

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

Report Nos.: 50-335/85-23 and 50-389/85-03

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: August 26-30, 1985

Inspector: LAR W Approved by: J/ J. Blake, Section Chief Engineering Branch Division of Reactor Safety

Signed Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 37 inspector-hours on site in the areas of plant chemistry and inservice testing of pumps and valves.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *K. N. Harris, Site Vice President
 *D. A. Sager, Plant Manager
 *C. A. Pell, Technical Services Supervisor
- *R. J. Frechette, Chemistry Supervisor
- D. A. Harte, Secondary Chemistry Supervisor
- R. E. Cox, Chemistry Staff Quality Control
- D. Stewart, Engineer, Performance Department
- *A. Johnson, Engineer, Performance Department
- *V. T. Chilson, Corporate Senior Nuclear Specialist

NRC Resident Inspector

*H. Bibb

*Attended exit interview

2. Exit Interview

> The inspection scope and findings were summarized on August 30, 1985, with those persons indicated in paragraph 1 above. No dissenting comments were received from the licensee.

> The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

Licensee Action on Previous Enforcement Matters 3.

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Plant Chemistry (79501 and 79502)

> As a result of its continuing concern for steam generator tube integrity. the NRC staff has recently issued recommended actions and review guidelines that are directed toward the resolution of unresolved safety issues regarding this subject (see Generic Letter 85-02 dated April 17, 1985.) One recommended action is as follows:

"Licensees and applicants should have a secondary water chemistry program (SWCP) to minimize steam generator tube degradation. The specific plant program should incorporate the secondary water chemistry guidelines in the Steam Generators Owners Group (SGOG) and Electric Power Research Institute (EPRI) Special Report EPRI-NP-2704, "PWR Secondary Water Chemistry Guidelines," October 1982, and should address measures taken to minimize steam generator corrosion, including materials selection, chemistry limits, and control methods. In addition, the specific plant procedures should include progressively more stringent corrective actions for out-of-specification water chemistry conditions. These corrective actions should include power reductions and shutdowns, as appropriate, when excessively corrosive conditions exist. Specific functional individuals should be identified as having the responsibility/authority to interpret plant water chemistry information and intitiate appropriate plant actions to adjust chemistry, as necessary.

The reference guidelines were prepared by the Steam Generator Owners Group Water Chemistry Guidelines Committee and represented a consensus opinion of a significant portion of the industry for state-of-the-art secondary water chemistry control."

Reference

Section 2.5 of NUREG-0844

In parallel action, the NRC Office of Inspection and Enforcement has developed two new Inspection Procedures to verify that the design of a plant provides conditions that ensure long term integrity of the reactor coolant pressure boundary and to determine a licensee's capability to control the chemical quality of plant process water in order to minimize corrosion and occupational radiation exposure.

The objectives of these new procedures were partially fulfilled during previous inspections. (See Inspection Reports 50-335/83-22 and 50-335/84-27 dated June 28, 1983 and October 4, 1984.) This follow-up inspection consisted of a review of the licensee's activities during the past year, with special emphasis on chemistry control.

a. Plant Design and Operation

At the time of this inspection St. Lucie Unit 1 was operating at 99% of power and approaching the end of its sixth fuel cycle. Unit 2 was in cold shutdown while repairs were being made on the reactor coolant pump motor. Because the Unit 2 outage was to be extended, the licensee was beginning to place the steam generators in wet chemistry lay-up conditions. Unit 2 is in its second fuel cycle.

Except for a single one-day outage, Unit 1 had operated continually since the last inspection. An audit of control and diagnostic chemistry analyses indicated that no significant chemistry transients had occurred and that all control parameters (i.e., cation conductivity, sodium, chloride) in the steam generator water had been maintained considerably lower than the limits recommended by the Steam Generator Owners Group (SGOG).

A similar audit of the operational experience of Unit 2 showed that Unit had a relatively short (37 days) initial refueling in October-November, 1984, but did not achieve stable, full-power operation until January 1985. From that time until the current maintenance outage the power level has been steady and the secondary chemistry parameters have been as good, or better, than those of Unit 1.

The licensee is experiencing difficulty with the condenser air ejector in Unit 1 and, during the second half of the current cycle, the concentration of dissolved oxygen in the feedwater approximated, or frequently exceeded, the 10 ppb limit prescribed for this parameter in plant procedures. These relatively high values are attributed to inefficient removal of the low quantities (<5SCFM) of air that leak into the condenser. The licensee is attempting to maintain maximum heat transfer to the condenser cooling water so as to achieve effective removal of air from the hotwells. The retention of air (and ammonia) in the hotwell water is also thought be caused by steam blanketing of the air ejector and consequent reduction in the effectiveness of the ejector. In an effort to minimize a similar loss of efficieny in Unit 2, the licensee has hydrolased the condenser tubes during the current outage to ensure clean surfaces for maximum heat transfer.

