

January 13, 1975

SUPPLEMENT NO. 1
TO THE
SAFETY EVALUATION
DIRECTORATE OF LICENSING
U.S. ATOMIC ENERGY COMMISSION
IN THE MATTER OF
FLORIDA POWER CORPORATION
CRYSTAL RIVER UNIT 3
DOCKET NO. 50-302

REGULATORY DOCKET FILE COPY

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1.0

INTRODUCTION

The Atomic Energy Commission's (Commission) Safety Evaluation Report (SER) in the matter of the application by Florida Power Corporation to operate the Crystal River Unit 3 facility was issued on July 5, 1974. In that SER, the Regulatory staff indicated that certain matters would be resolved prior to issuance of an operating license.

The purpose of this report is to supplement the SER by providing the staff's evaluation of the additional information submitted by the applicant on these matters since the SER was issued. Each of the following sections in this report is numbered the same as the pertinent sections of the SER.

Appendix A to this report is a continuation of the chronology of our actions related to the processing of this application. The report of the Advisory Committee on Reactor Safeguards (ACRS) on this application is attached as Appendix B. The staff's evaluation of the applicant's financial qualifications will be provided in a supplemental report prior to issuance of an operating license.

2.0 SITE CHARACTERISTICS2.3 Meteorology

The SER states that we will evaluate the applicant's meteorological data collection system for conformance with Regulatory Guide 1.23, "Onsite Meteorological Programs," dated February 17, 1972 prior to issuance of an operating license for this facility. We have reviewed the applicant's proposed meteorological program, including a review of the system performance specifications, and find it to be in conformance with Regulatory Guide 1.23. Installation of the meteorological data collection system has been completed and is operational. We will require submittal of additional collected meteorological data to further verify the atmospheric dispersion conditions prior to issuance of an operating license.

6.0 ENGINEERED SAFETY FEATURES6.3 Emergency Core Cooling System (ECCS)

The Advisory Committee on Reactor Safeguards recommended that appropriate operating limits and procedures be delineated in the Technical Specifications to ensure conformance with 10 CFR Part 50.46 with regard to the Final Acceptance Criteria (FAC) on ECCS matters. We will evaluate the applicant's ECCS report and incorporate the required operating limits into the Technical Specifications prior to the issuance of an operating license. Our evaluation of the applicant's ECCS analysis for conformance with 10 CFR Part 50.46 will be submitted in a supplemental report.

7.0 INSTRUMENTATION AND CONTROLS7.1 General

This section reflects the results of our review of the applicant's proposed resolutions of the outstanding instrumentation and control items identified in the SER. These items, identified by SER section are as follows:

1. Section 7.3.1 - Indication system for the core flooding tank isolation valves.
2. Section 7.3.2 - Steam line break isolation system.
3. Section 7.4 - Emergency feedwater system.
4. Section 7.5 - Safety related display instrumentation.
5. Section 7.6 - Residual heat removal overpressure protection interlocks.
6. Section 7.7 - Potential for accumulation of hydrogen in the control room emanating from the battery room.
7. Section 7.9.1 - Cable separation at the entrance of the reactor protection system cabinets.
8. Section 7.9.2 - Switchgear rooms flooding as a result of nearby main firewater line failure.
9. Section 7.9.3 - Common exhaust and door separation in the battery rooms.
10. Section 7.9.4 - 230 kV switchyard breakers control power separation.
11. Section 7.10 - Manual switches for disconnecting power to each group of control rods.

Items 1, 2, 3, 4, and 5, above were noted in the SER as commitments from the applicant to meet our requirements as stated in the SER. We have reviewed the additional information provided by the applicant for these items and have concluded that all the commitments have been satisfactorily implemented in accordance with the stated requirements and are discussed below.

Items 6, 7, 8, 9, 10, and 11 above permitted the applicant to either demonstrate existing design adequacy (through analysis or submittal of additional information) or submit modified designs that comply with our positions as stated in the SER. These items have been resolved satisfactorily as discussed below.

