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

Report No.: 50-302/84-32

Licensee: Florida Power Corporation
3201 34th Street, South
St. Petersburg, FL 33733

Docket No.: 50-302 License No.: DPR-72

Facility Name: Crystal River 3

Inspection Conducted: November 7-9, 1984

Inspector: for W. P. Ang 11/29/84
Date Signed

Approved by: J. J. Blake, Section Chief 11/29/84
Engineering Branch
Division of Reactor Safety
Date Signed

SUMMARY

Scope: This routine, announced inspection involved 18 inspector-hours on site in the areas of pipe support baseplate designs using concrete expansion anchors (IEB 79-02) and seismic analysis for as-built safety-related piping systems (IEB 79-14).

Results: No violations or deviations were identified.

REPORT DETAILS

1. Licensee Employees Contacted

*B. Simpson, Director, Nuclear Operations Engineering and Licensing
*T. Telford, Director, Quality Programs Department
*G. Westafer, Manager, Nuclear Licensing
*R. Widell, Manager, Nuclear Operations Engineering
G. Becker, Manager, Nuclear Mechanical/Structural
*P. Tanguay, Nuclear Engineering Supervisor
*A. Petrowsky, Nuclear Structural Engineer
*A. Friend, Nuclear Staff Engineer

Gilbert/Commonwealth, Inc. (GAI)

F. L. Moreadith, Manager, Power Engineer
T. D. Biss, Project Structural Engineer
E. Johnston, CR-3 Pipe Support Engineer

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on November 9, 1984, with those persons indicated in paragraph 1 above. Unresolved Item 302/84-32-01, "Compliance regarding 'WEJ-IT' reduced capacity," was identified and discussed with the licensee. The licensee did not express any dissenting comment.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. A new unresolved item identified during this inspection is discussed in paragraph 5.

5. Pipe Support Baseplate Design Using Concrete Expansion Anchors (IEB 79-02) and Seismic Analysis for As-built Safety-Related Piping Systems (IEB 79-14)

On October 8, 1984, the licensee submitted to NRC Region II supplementary information for IEB 79-02 on FPC letter 3F1084-01. The letter stated that licensee site-specific testing of WEJ-IT type concrete expansion anchors showed a 40% to 60% reduction of capacities from the 1982 catalog capacities. The 1977 catalog capacities were used in Crystal River 3

concrete expansion anchor calculations. The letter identified that further licensee evaluation of Crystal River 3 safety-related seismically analyzed pipe support concrete expansion anchors was being performed. An NRC inspection was performed to follow-up on the licensee's report and to verify licensee compliance with IEB 79-02 and IEB 79-14 requirements and licensee commitments.

Based on the licensee's letter noted above and discussions with the licensee, the following appeared to be the chronology of events.

In 1982, the licensee became aware of a 1981 change to the "WEJ-IT" catalog that reduced shear capacities as much as 50% from the 1977 catalog. Crystal River 3 calculations for concrete expansion anchors used the 1977 catalog capacities. The FPC/GAI evaluation of the change was that it would have minimal effects on the concrete expansion anchor calculations due to the relative contribution of shear in the safety factor calculation. Further FPC/GAI evaluation of the problem noted that there was a significant increase in concrete expansion anchor capacity in the 1977 WEJ-IT catalog from the 1974 WEJ-IT catalog. As a result of the apparent lack of consistency in the 1974, 1977 and 1981 catalogs, the licensee decided in August 1982 to perform site specific testing. The licensee felt that site specific testing would preclude uncertainties with past and future catalog changes to the WEJ-IT capacities. The licensee, however, did not consider the item to be reportable to the NRC at the time.

In June of 1984, the licensee and GAI commenced site-specific testing of WEJ-IT concrete expansion anchors. Preliminary results indicated a reduction in tensile capacity from the 1977 WEJ-IT catalog. FPC contacted the WEJ-IT manufacturer by telephone on June 20, 1984, and informed the manufacturer of reduced tensile capacity. Testing was completed in approximately August 1984. FPC/GAI sampled 30 large bore pipe support calculations and determined that by using the site specific WEJ-IT capacities, concrete expansion anchor safety factors were reduced in the pipe supports. Four pipe supports had concrete expansion anchor safety factors between one and two; 21 pipe supports had safety factors between two and four; and five pipe supports had safety factors greater than four.

In June 1984, and on September 17, 1984, the licensee informed NRC Region II, by telephone, of the testing and the results, and the 30 pipe support calculation review.

The licensee's October 8, 1984 letter, the site specific testing of WEJ-IT concrete expansion anchors, and the reanalysis of 30 pipe supports were reviewed and discussed with the licensee and its A/E, GAI. The inspector had the following observations:

a. Crystal River 3 was shutdown for reasons unrelated to this inspection. The licensee's A/E had determined that four pipe supports had concrete expansion anchors with safety factors between one and two. The licensee had initiated repair instructions for the four pipe supports but did not intend to repair the pipe supports while Crystal River 3 was shutdown. No system operability review had been performed to determine Technical Specification (TS) limiting condition for operation (LCO) applicability. The licensee was reminded by the NRC inspector of the following August 20, 1979, IEB 79-02, revision 1, Supplement No. 1 requirements:

"For the following two cases, plant operation may continue or may begin:

a. For the support as a unit, the factor of safety compared to ultimate strengths is less than the original design but equal to or greater than two.

b. For the anchor bolts the factor of safety is equal to or greater than two and for the support steel the original design factor of safety compared to ultimate strengths is met.