As discussed previously (Inspection Report 84-27) the licensee's capability to maintain high quality water in the secondary cycle has been enhanced by retubing the condensers with titanium, by adding a condensate cleanup system to Unit 1, by maintaining a high rate of steam generator blowdown (50-90 gpm), and finally, by being able to recover blowdown and minimizing the need for makeup water from the water treatment plant. The inspector was informed that the copper alioy tubes in the moisture separator reheaters (MSR) of Unit 1 will be replaced by stainless steel tubes so as to eliminate transfer of copper to the steam generators. The MSR tubes in Unit 2 are already stainless steel.

During the initial refueling outage for Unit 2 the licensee plugged 130 tubes per steam generator in the 'batwing' region as a preventative measure against leaks caused by abrasion and erosion of the inconel tubes by the carbon steel support components. Approximately 900 tubes in each steam generator were eddy current tested, and only one indication was observed in each steam generator. Sludge lancing was not carried out during the refueling outage. The inspector was informed that plans have not been made for sludge lancing the steam generators in Unit 2 during the upcoming (October 1985) refueling outage.

b. Secondary Water Chemistry Control

Through audits of plant data and discussions with chemistry personnel the inspector established that the criteria for high levels of secondary coolant purity, recommended by the SGOG and included in plant procedures, had been achieved routinely during the past year. Except during startups for Unit 1 these favorable conditions were attained without the use of condensate polishers. Although the presence of contaminants in the steam generators is indicated from observation of 'hideout return' when plant power is reduced, the licensee does not consider the concentration of these species (e.g., sodium, chloride, sulfate, and silica) to warrant chemistry holds being placed on plant cooldown, to soak these impurities out of the steam generators.

The inspector noted that the pH of the steam generator feedwater was usually at the upper limit of the range allowed in plant procedures, i.e., 8.8-9.6. The licensee stated that better control against oxidation of carbon steel pipes was being achieved at this higher pH. Consideration is being given to maintaining even more basic conditions in the secondary cycle after the copper-alloy MSR tubes have been replaced.

The inspector evaluated the licensee's capability to provide the necessary quality control for chemical measurements that are made to control plant chemistry. This evaluation was based on discussions with chemistry supervisory personnel and on a review of procedure CD-SPP-1 Quality Control of Analytical Results.

For non-radiological measurements quality control is based on the following:

- duplicate tests performed on weekly and quarterly frequencies
- analyses of 'spiked' samples on a semi-annual schedule
- comparison of results obtained by several technicians during different work shifts
- correlation of parameters; e.g., cation conductivity versus anions
- comparison of data obtained from 'grab' samples and inline instrumentation.

The inspector believes that the combination of all of these procedures will provide an acceptable measurement of technician ability and instrument reliability. However, the SGOG guidelines and plant procedures specify that certain actions, including changing plant status, must be taken when chemistry limits are exceeded. Consequently, it is in the licensee's interest to be able to place a high degree of confidence in confirmatory tests (usually manual) that are performed prior to taking corrective action. The licensee stated that the use of spiked samples in the ranges of these limits will be reviewed and correlated with guidance provided in the licensee's <u>Nuclear Plant</u> Chemistry Parameters.

The inspector toured the licensee's facilities used for sampling and analyzing primary and secondary coolants, environmental systems, and radwaste. These facilities were considered to be appropriately located, well designed, and very spacious for nuclear power plants. The laboratories were also very clean. The latter feature is considered to be of utmost importance analyzing radioactive samples or performing accurate measurements of part-per-billion concentations of ions. The 'wet' laboratories were equipped with modern, state-of-theart analytical instrumentation. The licensee has provided ample office space for chemistry supervisors in the immediate vicinity of the secondary water chemistry laboratory as well as desk space for technicians in rooms adjacent to the primary and secondary laboratories.

Summary

As the result of this inspection the inspector believes that both the design of the secondary water system as well as the manner in which the licensee's secondary water chemistry program is being implemented are the reasons that a high level of water chemistry control is being maintained. The inspector's observations confirm the licensee's response to Generic Letter 85-02 relative to the implementation of a secondary water chemistry program that will minimize steam generator tube degradation.

During this inspection no violations or deviations were identified.

6. Inservice Testing of Pumps and Valves (61726)

The licensee's proposed program to test safety related pumps and valves, in conformance with Technical Specifications and Section XI of the ASME Code, is under review by the NRC Region II office. This review also involves an evaluation of the licensee's requests for relief from specific requirements of the ASME Code. During this inspection several relief requests were discussed in depth and the inspector was provided with sufficient information to complete his review. The licensee will document all changes that were considered necessary to clarify or supplement the bases of the relief requests. In addition, several requests will be withdrawn and added. All changes must be submitted to the NRC through proper official channels before the NRC staff's Safety Evaluation can be issued.

The inspector audited the licensee's Pump Summary Book for Unit 1 to assess the results of pump tests that have been previously performed per the requirements of the ASME Code. The information provided in this document (i.e., measurements of vibration, bearing temperature, and flow rate, as well as pertinent discussions of test results) provides the type of information required by the Code. During this audit the inspector did not observe any violations of Code criteria or any trends that indicated degradation of a pump.