7.3.1 Core Flooding Tank Isolation Valves - Item 1

The staff has completed its review of the applicant's design modifications of the core flooding tank isolation valve position indication circuitry and concludes that the modifications provide redundant and independent indication systems for each core flooding tank valve.

7.3.2 Steam Line Break Isolation (SLBI) - Item 2

We have reviewed the design modifications to the steam line break isolation (SLBI) instrumentation control and electrical equipment and conclude that they provide the required isolation and are acceptable.

7.4 Systems Required for Safe Shutdown - Item 3

The staff identified failures of single active components coincident with certain auxiliary feedwater line ruptures that could cause the loss of this vital system. We have reviewed the applicant's design modifications and conclude that the proposed modifications provide the necessary redundancy to make the consequences of a single failure in the auxiliary feedwater system acceptable.

7.5 Safety Related Display Instrumentation - Item 4

We have reviewed the applicant's design modifications to display information required by the operator to perform required safety manual functions and post accident surveillance and conclude that it is acceptable.

7.6 Residual Heat Removal (RHR) Interlocks - Item 5

The applicant's modifications to the RHR motor-operated suction valve interlocks have been reviewed by the staff and found to be acceptable. We conclude that the applicant's design modifications provide satisfactory diversity of principles on interlocks on the RHR system valves to prevent opening of these valves and for automatic closure of these valves.

7.7 Control Room Ventilation - Item 6

The SER addressed the problem of exhausting the hydrogen generated in the battery rooms into the control room through the common ventilation system ducts. We indicated that the applicant should either demonstrate that a fire or explosion could not occur in the control room using the common ducts, or modify the design to prevent these events from happening. We have reviewed additional analysis and calculations submitted by the applicant and have concluded that the maximum possible accumulation of hydrogen in the control room will not be sufficient to yield an explosive mixture during both normal and emergency operations of the control room ventilation system. Therefore, we conclude this concern has been resolved without the need to modify the existing design.

7.9.1 Reactor Protection System (RPS) Cable Separation - Item 7

We stated in the SER that the applicant had agreed to examine the cable arrangement at the entrance of the RPS cabinets, and either show that it maintains required vertical and horizontal distance separation or provide barriers when the minimum spatial separation between redundant safety related cables cannot otherwise be maintained.

The result of this examination has indicated the need for barriers in certain instances. The applicant has agreed to install suitable barriers wherever required to maintain the

minimum required separation. We have concluded that this use of barriers is an acceptable design modification and that an acceptable degree of separation will be incorporated in the final installation of the RPS cables.

7.9.2 Switchgear Rooms Flooding - Item 8

The SER stated that the applicant had agreed to examine the potential for flooding both safety related switchgear rooms as a result of nearby main firewater line failure, and either demonstrate that flooding will not result or modify the facility design to make the consequences of such a failure acceptable.

The applicant has indicated that the design will be modified to include a preaction valve that will allow water to be in or flow through the main firewater line only when the fire protection system is operated. We have concluded that this design modification is acceptable.

7.9.3 Battery Rooms Separation - Item 9

We stated in the SER that the applicant had agreed to examine the common ventilation exhaust duct and common wall and door in the battery rooms, and either demonstrate that the exhaust duct, door and wall designs will confine a fire or explosion to one of the redundant battery rooms or make appropriate design modifications to assure complete independence between the two battery rooms.

The applicant has indicated that the common exhaust duct will be removed from within the battery rooms. Also, the common door between the battery rooms will be eliminated and filled with concrete. We have concluded that these design modifications are acceptable.

7.9.4 230 kV Switchyard Breakers Control Power Separation - Item 10

The SER stated that the applicant had agreed to submit additional information in support of the design arrangement for routing independent d-c control power feeds to the 230 kV switchyard breakers via a common walk through tunnel, and either demonstrate that the design is not susceptible to common mode failure or modify it accordingly.

The applicant has documented in the FSAR that physical separation for independent cable installed within the common walk through tunnel will be maintained by the use of cable tray and conduit. We have concluded that this use of cable trays and conduits constitutes acceptable separation and that the 230 kV switchyard is in accordance with General Design Criteria No. 17.

