Florida Power
CORPORATION

May 1, 1984
3F0584-01

Director of Nuclear Reactor Regulation
Attention: Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
On-Line ES Actuation Logic Testing

Dear Sir:

In your letter to Florida Power Corporation (FPC), dated February 21, 1984, you provided comments based on our October 31, 1984 submittal. The responses to these comments are provided herein in Enclosure 1. Your reply is needed by May 31, 1984 for Florida Power Corporation to meet our system design schedule.

Florida Power Corporation requests that the NRC expeditiously review and approve our prior request to remove the Engineered Safety Features Actuation System (ESFAS) signals for the valves listed in Table 1 of our October 31, 1984 submittal. We are presently experiencing problems with spurious ES actuations of these valves which could cause component damage or system transients. This is a problem that can only be resolved by removal of the ES signal from these valves.

If you have any further questions, please contact this office.

Sincerely,

G. R. Westafer

G. R. Westafer
Manager, Nuclear Operations
Licensing and Fuel Management

EMG/feb

cc: Mr. J. P. O'Reilly
Regional Administrator, Region II
Office of Inspection & Enforcement
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101 Marietta Street N.W., Suite 2900
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ENCLOSURE 1

RESPONSE TO NRC COMMENTS ON PROPOSED ON-LINE ES ACTUATION LOGIC TESTING

CRYSTAL RIVER UNIT 3

COMMENT 1: The current testing of ES logic includes the capability to test groups of end devices by tripping the ES sensor channels to give the required logic coincidence. In this manner all end devices associated with the test group are actuated. In general, where full system action is to be avoided, this is accomplished by placing those components associated will full system actuation in different test groups. As an example, if full system actuation occurs on starting of an injection pump and opening of a valve in the system flow path, each of these components would be placed in a different test group such that they would be tested separately to avoid system operation. Further, testing in this manner places equipment in the state required to perform the safety action. Where testing is performed in a manner as proposed, i.e., blocking of actuation signals, it is necessary to give appropriate consideration to the effects that the inoperable components have with regard to system redundancy. As an example in the makeup and purification system, valves MUV-53 and MUV-257 are two normally open valves that are located in the same line. The safety function is obtained by the closure of either valve. In a case such as this, these components should not be included in the same test group if they are to be tested in a manner which would block a ES signal from operating the end device. The aspect of the test scheme which renders a device inoperable should not negate the automatic actuation of redundant components. This is an aspect of the design which should be addressed in a formal proposed change.

RESPONSE 1: ES actuation is tested on a single train basis. It is the philosophy of this testing system that automatic actuation of redundant components will not be rendered inoperable during testing.

COMMENT 2: Testing schemes which include blocking of safety actions should include appropriate bypassed and inoperable status indication to assure that the systems are returned to an operable state on the conclusion of testing.

RESPONSE 2: Bypassed and inoperable status indication is provided in the proposed scheme. See FPC's submittal to the NRC, dated January 30, 1984 (3F0184-26), Page 4 under Design Configuration.

COMMENT 3: An evaluation of proposed changes should include verification that the modifications do not negate the original system design basis as well as satisfying IEEE-279-1971 requirements. The latter should be accomplished by a description of how each specific requirement is satisfied by the proposed modification.

RESPONSE 3: The proposed scheme satisfies the intent of IEEE 279-1971 and does not negate original design basis as identified in FSAR section 7.1.3.

COMMENT 4: FPC requested staff approval for removing the ES automatic closure signal from the make-up tank isolation valve (MUV-64) in order to improve the availability of the HPI/make-up pumps, which can fail in a very short period of time from loss of suction from both make-up tank and the borated water storage tank (BWST). With the present design, an inadvertent or bonafide ES signal will cause the make-up tank valve to close and the BWST valve to open. However, failure of the BWST valve to open would cause loss of suction to two pumps. FPC stated that increased pump availability could be provided by manual closure of MUV-64 from the control room. Preliminary calculations by FPC also indicate that the operator has a minimum of five minutes to several hours to close the valve before a low level occurs in the make-up tank or in both the make-up tank and the BWST. A low level alarm and level indicator are provided in the control room to alert the operator of a low level condition. The HPI/make-up pump is protected against a failure of the piping in the discharge of the make-up tank by a check valve preventing back flow of borated water from the BWST. Based on the licensee's submittal we are unable to conclude that removal of the automatic closure signal from MUV-64 will not cause unacceptable reactor coolant boron dilution during emergencies prior to the manual isolation of the valve. The effects of the mixing of low

concentration borated water in the BWST was not discussed in the FPC submittal. Furthermore, FPC has not identified the events that may require isolation of the valve between five minutes to several hours. The staff requires a minimum time interval of 10 minutes to find manual operator action acceptable for mitigating the unacceptable consequences of an event.