The above criteria may be applied provided that the affected systems are upgraded to design margins of safety expeditiously for normally accessible supports and by the next refueling for nonaccessible supports. Accessibility is as defined in Bulletin No. 79-14 where "normally accessible" refers to those areas of the plant which can be entered during reactor operation.

1. Any support not satisfying the criteria should be classed as inoperable and the Technical Specification action statement met unless it can be shown that the system can function in a design basis seismic event without the support.

2. Repairs to supports should result in return to the design factor of safety.

3. Operations may be continued while repairs to upgrade the system from a factor of safety equal to or greater than two with respect to design loads are performed. Consideration must be given to the effect of the repair process on support function and system operability. In other words the time the support is not functional should be limited to TS action statement times or the support must be determined not to cause the system to be unable to perform its function in a seismic event. The licensee should also exercise care not to take several supports on a given system out of service at the

same time or cause both trains of one safeguards system to be made inoperable at the same time. Control over workmen on safety-related systems during plant operation requires a high degree of control by the licensee."

After discussions with the licensee's Director of Nuclear Operations Engineering and Licensing regarding applicability of IEB 79-02 and TS LCOs, the licensee decided to perform additional calculations and to repair the pipe supports as required. The licensee reported that three of the four pipe supports were being repaired during the inspection and additional calculations were performed to show that the fourth pipe support had concrete expansion anchor safety factors that complied with IEB 79-02 requirements.

b. As stated in the licensee's October 8, 1984 letter, the licensee initiated a program to identify and upgrade all safety-related large bore (2" IPS and greater) pipe supports with safety factors less than two by the end of the next refueling outage (scheduled to start in March 1985). The inspector informed the licensee that the IEB 79-02 requirements previously noted and the CR 3 TS may require additional action. Specifically, the following comments were made by the NRC inspector:

(1) Evaluation of the remainder of the safety-related seismically analyzed concrete expansion anchors and pipe supports should be performed expeditiously on a system-by-system basis. Operability evaluations as outlined in IEB 79-02, Rev. 1, Supplement 1 should be performed on concrete expansion anchors whose safety factors are less than two. TS LCOs should be complied with. The licensee outlined a plan to provide for the above noted item but would not verbally commit to it.

(2) The licensee intends to leave supports whose concrete expansion anchors safety factors are between two and four as acceptable for the following reasons:

- Expansion anchor capacity values are based upon actual capacity parameters established in Crystal River Unit 3 concrete.

- Anchor installation parameters, i.e., embedment, diameter, length, and setting torque have been verified for all safety-related seismically analyzed installations on 2" IPS and greater.

- Successful operation of Crystal River Unit 3 for seven years has subjected piping systems to all normally postulated transient loads except seismic loading. During this period, no piping system degradation has been attributable to expansion anchor problems.

The licensee was informed that the Bulletin required that the calculations be performed to verify a safety factor of four or to modify the support. The licensee was further informed that the reasons provided did not appear to provide adequate justification for reduced safety factors in that:

(a) The site specific tests were static load tests whereas the loads that could be experienced by the support could be cyclic and/or dynamic.

(b) The site specific data were based on five sample that had a significant spread in test results. For example, for 5/8" WEJ-IT with 4" embedment, the test results showed minimum capacity of 4000 lb., and a maximum capacity of 6000 lb. An average capacity of 5160 lb. was obtained and will be used in the pipe support calculations.

(3) The licensee did not intend to evaluate pipe supports for safety-related seismically analyzed piping less than 2" IPS. The licensee's July 6, 1979, IEB 79-02 response stated that small bore piping were not reevaluated for IEB 79-02 due to conservatism in the analysis. However, since the WEJ-IT capacities have been reduced as much as 60 percent, the licensee was requested to reconfirm the adequacy of the licensee's July 6, 1979, IEB 79-02 response regarding small bore piping. Although the licensee indicated that this would be done, the licensee restated its position that it gives no verbal commitments.

c. The licensee stated that the onsite testing noted above was performed with some QC surveillance. However, no QA record was readily available to show QA/QC verification of test results and subsequent review. No nonconformance reports were generated for the pipe supports whose concrete expansion anchor safety factors were less than four, nor for the test capacity results that were less than those used in the design calculations. Engineering memoranda and letters, however, documented the above noted conditions. A review of FPC Safety-Related Engineering Procedure (SREP) 4, rev. 3, Temporary Change 1 - Design Verification, SREP 8, rev. 3, Change 1 - Corrective Action, and SREP 10, rev. 4 - 10 CFR Part 21, indicated that the SREPs did not appear to provide a specific means of documenting nonconforming design conditions, nor the controls necessary to assure 10 CFR 50, Appendix B, Criterion XVI compliance. The FPC QC Director committed to look into the procedures to assure 10 CFR 50, Appendix B, Criterion XVI compliance.

The unresolved issues noted in paragraphs 5.b.(1), (2), and (3) and 5.c were identified as Unresolved Item 50-302/84-32-01 - IEB 79-02 Compliance Regarding "WEJ-IT" Reduced Capacity.

IEB 79-02 and IEB 79-14 were left open pending licensee compliance with Bulletin requirements.

No violations or deviations were identified.