

July 27, 1999

Mr. John Paul Cowan
Vice President, Nuclear Operations
Florida Power Corporation
ATTN: Manager, Nuclear Licensing (NA1B)
Crystal River Energy Complex
15760 W. Power Line Street
Crystal River, Florida 34428-6708

SUBJECT: CRYSTAL RIVER UNIT 3 - ISSUANCE OF AMENDMENT REGARDING BASIS
FOR PIPE BREAK CRITERIA (TAC NO. MA2128)

Dear Mr. Cowan:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No.181 to Facility Operating License No. DPR-72 for Crystal River Unit 3 (CR-3). By letter dated May 28, 1998, Florida Power Corporation submitted proposed changes to the licensing bases for CR-3. The changes incorporate Generic Letter 87-11, "Relaxation in Arbitrary Intermediate Pipe Rupture Requirements," and NUREG/CR-2913, "Two-Phase Jet Loads," as part of the licensing basis for CR-3.

A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by:

Leonard A. Wiens, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-302

Enclosures: 1 Amendment No. 181 to DPR-72
2. Safety Evaluation

cc w/enclosures: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Sincerely,

A handwritten signature in black ink, appearing to read "A. Wiens".

Leonard A. Wiens, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-302

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NUCLEAR REGULATORY COMMISSION
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FLORIDA POWER CORPORATION
CITY OF ALACHUA
CITY OF BUSHNELL
CITY OF GAINESVILLE
CITY OF KISSIMMEE
CITY OF LEESBURG
CITY OF NEW SMYRNA BEACH AND UTILITIES COMMISSION,
CITY OF NEW SMYRNA BEACH
CITY OF OCALA
ORLANDO UTILITIES COMMISSION AND CITY OF ORLANDO
SEMINOLE ELECTRIC COOPERATIVE, INC.
CITY OF TALLAHASSEE

DOCKET NO. 50-302

CRYSTAL RIVER UNIT 3 NUCLEAR GENERATING PLANT
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. **181**
License No. DPR-72

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Florida Power Corporation, et al. (the licensees), dated May 28, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

- E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, changes to the updated Final Safety Analysis Report (FSAR) to incorporate the criteria contained in Generic Letter (GL) 87-11 and NUREG/CR-2913 as part of the Crystal River, Unit 3 licensing basis, as set forth in the application for amendment by Florida Power Corporation dated May 28, 1998, are authorized subject to the following limitations:

The use of the criteria in GL 87-11 for postulating breaks in piping located inside the containment and analyzed to the provisions of United States of America Standards B31.1-1967 shall be subject to the conditions specified in the staff's September 28, 1989, letter to Florida Power Corporation, "Crystal River Unit 3 - High Energy Line Break (HELB) Criteria for Analysis of Piping Outside Containment".

The NUREG/CR-2913 criteria will be used to evaluate jet loads on safety-related structures, systems and components due to postulated ruptures in the reactor coolant system (RCS), within the temperature and pressure limitations specified in the report for applicability of the jet model, at distances of greater than 10 pipe diameters from the postulated RCS rupture.

The licensee shall submit the revised description authorized by this amendment with the next update of the FSAR in accordance with 10 CFR 50.71(e).

3. This license amendment is effective as of its date of issuance and shall be implemented as specified in (2) above.

FOR THE NUCLEAR REGULATORY COMMISSION



Sheri R. Peterson, Chief, Section 2
Project Directorate II
Division of Project Licensing Management
Office of Nuclear Reactor Regulation

Date of Issuance: July 27, 1999



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 181 TO FACILITY OPERATING LICENSE NO. DPR-72