7.10 Control Systems - Item 11

We indicated in the SER that information had been requested from the applicant justifying the use of manual switches for disconnecting power to each group of control rods.

It has been determined that access to these switches are for maintenance purposes and that maintenance personnel will be adequately protected. We have concluded that the use of manual switches does not degrade the safety of the plant and is acceptable.

7.11 Anticipated Transients Without Scram (ATWS)

The applicant is reviewing the staff report, WASH-1270, "Technical Report on Anticipated Transients Without Scram (ATWS) for Water-Cooled Power Reactors" and was granted an extension to December 31, 1974 for submittal of its analysis on this matter. That analysis is contained in B&W Topical Report BAW-10099, "Babcock & Wilcox Anticipated Transient Without Scram Analysis", dated December 1974. The staff evaluation of that analysis will be contained in a supplemental report.

8.0 ELECTRIC POWER8.1 General

This section reflects the results of our review of the applicant's proposed resolution of the outstanding electrical items identified in the SER. These items identified by SER section are as follows:

1. Section 8.3 - Connection of selected Non-Class IE loads to one of the Class IE emergency buses.
2. Section 8.3 - Diesel generator qualifications.
3. Section 8.3 - Provisions for paralleling redundant diesel generators.
4. Section 8.3 - Isolation of the emergency buses from the offsite power sources when offsite power is lost.
5. Section 8.3 - Tie breakers connecting redundant emergency buses at the 480 volt level.
6. Section 8.4 - D.C. power system.

Items 1, 2, 3, 4, and 5, above were noted in the SER as commitments from the applicant to meet our requirements stated in the SER. We have reviewed the additional information provided by the applicant for these items and have concluded that all commitments have been satisfactorily implemented in accordance with the stated requirements and are discussed below.

With regard to item 6, the SER indicated that the applicant should either demonstrate (through analysis or submittal of additional information) the adequacy of the designs, or submit modified designs to comply with our position as stated in the SER. This item has been satisfactorily resolved by design modification as discussed below.

8.3 Onsite AC Power Systems

Connection of Selected Non-Class IE Loads to Class IE

Emergency Buses - Item 1

We stated in the SER that in the event of an accident coincident with the loss of offsite power, a failure in the Non-Class IE electrical system could result in the unselected connection of Non-Class IE loads to the emergency buses which could result in the tripping of the associated diesel generator due to overload. The applicant has modified the design so that the feeder breaker connecting the 4160/480 V transformer to one of the emergency buses will be open during an accident concurrent with the loss of offsite power. We have reviewed the above design modification and find that the diesel generator capacity is assured during this postulated event and the system, as modified, is therefore acceptable.

Diesel Generator Qualifications - Item 2

We also stated in the SER that the applicant should identify other nuclear plants which used the same type of diesel generator

which are to be used in the Crystal River Unit 3 facility. The applicant has stated that the diesel generators which have been qualified for service at Crystal River Unit 3 are similar to those qualified and in use at the Peach Bottom Units 2 and 3, Three Mile Island Unit No. 1, Millstone Nuclear Plant No. 1 and the Prarie Island plant, all of which have received operating licenses. We conclude that the diesel generator qualifications have been adequately substantiated.

Provisions for Paralleling Redundant Diesel Generators - Item 3

As stated in the SER our review of the electrical schematics identified a lack of independence of the redundant emergency buses as a result of a design feature that provided for paralleling of the redundant diesel generators through the tie breakers connecting redundant 4160V buses when the offsite power will not be available. We have reviewed the applicant's proposed design modification and conclude that appropriate design changes have been made to the circuitry to preclude inadvertent paralleling of the diesel generators.

Isolation of the Emergency Buses from the Offsite Power Sources

When Offsite Power is Lost - Item 4

It was noted during our review that the manual controls through which offsite power will be supplied to the emergency buses interfered with the operation of the undervoltage trip signal required to isolate the emergency buses from the offsite

power sources when offsite power is lost. We have evaluated the applicant's design modification to provide interlocks to prevent paralleling of the emergency buses during loss of offsite power and conclude that the required isolation has been provided.

