



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

Report No.: 50-302/83-20

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 at Crystal River site near Crystal River, Florida

Inspector: Frank Jape 8/18/83  
 for K. E. Davenport Date Signed

Approved by: Frank Jape 8/18/83  
 F. Jape, Section Chief Date Signed  
 Operational Program Branch  
 Division of Engineering and Operational Programs

SUMMARY

Inspection on July 13-29, 1983

Areas Inspected

This routine, unannounced inspection involved ninety-six inspector-hours on site in the areas of precritical testing, zero power physics testing and power escalation testing.

Results

Of the three areas inspected, no violations or deviations were identified in three area.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

M. Howard, Director Site Nuclear Operation  
\*P. McKee, Plant Manager  
\*M. Collins, Nuclear Safety and Reliability Superintendent  
M. Culver, Senior Reactor Specialist  
M. Callahan, Engineer, Nuclear Licensing and  
Fuel Management Group  
F. Zimmank, Nuclear Mechanical/Structural Engineer  
J. Neyman, Nuclear Reactor Specialist

Other licensee employees contacted included two technicians.

#### Other Organizations

##### Babcock and Wilcox Personnel

E. Jebson  
R. McAndrew  
M. Horne  
B. Bojduj  
H. Liles  
L. McDougal  
S. Shackelford

##### NRC Resident Inspector

\*T. Stetka

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on July 29, 1983, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspection findings without significant comments.

### 3. Licensee Action on Previous Enforcement Matters

Not inspected.

### 4. Unresolved Items

Unresolved items were not identified during this inspection.

## 5. Precritical Activities

The inspector reviewed the following procedures and witnessed the test performance.

### PT-100 "Controlling Procedure for Precritical Testing"

This procedure provides the sequence for performing required tests and activities prior to zero power physics testing (ZPPT). These tests include: (a) Receiving, setup, and checkout of reactimeter (performed by B&W personnel); (b) Control Rod Drop Time Tests (SP-102); (c) RTD Normalization Constant Determination; and (d) RC Flow Measurement Test at Zero Power (PT-101). Procedure changes were made to reflect 3 Reactor Coolant Pump (RCP) operations. The acceptance criteria for the Control Rod Drop Time Test were met in that the drop times for the individual safety and regulating rods from fully withdrawn to three-fourths insertion was less than 1.66 seconds. This test will be performed at power with the RCP configuration used. The RTD normalization will be recalculated for four pump operation at power conditions.

The purpose of PT-101 is to measure flow characteristics with three RCP's operating and to compare RC flow with design calculation. Detailed review of the test results confirmed the values determined by the licensee for meeting acceptance criteria of STS limits 3.2.5 Table 3.2-1 with 3 RCP operations. This test will be repeated for 4 RCP's before the fourth RCP is used at power.

## 6. Zero-Power Physics Test

The zero-power physics test was performed to verify the nuclear design parameters used in the safety analysis and the technical specifications. Performance testing procedure PT-110, "Zero-Power Physics Testing", prescribed the order in which various cycle 5 zero-power physics tests were performed and the procedures by which they were performed. This inspection confirmed that the tests were performed in the sequence specified, given initial review, and met the established acceptance criteria. The following zero-power physics tests were reviewed for technical adequacy and witnessed by the inspector.

### a. Control Rod Calibration

Performance Testing Procedure PT-112, "Hot Zero-Power Regulating Rod Group Worth and Differential Boron Worth Measurement" was used to determine the hot zero-power, cycle 5 integral and differential reactivity worth for Control Rod Assembly (CRA) Groups 5, 6 and 7. Procedure PT-112 uses the boron-swap method to determine rod group reactivity worth. This method sets a deboration rate and compensates for the change in reactivity by small step changes in rod group position. The calculation of reactivity is made on a continuous basis by a Babcock and Wilcox reactimeter.

The measured reactivity worth of CRA Groups 5, 6 and 7 each met the acceptance criterion of  $\pm 15\%$  of the predicted value. The total reactivity worth of the sum of CRA Groups 5, 6 and 7 met the acceptance criterion of  $\pm 10\%$  of the predicted value.

b. Boron Worth Measurement

Procedure PT-112 was also used to determine the hot, zero-power, cycle 5 differential boron worth. The differential boron worth was calculated by dividing the change in the measured reactivity worth of the inserted CRA groups between initial and final critical positions of the group worth measurements by the corresponding change in boron concentration.

The measured differential boron worth met the acceptance criterion of  $\pm 15\%$  of the predicted value.

c. Temperature Coefficient Determination

Performance testing procedure PT-114, "Moderator and Temperature Coefficients Determination at Hot Zero Power", was used to determine the cycle 5 isothermal temperature coefficient at hot zero power. The moderator temperature coefficient was determined by subtracting the calculated doppler coefficient from the measured isothermal temperature coefficient. The measured hot zero power temperature coefficients met the established acceptance criteria.

d. Ejected Rod Worth Measurement

Procedure PT-115 is used to determine the worth of the highest worth ejected rod and the worst case ejected rod by boration and compensating for the change in reactivity by small step changes in rod position. Worth of the ejected rod is determined by summing up the incremental changes in reactivity additions recorded on the reactimeter. The test results met the acceptance criteria by being within  $\pm 20\%$  of the predicted value given in the cycle 5 Physics Test Manual. The measured worth of the worst case ejected rod was not greater than  $1\% \Delta k/k$  and therefore acceptable.

e. Sensible Heat Determination

Procedure PT-116 establishes the upper flux limit for Zero Power Physics Testing as indicated on the Intermediate Range Nuclear Instrumentation. Sensible heat is being produced when indication in RCS T-ave, RCS Loop T-hot and Makeup Tank Level are increasing. The intermediate range current readings are reduced by a factor of 3.3 to establish the upper flux limit for ZPPT.

## 7. Power Escalation Tests

Procedure PT-120 outlines the steps taken during escalation of reactor power from 0 to 75% following completion of zero power physics testing. It provides test requirements at the 30%, 56% and 75% power plateaus (rescaled for 3 RCP operation). The inspector witnessed completion of enclosure 1 and enclosure 2, reviewed the test results of enclosure 3 and enclosure 5, and verified that acceptance criteria for 30% power plateau for section 10.2.1 thru 10.2.5, and 10.2.7 were met.

## 8. Plant Tour

The inspectors toured the control room, reactor auxiliary building, containment building and the diesel generator building to observe work activities in progress, housekeeping, and tag controls on equipment.

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