Progress Energy

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10CFR50.90

March 24, 2011
3F0311-04

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – License Amendment Request #313, Revision 0 Revise Shutdown Margin Definition for Stuck Rod Exception

Dear Sir:

Pursuant to 10 CFR 50.90, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc. (PEF), hereby submits License Amendment Request (LAR) #313, Revision 0. This proposed LAR adopts Technical Specification Task Force (TSTF)-248, Revision 0, "Revise Shutdown Margin Definition for Stuck Rod Exception," which modifies the definition of Shutdown Margin (SDM) to include the following as a new sentence: "However, with all CONTROL RODS verified fully inserted by two independent means, it is not necessary to account for a stuck CONTROL ROD in the SDM calculation."

In the NRC to the Nuclear Energy Institute correspondence dated October 31, 2000, the NRC concluded the proposed revisions to adopt TSTF-248, Revision 0, were acceptable. The proposed LAR changes are consistent with the NRC approved TSTF -248, Revision 0. This TSTF has since been incorporated into NUREG 1430, Revision 3, "Standard Technical Specifications Babcock and Wilcox."

This correspondence contains no new regulatory commitments. FPC requests the approval of this LAR by March 30, 2012, with a 60 day implementation period. This time frame is required to perform necessary changes to plant procedures and other plant documents.

This request has been reviewed and approved for submittal by the Crystal River Unit 3 Plant Nuclear Safety Committee.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Superintendent, Licensing and Regulatory Programs at (352) 563-4796.

Sincerely,

Jon A. Franke
Vice President
Crystal River Nuclear Plant

JAF/par

A001
NRR

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W. Powerline Street
Crystal River, FL 34428

Attachments:
A. Description of Proposed License Amendment Request, Technical Analysis and Regulatory Analysis
B. Proposed ITS Page Change – Strikeout and Shadowed Text Format
C. Proposed ITS Page Change – Revision Bar Format
D. Proposed ITS Bases Page Change – Strikeout and Shadowed Text Format
E. List of Regulatory Commitments

xc: NRR Project Manager
Regional Administrator, Region II
Senior Resident Inspector
State Contact

STATE OF FLORIDA

COUNTY OF CITRUS

Jon A. Franke states that he is the Vice President, Crystal River Nuclear Plant for Florida Power Corporation, doing business as Progress Energy Florida, Inc.; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.

Jon A. Franke
Vice President
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 24 day of March, 2011, by Jon A. Franke.

Carolyn E Portmann

Signature of Notary Public
State of Florida

CAROLYN E. PORTMANN
Commission # DD 937553
Expires March 1, 2014
Bonded Thru Troy Fain Insurance 800-385-7019

(Print, type, or stamp Commissioned
Name of Notary Public)

Personally Known ✓ -OR- Produced Identification _____

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #313, REVISION 0

ATTACHMENT A

DESCRIPTION OF PROPOSED LICENSE AMENDMENT REQUEST, TECHNICAL ANALYSIS AND REGULATORY ANALYSIS

DESCRIPTION OF PROPOSED LICENSE AMENDMENT REQUEST, TECHNICAL ANALYSIS AND REGULATORY ANALYSIS

1.0 DESCRIPTION OF PROPOSED LICENSE AMENDMENT REQUEST

The proposed License Amendment Request (LAR) adopts Technical Specification Task Force (TSTF)-248, Revision 0, "Revise Shutdown Margin Definition for Stuck Rod Exception," to revise the definition of Shutdown Margin (SDM) found in the Crystal River Unit 3 (CR-3) Improved Technical Specifications (ITS). This LAR will revise the definition to include a provision allowing an exception to the highest reactivity worth stuck control rod penalty if there are two independent means of confirming that all control rods are fully inserted in the reactor core. Due to the Absolute Position Indication System (API) having two independent strings of indication; if both strings are fully functional on all control rods, and with both strings confirming rods being fully inserted after a trip, there is adequate verification of the configuration of the rods such that past response to a calculation of SDM was overly conservative. The API rod inserted indication is provided by independent reed switches on the position indication tubes. One is an in-limit reed switch while the other is a zero percent limit switch. Additionally, the rod bottom lights have battery backed power to allow confirmation of rod insertion during loss of power events.