Tie Breakers Connecting Redundant Emergency Buses at the 480 Volt Level - Item 5

We stated in the SER that the tie breakers connecting redundant emergency buses at the 480 volt level would not open automatically upon receipt of an engineered safety feature actuation trip signal, thus compromising the independence of the redundant emergency buses. We have reviewed the applicant's proposed modifications and conclude that the interlocks provided assure the independence of the redundant emergency buses.

8.4 D-C Power System - Item 6

We stated in the SER that the applicant had agreed to modify the design to assure that the independence of the redundant d-c systems is maintained by either supplementing administrative controls with mechanical and/or electrical interlocks or deleting the manual cross-connections between the redundant d-c systems. The applicant has elected to delete all the cross-connections between the redundant d-c systems. We have reviewed the design modifications and have concluded that they conform to General Design Criteria No. 17 and IEEE Std. 308-1969 and are acceptable.

We also stated in the SER that the applicant had agreed to make the design of the cross-section between 120 volt vital a-c buses conform to General Design Criteria No. 17 and to reconsider the supply of the vital buses from the non-Class IE regulated instrument buses. The applicant has elected to (1) delete all the cross-connections between the redundant 120 volt vital a-c buses and (2) delete the supply of the vital buses from the Non-Class IE regulated instrument buses. We have reviewed these design modifications and have concluded that they are acceptable also.

13.0 CONDUCT OF OPERATIONS13.1 Plant Organization, Staff Qualifications and Training

The SER stated that our review of the applicant's operating personnel requalification program had not been completed. We have since completed our evaluation of this program, which is described in Amendments Nos. 35 and 42 to the application, and have determined the program meets the requirements of Sections 50.34(b)(8) and 50.54(i-1) of 10 CFR Part 50 and Appendix A of 10 CFR Part 55. We have concluded that the applicant's personnel requalification program is acceptable.

APPENDIX A

CHRONOLOGY

CONTINUATION OF THE REGULATORY REVIEW OF FLORIDA POWER CORPORATION

CRYSTAL RIVER, UNIT 3

- 115. May 15, 1974 Submittal of Amendment No. 39 consisting of revised and additional pages to the FSAR.
- 116. June 10, 1974 Letter from applicant concerning feedwater systems and electrical instrumentation and control aspects of the engineered safeguards system.
- 117. July 3, 1974 Submittal of Amendment No. 40 consisting of revised and additional pages to the FSAR.
- 118. July 3, 1974 Letter from applicant regarding Revision #3 to Effects of High Energy Piping System.
- 119. July 5, 1974 Letter to applicant transmitting Safety Evaluation Report.
- 120. July 15, 1974 Letter from applicant requesting extension of completion of construction for Unit 3.
- 121. July 23, 1974 Letter from applicant transmitting detailed EI&C Drawings.
- 122. August 8, 1974 Letter to applicant transmitting Regulatory Guide 1.33.

123. August 9, 1974 Letter from applicant regarding final acceptance criteria and B&W reports.
124. August 9, 1974 Letter from applicant regarding revised requalification training program.
125. August 12, 1974 Letter from applicant transmitting additional EI&C Drawings.
126. August 27, 1974 Submittal of Amendment No. 41 consisting of revised pages and exhibits to the application and FPC's 10 year statistical report and financial report and technical qualifications.
127. September 23, 1974 Submittal of Amendment No. 42 consisting of revised and additional information to the FSAR.
128. September 23, 1974 Letter from applicant transmitting additional EI&C drawings.
129. October 18, 1974 ACRS Report from the ACRS to the Chairman.
130. October 30, 1974 Letter from applicant furnishing additional information regarding the extension request for the completion dates of the construction permit.
131. November 1, 1974 Submittal of Amendment No. 43 consisting of revised and additional information to the FSAR.