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

1.0 INTRODUCTION

By letter dated May 28, 1998, Florida Power Corporation (the licensee) submitted a request to amend Facility Operating License No. DPR-72 for Crystal River Unit 3 (CR-3). License Amendment Request #225 proposes changes to the Final Safety Analysis Report (FSAR) to incorporate Generic Letter (GL) 87-11, "Relaxation in Arbitrary Intermediate Pipe Rupture Requirements," and NUREG/CR-2913, "Two-Phase Jet Loads," as part of the approved licensing basis for CR-3 for evaluating pipe breaks inside the containment. The licensee proposed the FSAR changes to address the U. S. Nuclear Regulatory Commission (NRC) concern identified in a December 22, 1997, letter regarding whether structures, systems and components (SSCs) important to safety are sufficiently protected from jet impingement or pipe whip in compliance with General Design Criterion (GDC) 4 of Appendix A to Title 10 of the Code of Federal Regulations (10 CFR) Part 50. The licensee determined that the proposed FSAR change does not involve a significant hazard.

2.0 EVALUATION

The licensee discussed the current design basis for pipe rupture (break) postulation for CR-3 in Attachment B to its May 28, 1998, letter. According to the licensee, CR-3 was originally designed and constructed considering the proposed 10 CFR 50.34, Appendix A, "General Design Criteria for Nuclear Power Plant Construction Permits" as published in the Federal Register (32 FR 10213). FSAR Section 1.4 describes the general design criteria applicable to CR-3. Criterion 10 requires that, "The containment structure shall be designed to sustain the initial effects of gross equipment failures, such as a large coolant boundary break, without loss of required integrity...." Criterion 40 requires that, "Protection for engineered safeguards shall be provided against dynamic effects and missiles that may result from plant equipment failures." Criterion 42 requires that, "Engineered safety features shall be designed so that the capability of each component and system to perform its required function is not impaired by the effects of a loss-of-coolant accident (LOCA)." Chapter 4 of the FSAR provides specific design requirements applicable to the reactor coolant system (RCS) boundary. Chapter 4 states that the effects of pipe rupture inside the containment have been considered. As indicated by the licensee, the licensing basis criteria required that safety-related SSCs be designed to withstand postulated pipe ruptures anywhere within the RCS.

NRC guidance for postulating pipe ruptures inside the containment is contained in Standard Review Plan Section 3.6.2. Revision 1 of the criteria required that ruptures be postulated in those locations where the stress limits specified in Branch Technical Position (BTP) MEB 3-1

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have been exceeded. In addition, BTP MEB 3-1 required postulation of at least two intermediate ruptures at locations of highest stress even if the specified stress limits are not exceeded (these postulated ruptures are termed arbitrary intermediate ruptures). GL 87-11 provided a revision to BTP MEB 3-1 (Revision 2-1987) which eliminated the requirement to postulate arbitrary intermediate ruptures. GL 87-11 states that, "Licensees of operating plants desiring to eliminate previously required effects from arbitrary intermediate pipe ruptures may do so without NRC approval unless such changes conflict with the license or technical specifications." The licensee has proposed to amend the FSAR to adopt the position in GL 87-11.

The criteria for postulating pipe ruptures specified in BTP MEB 3-1, Revision 2 is based on stresses calculated using the criteria contained in Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. However, the licensee intends to use the criteria contained in the United States of America Standards (USAS) B31.1 power piping code that was used for the piping design. The staff previously accepted the use of GL 87-11 for postulating pipe ruptures outside the containment at CR-3 for piping designed to USAS B31.1. The staff approved the use of GL 87-11 for postulating pipe ruptures outside the containment with certain restrictions as discussed in a September 28, 1989, NRC letter to the licensee. The licensee proposed to apply the same restrictions for postulating ruptures in high energy systems inside the containment for piping designed to USAS B31.1. The staff considers the licensee's proposal to use the GL 87-11 criteria, as approved by the staff for postulating pipe ruptures outside the containment, acceptable for postulating ruptures in piping inside the containment designed to USAS B31.1.