RESPONSE 4: It was noted in FPC's October 31, 1983 submittal (3F1083-25), that the operator has a minimum of five minutes to several hours to close MUV-64 before a low level in the make-up tank will occur. The five minute limitation is based on a scenario where ES actuation starts both HPI pumps, but due to a single failure, the BWST suction line to the normal running make-up pump does not open. Under this scenario, the normal running make-up pump and the ES HPI pump on that side will continue to draw borated water from the make-up tank. If operation action is not taken within five minutes, the make-up tank will be emptied and the normal running make-up pump and the ES HPI pump on that side damaged. In this postulated scenario, the other standby make-up pump also starts on an ES actuation signal and draws borated water only from the BWST. Since a single failure has been postulated in the normal make-up pump train, a second failure in the standby pump train is not postulated; therefore, the standby pump train will provide the necessary borated water.

The several hour upper limit is based on a scenario where initially upon ES actuation, the suction valves from the BWST will open and water will flow from both tanks. Mixing of a low concentration borated water will not occur in the borated water storage tank (BWST). A check valve is located in each supply line from the BWST to the suction of the make-up pumps which prevents back flow of borated water from the make-up tank to the BWST.

Based on a worst case condition (i.e., largest amount of make-up tank volume injected) analysis shows that approximately three hours will elapse before low-low level in the make-up tank will be reached. However, it would be expected that the operator would close MUV-64 within 10-20 minutes after an ES actuation, thereby reducing the make-up tank volume discharged to the reactor coolant system. The dilution effect is considered acceptable based on the following:

a. Table 3-6 (Equilibrium Cycle Shutdown Reactivity Analysis) of the FSAR shows that at the end of life the excess control rod worth equals 1.0% K/K. Therefore, while the reactor coolant system is above 532°F, negative reactivity by control rods alone is assured.

b. A comparison of the volume and boron concentration of the BWST (420,000 gallon @ 2270 ppm) with that of the make-up tank (3000 gallon @ 0 to 1200 ppm) shows that injecting the make-up tank contents with the BWST would result in an insignificant effect on the reactor coolant system equilibrium concentration.

COMMENT 5: As a result of operating experience and changes in operating practices at Crystal River Unit 3, FPC has determined that certain plant equipment may be required to operate after an accident and should not be isolated when the reactor building isolation signal is activated. FPC therefore proposes to remove the isolation signal from the power-operated isolation valves in the eight motor jacket cooling water and seal water return lines serving the Reactor Coolant Pumps. The original design basis for control of the reactor coolant pumps and their auxiliaries include the following:

a. The reactor coolant pumps are not required for any post accident condition;

b. The pumps can be operated for indefinite periods of time with either seal or motor cooling; and

c. Momentary isolation of pump motor cooling is acceptable.

As a result, the pump motor cooling water lines penetrating the Reactor Building were equipped with isolation valves that were automatically actuated by the Reactor Building Isolation ES Signal.

Based on the TMI-2 lessons learned and on operational difficulties that have been experienced with the reactor coolant pump seals, the original basis for control of the isolation valves associated with the seal return and motor cooling lines is no longer appropriate. More specifically, the reactor coolant pumps may be required to operate following onset of a small break LOCA. For

more reliable operation of the pumps, seal injection and motor cooling should not be perturbed during power operation. Therefore, automatic isolation of the seal water return and motor cooling water lines is not desirable. The staff has reviewed FPC's justification for removing the ES signal from these isolation valves. Although the October 31, 1983 submittal briefly discusses the effect of the proposed change on Reactor Building integrity, no specific discussion of how 10 CFR 50, Appendix A Criterion 55 (GDC-55) would continue to be met since these valves could no longer be considered "automatic isolation valves". Table 5-4 in the Crystal River Unit 3 FSAR shows that these valves close automatically following an ES signal. Since GDC-55 applies to the reactor coolant pump seal return isolation valves (MUV-253, -258, -259, -260, -261), the staff needs information regarding how the criterion will continue to be met.

RESPONSE 5: Each seal water return line has a flow sensor which annunciates in the control room on high flow. If a reactor coolant pump seal would fail, the resulting increase in flow through the seal return line would be alarmed to alert the operator to take manual action. The control switches for these valves are currently located on the main control board. These switches would remain functional after the ES actuation signal is removed.

The seal water return lines are designed as seismic category I from the reactor coolant pumps through to the make-up tank. The lines are fabricated in accordance with B31.7, class N1 from the reactor coolant pumps to the outside containment isolation valve. After the isolation valve, the seal return line is fabricated as B31.7, class N3, February 1968 (issued for trial and comment) through to the make-up tank.

The reactor coolant pumps can be operated for indefinite periods of time with motor cooling, and limited periods of time with seal injection cooling.

COMMENT 6: Sodium thiosulphate has been deleted as an agent in the Reactor Building spray solution. The tank formerly used for sodium thiosulphate is currently used in the system for addition of sodium hydroxide to the spray water. The tank formerly used for the sodium hydroxide addition system has been retired in place (or "spared"). The discharge line from this spared tank includes two (2) motor operated valves which are automatically actuated via the Reactor Building Isolation ES Signal. Since the tank is spared and does not perform any safety function,

the isolation valves are maintained in a closed position. If the isolation valves are locked closed, the ES signals could be removed without decreasing the integrity of the Reactor Building Spray System. FPC should commit to lock closed the valves that are on the discharge lines from the sodium make-up tank.

RESPONSE 6: FPC will lock closed the former sodium hydroxide storage tank isolation valves.