APPENDIX B

October 17, 1974

Honorable Dixy Lee Ray
Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Subject: REPORT ON CRYSTAL RIVER NUCLEAR GENERATING PLANT, UNIT 3

Dear Dr. Ray:

At its 174th meeting, October 10-12, 1974, the Advisory Committee on Reactor Safeguards completed its review of the application of the Florida Power Corporation for a license to operate the Crystal River Nuclear Generating Plant, Unit 3, at power levels up to 2432 Mw(t). This project was considered during a Subcommittee meeting in Washington, D. C., on July 29, 1974, and a site visit was made on July 9, 1974. In the course of the review, the Committee had the benefit of discussions with representatives and consultants of the Florida Power Corporation, the Babcock and Wilcox Company, Gilbert Associates, Inc., and the AEC Regulatory Staff. The Committee also had the benefit of the documents listed below.

The plant is located on the Gulf of Mexico in Citrus County, Florida, about 7-1/2 miles northwest of the town of Crystal River. The site comprises 4738 acres and includes Units 1 and 2 which are oil-fired. The minimum exclusion distance is 4400 feet, and the radius of the low population zone has been selected as 5 miles. The cooling water intake canal extends about 14 miles into the Gulf, and the discharge canal extends out about 10 miles.

The protection against flooding has been expanded to meet the estimated maximum hurricane-induced surge level with additional wave run-up heights, using parameters more conservative than those identified at the construction stage.

Rec'd
of Licensing
Date 10/18/74
Time 2:10

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Date 10/18/74
Time 2:10

AR-7175

L. W. McIntyre, Reg.

October 17, 1974

A number of design modifications have been made during construction of the Crystal River plant in response to Regulatory Guides and changes in criteria. These changes have been reviewed and found acceptable by the Regulatory Staff and the Committee in connection with their reviews of the Crystal River plant or of other plants embodying similar changes (including Three Mile Island Nuclear Station, Unit 1, Arkansas Nuclear One, Unit 1, and Rancho Saco Nuclear Generating Station, Unit 1).

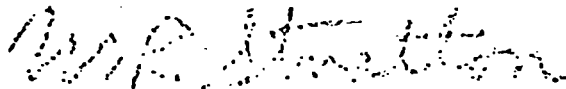
Among the items to be included in the Technical Specifications will be the operating limits and procedures for ensuring conformance with 10 CFR 50.46, covering ECCS evaluations. The Committee wishes to be kept informed on the progress of the Staff's review of the ECCS evaluation model employed, and the resulting changes in the manner of handling uncertainties and peaking factors in the Technical Specifications.

The evaluation of Anticipated Transients Without Scram (ATWS) is still pending. Reports on this generic matter were due by October 1, 1974, and review of the general evaluation by the Regulatory Staff or the Committee has not been completed. Following the generic review, specific case-by-case analysis are to be submitted, including a specific analysis on Crystal River Unit 3. This matter should be completed before operation of this unit and resolved in a manner satisfactory to the Regulatory Staff. The Committee wishes to be kept informed.

Other generic problems relating to large water reactors have been identified by the Regulatory Staff and the ACRS and discussed in the Committee's report dated February 13, 1974. These problems should be dealt with appropriately by the Regulatory Staff and the Applicant as suitable approaches are developed.

The Advisory Committee on Reactor Safeguards believes that, if due regard is given to the items mentioned above, and subject to satisfactory completion of construction and preoperational testing, there is reasonable assurance that the Crystal River Nuclear Generating Plant, Unit 3, can be operated at power levels up to 2452 MW(t) without undue risk to the health and safety of the public.

Sincerely yours,



W. R. Stratton
Chairman

References: Listed on page 3

REFERENCES:

1. Florida Power Corporation letter dated January 25, 1971, submitting Application for Operating License for Crystal River Nuclear Generating Plant and Final Safety Analysis Report (FSAR) Volumes 1-7.
2. Amendments 12 through 42 to the Application of Florida Power Corporation (Amendments to the FSAR).
3. Florida Power Corporation letter dated April 19, 1973, regarding the inadvertent disabling of components by racking out of circuit breakers.
4. Directorate of Licensing letter dated July 5, 1974, transmitting Outstanding Issues; and Safety Evaluation Report.