Florida Power
CORPORATION

September 29, 1982
#3F-0982-15
File: 3-0-30

Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Interim Reliability Evaluation Program Study Recommendations

Dear Mr. Stolz:

By letter dated August 20, 1982, you requested an update to our November 6, 1980 responses concerning the Interim Reliability Evaluation Program (IREP) study of Crystal River Unit 3. The specific items and their responses are duplicated below with change bars to denote an updated response.

Item 1.
Ensure that the licensee's voluntary action to eliminate the AC power dependency in the steam-driven emergency feedwater train is properly implemented.

Response
This item is complete and has been verified by NRC I&E Inspectors.

Item 2.
Verify the existence of or add to the Technical Specifications a limiting condition for operation that requires prompt shutdown if the steam-driven emergency feedwater pump train and the electric-motor-driven emergency feedwater pump train are both inoperative.

A046

Response
Technical Specifications LCO 3.7.12 and the applicable paragraph 3.0.3 adequately address this recommendation. Additionally, FPC has implemented further administrative controls.

Item 3.
Verify the adequacy of the licensee's procedures regarding the checking of check valve position for those valves whose failure would cause a LOCA that blows down outside containment and require appropriate testing in the Technical Specifications.

Response
A Pump and Valve Test program was submitted to the NRC on July 25, 1979, and subsequent revisions per NRC request. FPC's proposed program meets Tech Spec 4.0.5 and ASME Section XI requirements.

Item 4.
The common DC power dependency between one diesel and the emergency feedwater system turbine admission valve should be eliminated. We note, however, that one of the suggestions made by our contractor (to power the admission valve from both DC trains) may not be desirable since it may compromise DC power redundancy. An EFS turbine steam admission valve that fails open upon loss of DC power may be appropriate.

Response
Florida Power Corporation evaluated the addition of a third emergency feedwater (EFW) pump and concluded that it was not desirable. Our November 30, 1981 letter to Mr. Harold Denton (NRC) gave the cost/benefit results and stated the following reasons for not needing a third EFW pump.

- The unavailability of the CR-3 upgraded two-pump EFW system (2×10^{-4}) is similar to the typical EFW system value (1.5×10^{-4}) presented in WASH-1400 Appendix 5, Table V-4-1.
- The CR-3 existing two-pump system (with upgrade installed) exceeds all of the proposed safety criteria.
- None of the three pump designs satisfy the proposed NRC or AIF cost/benefit criteria.

The installation of a valve in parallel to the EFW turbine emission valve that would be powered from the other DC bus was studied. The two EFW trains are controlled by separate buses. Should the steam-driven EFW pump and associated DC power supply fail, the other EFW train would be available. The valves can be manually operated, if required. Therefore, Florida Power Corporation did not see a significant gain in safety and decided to maintain the complete separability of the two trains.

Item 5.
Additional investigation of the diesel-generator failure history is recommended.

Response
Emergency diesel generator (EDG) failure history from commercial operation (unscheduled maintenance) to date is as follows:

Year	No. of Failures	Total Duration of Failures (Hrs.)
1977	4	21.0
1978	2	6.0
1979	4	59.0
1980	3	128.0
1981	4	72.5
1982 (thru July)	7	6.5

Unavailability of the emergency diesel generators is extremely low.

Item 6.
We recommend operator training and procedure review based on the IREP sequences. It is our understanding that this is now underway. The adequacy of this training and procedure review should be ascertained.

Response
Operator training and procedure review to assure inclusion of the major concerns you expressed in your cover letter have been accomplished.

Procedural changes and operator training required to implement the Anticipated Transient Operating Guidelines are part of those items encompassed by SECY 82-111, "Requirements for Emergency Response Capability", which has been approved by the NRC Commissioners on July 16, 1982. Completion schedules for these items will be submitted in accordance with that document.

Item 7.
The decay heat closed cycle cooling water system (DHCCCS) has two trains which are completely redundant. This system provides component cooling to several engineered safety features. Thus, a single failure would disable not only one train of DHCCCS but also one train of multiple engineered safety features. It may be prudent to modify the DHCCCS to include one or more properly engineered cross-over points to reduce this common coupling of multiple systems.

Response
The Engineered Safety Features Actuation Systems (ESFAS) consist of redundant trains, each train supplied by a separate train of the Decay Heat Closed Cycle Cooling System (DHCCCS). Failure to achieve an ESFAS function, therefore, requires the failure of two trains, i.e.:

- both ESFAS trains, or
- both DHCCCS trains, or
- one DHCCCS train and the ESFAS train not supplied by the failed DHCCCS train.

It has been suggested that DHCCCS "crossover points" would eliminate the last double-failure combination, thereby improving plant reliability.

A reliability analysis was performed to assess the potential benefit to be derived from DHCCCS crossover points. The absolute improvement in plant reliability depends on numerical values assigned to various component failure rates. There is considerable debate within the industry as to appropriate failure rates, particularly in regard to the influence of human errors. However, the calculated analysis provided ranges for the relative improvement in plant reliability.

Assumptions in the analysis were made such that the maximum improvement in reliability would be achieved. A measure of this improvement is the factor F, defined as:

$$F = \frac{\text{unavailability of ESFAS without crossover points}}{\text{unavailability of ESFAS with crossover points}}$$

The maximum value for the calculated "improvement factor" is 2.0. When failure probabilities reported in the IREP study are used as input, the "improvement factor" is only 1.5. The maximum improvement factor of two is relatively insignificant considering typical uncertanties (a factor of ten, or more) in actual data bases used in probabilistic risk assessment analyses. We, therefore, do not feel that the suggested crossover points significantly increase the reliability of Engineered Safety Feature Actuation Systems, which are already designed with large safety margins.

The included analysis is not directly applicable to the High Pressure Injection System (HPI). The HPI System consists of two pumps in two trains with cooling water supplied from the DHCCCS, with a third pump supplied with cooling water from the NSCCCS as the system is presently designed, which would make the addition of DHCCCS crossover points for the HPI system unnecessary.

Item 8.
Review the steam line rupture matrix circuitry for actuation or failure modes which might disable both trains of emergency feedwater. It may be appropriate to conduct a risk tradeoff study of these systems to see if they do indeed reduce overall risk.

Response
Florida Power Corporation is aware of the concern expressed. The design of the new B&W Emergency Feedwater Integrated Control system (EFIC) has been finalized. We are in the process of procuring parts and are processing about 16 modification design projects for EFIC. The complete EFIC system should be ready for operation after the Fall of 1984 refueling outage.

Item 9.
Consider the possibility of further modifications to the Emergency Feedwater System. The Crystal River 3 plant has a two pump EFS arrangement. With action on items 1, 2, 4 and 8 above, the Crystal River 3 EFS is not notably unreliable. However, here, as well as in other EFS studies, we find inherent limitations in the two pump configuration.

Response
Response to Items 1, 2, 4 and 8 indicate our concurrence with this recommendation.

At the present time Florida Power Corporation does not have any additional comments on the results of the IREP study that were not included in our November 6, 1980 letter.

Very truly yours,

Patsy Y. Baynard

Dr. P. Y. Baynard
Assistant to Vice President
Nuclear Operations

WAK/myf

cc: Mr. J.P. O'Reilly
Regional Administrator
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
101 Marietta Street, Suite 3100
Atlanta, GA 30303