Florida Power
CORPORATION

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Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Three Reactor Coolant Pump Operation without Reactor Coolant Pump Power Monitors

Dear Mr. Denton:

On April 6, 1982, your staff authorized operation of Crystal River Unit 3 (CR-3) at power levels up to 2300 MWt (90.4% of RATED THERMAL POWER) without use of Reactor Coolant Pump Power Monitors (RCPPMs) provided four (4) reactor coolant pumps were operating. Based on industry experience with the potential for less than 4-pump operation, Florida Power Corporation (FPC) hereby requests approval to operate CR-3 at power levels up to 75% of 2300 MWt with three of four reactor coolant pumps (RCPs) operating and the RCPPMs bypassed. The background of and justification for our request are provided herein.

The purpose of the RCPPMs is to anticipate loss of reactor coolant flow by monitoring the power supply to the RCPs. Installation of the RCPPMs provided a shorter delay between loss of flow and rod insertion in the safety analysis when compared to Nuclear Overpower based on Reactor Coolant Flow and Axial Imbalance trips.

Operational experience with the RCPPMs has shown that existing trip setpoints and response times coupled with transmission grid disturbances result in an unacceptable number of spurious reactor trips. These reactor trips have occurred due to distant fossil plant output perturbances, swapover between unit auxiliary and startup transformers, and startings of RCPs. The existence of this situation resulted in excessive challenges to safety systems.

To expedite operation of CR-3 without use of the RCPPMs, we calculated an interim power level (2300 MWt) without the pump status trip and assuming current conservatisms were maintained. All analyses were conducted in a

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manner consistent with Babcock and Wilcox reload methodology as described in the NRC approved technical specifications for Cycle 4 operation of CR-3. The worst case analysis yielded a minimum DNBR of 1.43 for the 4-pump coastdown event, i.e., loss of flow accident. The acceptance criteria for minimum DNBR for Cycle 4 operation is 1.35. Therefore, sufficient safety margin was shown to exist and your staff approved operation of CR-3 at any power level up to 2300 MWt with the RCPPMs bypassed provided four RCPs were operating.

For the case of three of four RCPs operating, DNBR protection must still be provided. A Reactor Protection System (RPS) power-imbalance envelope has been established for four pump operation. Because values of DNBR are dependent upon flow, the power-imbalance envelope must be adjusted for three pump operation. A decrease in the reactor coolant flow of $\sim$25% (i.e., for 4-pump to 3-pump operation) has the effect of reducing the power-imbalance envelope by $\sim$25% Full Power. Thus, the RPS 3-pump steady-state reactor coolant flow protection for DNBR is provided by the power-imbalance flow trip, in which the power setpoint to the trip bistable is automatically adjusted for 3-pump operation by the decrease in reactor coolant flow to $\sim$75% flow.

DNBR analyses performed for steady-state partial pump operation are based on design power levels which are related to the flux-flow setpoint. The flux-flow setpoint value is established so that a minimum DNBR criteria is not violated.

Since the flux-flow ratio represents the relationship between a design power level and a design flow rate, (full power, 4-pump operation), the relationship will remain valid for different flow rates and corresponding power levels. A reduction in design flow of 25% corresponding to 3-pump operation would require a reduction in power of $\simeq$25%. Therefore, 3-pump operation at 75% of the maximum 4-pump power level will satisfy DNBR criteria.

In summary, the 3-pump RPS philosophy is that steady-state 3-pump protection is provided through the power/imbalance/flow/trip. The setpoint to the bistable is automatically adjusted by the reduction in reactor coolant flow, such that no operator action is required to provide a 3-pump power-imbalance flow protection.

Because of past operating experience with the RCPPMs and the potential need for 3-pump operation, FPC has analyzed the operation of CR-3 at power levels up to 75% of 2300 MWt with three RCPs operating and the RCPPM function bypassed. We have determined minimum DNBR will not be exceeded for the worst case pump coastdown event with three RCPs operating because the same or higher DNBR will be observed at the onset of the transient and the flow reduction rate (i.e., 75% to 0% versus 100% to 0%) will be reduced. To ensure these conditions are met, FPC will scale the nuclear instrumentation to read 100% Full Power at 2300 MWt and maintain the power level at no greater than 75% of 2300 MWt for 3-pump operation.

The FPC onsite and offsite safety review committees have reviewed and recommended approval for operation of CR-3, as described above. Operation in such a manner does not constitute an unreviewed safety question.

Pursuant to 10CFR170.12, Florida Power Corporation has determined the requested action to constitute a Class III amendment. However, as this request supplements our request of April 1, 1982, no additional amendment fee is provided.

Very truly yours,

David G. Mardis

David G. Mardis
Acting Manager
Nuclear Licensing

cc: Mr. J. P. O'Reilly