Although the RCS attached piping was designed to USAS B31.1, the licensee committed, in its letter dated November 21, 1997, to upgrade the analysis of critical sections of the RCS attached piping to Class 1 requirements. The licensee should reassess the postulated rupture locations based on the BTP MEB 3-1 Class 1 criteria when the upgraded analyses are completed.

The licensee also requested the use of the criteria contained in NUREG/CR-2913 to determine jet impingement forces on safety-related SSCs due to postulated pipe ruptures. The licensee's current criteria are discussed in FSAR Section 14.2.2.5.11. The criteria require a conical jet expansion at an included angle of 30 degrees with the pressure falling off in inverse proportion to the cross-sectional area of the jet. NUREG/CR-2913 provides criteria for jet expansion loads as a function of the initial fluid conditions in the pipe. The criteria were developed by Sandia National Laboratories, using multidimensional computational methods, to solve the governing equations of mass, momentum, and energy. These calculations formed the basis for developing the jet impingement forces. NUREG/CR-2913 indicates that the jet model is applicable for stagnation pressures between 870 and 2466 psia up to 126°F subcooling for liquid and to .75 (or greater) quality steam. The criteria in NUREG/CR-2913 have also been referenced in ANSI/ANS 58.2-1988, "design basis for protection of light water nuclear power plants against the effects of postulated pipe rupture." In its submittal, the licensee indicated the normal RCS operating pressure and temperature range is well within the ranges specified in NUREG/CR-2913. However, the licensee indicated that the NUREG/CR-2913 jet model is acceptable for fluid conditions up to 158°F subcooling. This range of subcooling exceeds the value of 126°F specified in NUREG/CR-2913 and endorsed in ANSI/ANS 58.2-1988. The staff does not endorse the use of the jet model outside the pressure and temperature limitations specified in NUREG/CR-2913. In its submittal, the licensee indicated that the maximum actual

subcooling in the RCS is 95°F, which is within the temperature range specified in NUREG/CR-2913.

The staff has previously accepted the NUREG/CR-2913 methodology for use at Vogtle and Watts Bar. At these facilities, the staff accepted use of the NUREG/CR-2913 methodology to evaluate jet loads on components at a distance greater than 10 pipe diameters from the break.

During a May 21, 1999, conference call, licensee representatives indicated the NUREG/CR-2913 criteria would be used to evaluate jet loads at a distance greater than 10 pipe diameters from the break. Therefore, subject to the limitation that the procedure not be used for subcooling less than 126°F, the staff finds the licensee's proposed use of the criteria in NUREG/CR-2913 for evaluating jet loads on SSCs at a distance greater than 10 pipe diameters from the postulated break acceptable.

3.0 STATE CONSULTATION

Based upon a letter dated March 8, 1991, from Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, to Deborah A. Miller, Licensing Assistant, U.S. NRC, the State of Florida does not desire notification of issuance of license amendments.

4.0 ENVIRONMENTAL CONSIDERATIONS

The amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding (63 FR 38200). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The staff has reviewed FPC's submittal and supporting documentation. The staff finds the proposed changes to the FSAR to incorporate the criteria contained in GL 87-11 and NUREG/CR-2913 as part of the CR-3 licensing basis, acceptable subject to the following limitations:

The use of the criteria in GL 87-11 for postulating breaks in piping located inside the containment and analyzed to the provisions of USAS B31.1-1967 should be subject to the conditions specified in the staff's September 28, 1989, letter to Florida Power Corporation, "Crystal River Unit 3 - High Energy Line Break (HELB) Criteria for Analysis of Piping Outside Containment".

The NUREG/CR-2913 criteria will be used to evaluate jet loads on safety-related SSCs due to postulated ruptures in the RCS, within the temperature and pressure limitations specified in the report for applicability of the jet model, at distances of greater than 10 pipe diameters from the postulated RCS rupture

Based on this finding, the staff concludes that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Fair

Date: July 27, 1999

Mr. John Paul Cowan
Florida Power Corporation

CRYSTAL RIVER UNIT NO. 3

cc:

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