicable code for RCPB piping is the ASME B and PV Code, Section III, Subsection NB, 1977 Edition with addenda through Summer 1977.

a. Review of Quality Assurance Records

The inspector reviewed material test reports, certification records, vendor shop manufacturing and NDE records, NSSS manufacturer's quality release forms, vendor inspection and receiving inspection records, records of disposition of nonconforming material and installation records including site radiographs of field welds to ascertain whether applicable quality requirements were met for the following spool pieces and valves.

<u>SPOOL/VALVE #</u>	<u>SIZE</u>	<u>RECEIVING INSPECTION REPORT #</u>
RC-147-1	12"	R-81-204
RC-154-1	12"	R-79-1804
RC-301-1	10"	R-80-173
SI-127-1	10"	R-80-1159
V-3481	10"	R-77-206
V-3217	-	R-77-394

b. Visual Inspection of Welds

The inspector visually examined completed and accepted reactor coolant pressure boundary (RCPB) piping, valves and welds to select the samples for the inspection delineated in paragraph a above. In addition the inspector visually examined completed and accepted RCPB welds as described below to determine whether applicable code and procedure requirements were being met. The below listed welds were examined relative to the following: size and shape, weld surface finish, transitions between different wall thicknesses; weld reinforcement, socket engagement marks, excessive grinding, under cut, arc strikes, weld spatter and other process surface indications.

<u>WELD NO</u>	<u>SYSTEM</u>
RC-181-009	Reactor Coolant
RC-181-010	Reactor Coolant
RC-181-013	Reactor Coolant
RC-175-014	Reactor Coolant
RC-175-016	Reactor Coolant
RC-175-017	Reactor Coolant
RC-148-002	Reactor Coolant
RC-147-001	Reactor Coolant
SI-127-002	Safety Injection
SI-127-001	Safety Injection
RC-181-008	Reactor Coolant

With regard to the inspection above on May 12, 1982 the inspector noted markings for pipe withdraw on socket weld joint #'s RC-181-009, RC-181-010, RC-181-013, RC-175-014, RC-175-016, and RC-175-017 were not

in accordance with St. Lucie site Quality Procedure for Pipe Erection, SQP-47, or Florida Power and Light Procedure for Visual Inspection of Welds, QI-9.1. QI-9.1 and Sub-Section NB of the ASME Code require a minimum of 1/16" gap between the end of the pipe and bottom of the socket prior to welding. This gap is verified at final inspection by the contact and withdraw scribe marks made in accordance with site procedure SQP-47. SQP-47 requires that lines be scribed at the following socket/pipe locations:

- (1) on the fitting 3/8" from the face
- (2) on the pipe a distance equal to the socket depth minus 1/16"
- (3) on the pipe 1-1/8" from the line scribed in (2) above. This line would also be 1 1/8" from the face of the fitting when the fitting is correctly aligned.

The total distance between scribe line (1) and scribe line (3) that will be verified at final inspection is 1 1/2".

The six RCPB socket welds addressed above did not have scribe marks at position (1) and the withdraw marks at position (3) were located between 1" and 1-1/32" from the face of the fitting. This would indicate that the 1/16" minimum gap between the end of the pipe and the bottom of the fitting was not met. This violation was reported to the licensee as item 389/82-20-01, Failure to follow procedure for marking and inspection of pipe engagement into socket fitting.

- c. In addition to the above the inspector also noted the following visual discrepancies on RCPB piping and safety related piping in the reactor building. These discrepancies are further examples of a previous unresolved item 389/82-13-01.

- (1) Fillet welds on socket joints for weld no's SI-451-FW-1 and RC-181-013 were undersize.
- (2) Weld joint no. SI-127-001 did not have a 3 to 1 taper on the valve side of the weld.

NRC has reported these types of discrepancies to the licensee several times and the licensee has committed to a planned program for reinspection of RCPB and safety related piping after cold hydro.

Within the areas examined no violations or deviations were observed except as reported in paragraph 7.b above.

8. Preservice Inspection (PSI) - Audit of Work and Work Activities by Observation and Reverification Inspection

The inspector observed work and work activities for preservice inspection to ascertain whether the onsite preservice inspection of Class 1, 2 and 3 pressure retaining components are performed in accordance with Regulatory requirements and licensee commitments. In addition to observing work activities performed by the licensee the inspector re-examined two Class 1 stainless steel welds using Region II ultrasonic equipment. The PSI is being performed in accordance with the ASME Boiler and Pressure Vessel Code, Section XI, 1977 Edition with addenda through S78 as modified by 10 CFR 50.55a(g).

- a. The inspector selected the following welds for reverification inspection:

<u>WELD JOINT NO.</u>	<u>PIPE SIZE</u>	<u>SCAN PERFORMED</u>
SI-127-FW-2	10" dia. X 1.125" wall	45° from one side and radial scans
SI-127-FW-1	10" dia. X 1.125" wall	45° from one side and radial scans

During the inspection of field weld SI-127-FW-2 the inspector noted an indication in the root of the weld. This indication appeared to be caused by an irregular root, however, the weld reinforcement and a ground area located at the toe of the weld prevented proper evaluation of this original. The inspector reviewed the construction radiographs of this weld area and noted an irregular root condition on the radiographs. The licensee's preservice inspection record of this weld did not note any recordable indications, discontinuities or geometry. In addition, the record did not indicate that approximately 50 percent of the weld could not be inspected due to the joint configuration. However, records for weld joint SI-127-SW-2, which was a shop weld, noted an indication in the area observed by the inspector on weld SI-127-FW-2 and recorded inspection restrictions due to geometry. The licensee had started to perform a reinspection of both weld joints to determine if the problem was due to incorrect entries made on the preservice records or if the problem was due to an inadequate inspection. This investigation was incomplete at the conclusion of this inspection. The inspector reported this as an inspector followup item 50-389/82-20-04, Preservice inspection records for UT of weld joint SI-127-FW-2 appear inadequate.

- b. The inspector also examined work activities being performed by the licensee on the reactor coolant loop piping. One area of particular interest to the inspector was actions being taken by the licensee to inspect the welds joining the carbon steel main coolant loop piping to the stainless steel reactor coolant pumps. The design for joining

these components at St. Lucie requires the use of a four inch centrifugal cast stainless steel extension piece which has a weld prep on both ends. One end of the extension piece is attached to the main coolant pump and the other end to the reactor coolant loop piping. However when both welds were completed the distance from toe to toe between the two welds was approximately two inches. This distance was not sufficient for adequate UT examination of these welds during preservice and inservice inspections. In addition, scanning distances needed for UT inspection of these welds were further complicated by the thickness transition between the coolant loop pipe and the cast extension piece. The licensee was presently grinding both welds on the extension piece in order to increase the scanning area as much as practical. However, in order to inspect the weld from the pipe to the extension piece a ten to one taper may have to be ground on the pipe. Inspector followup item 389/82-20-05, "Reactor coolant pressure boundary piping not designed for inservice inspection," was opened to track the licensee's actions on these welds and to insure that a relief request is filed for the areas where UT inspection will be impractical.

Within the areas examined no violations or deviations were observed.