The LAR proposes to add the following sentence to the CR-3 ITS, Section 1.1, "Definitions," SHUTDOWN MARGIN (SDM):

> "However, with all CONTROL RODS verified fully inserted by two independent means, it is not necessary to account for a stuck CONTROL ROD in the SDM calculation."

Incorporating this revised definition into the CR-3 ITS has potential benefit by:

- avoiding boration following a reactor trip to maintain SDM
- saving water and acid processing leading up to and following the subsequent startup
- allowing the commencement of cooldown to occur more quickly
- minimizing the amount of occupational and public dose based on less effluents released

2.0 Technical Analysis

This proposed LAR adopts TSTF-248, Revision 0, which modifies the subject ITS by changing the definition of SDM to include the following sentence: "However, with all CONTROL RODS verified fully inserted by two independent means, it is not necessary to account for a stuck CONTROL ROD in the SDM calculation."

The proposed change is consistent with the NRC approved TSTF-248, Revision 0. The consideration of a stuck rod is provided only to allow for a single failure of one rod to not fully insert when a scram is initiated. However, with positive indication that all rods are already fully inserted, such a provision is overly conservative. This proposed change is consistent with the definition of SDM provided in NUREG 1430, Revision 3, "Standard Technical Specifications Babcock and Wilcox."

Revising the ITS definition of SDM would not require core designers to revise any SDM boron calculation. The change would afford CR-3 flexibility to either use the tabulated SDM boron concentration (which includes the one stuck rod penalty), or if all rods are confirmed fully

inserted by two independent means (i.e., both strings of reed switches), remove the one stuck rod penalty from the SDM boron calculation to allow for a lower boron requirement. This change would only require station procedure changes to take advantage of the additional flexibility.

The API System has independent reed switches that will provide indication of rod insertion. The absolute position transducer consists of a series of magnetically operated reed switches mounted in a tube parallel to the motor tube extension. Each switch is hermetically sealed. Switch contacts close when a permanent magnet mounted on the upper end of the lead screw extension comes in close proximity. As the lead screw (and the Control Rod Assembly) moves, switches operate sequentially producing an analog voltage proportional to position. Other reed switches included in the same tube with the position indicator matrix provide full-in and full-out limit indications.

The API rod inserted indication is provided by independent reed switches on the position indication tubes; one is an in-limit reed switch, while the other is a zero percent limit switch. Additionally, the rod bottom lights have battery backed power to allow confirmation of rod insertion during loss of power events.

If both channels of API are fully operable on all control rods, and both channels confirm that all rods are fully inserted after a trip, there is adequate verification of the configuration of the control rods such that the one stuck rod penalty in the SDM calculation is overly conservative.

Potentially avoiding having to borate following a reactor trip to maintain SDM would save on water and acid processing leading up to and following the subsequent startup. This reduction in water and acid processing will provide a secondary benefit of reduced occupational and public dose since less effluent will be discharged to the CR-3 discharge canal. Approximately 85% of the CR-3 2009 activity released in liquid effluents was directly related to water processing following a reactor trip and startup. An additional benefit would be to allow for verification of SDM sooner following an End-of-Cycle shutdown, which would permit commencement of cooldown more swiftly. The technical advantage to using this improved definition of SDM arises late in the cycle, when margin to the SDM limit is smaller than at Beginning-of-Cycle.

3.0 Regulatory Analysis

3.1 No Significant Hazards Consideration

Florida Power Corporation (FPC) has evaluated the proposed License Amendment Request (LAR) against the criteria of 10 CFR 50.92(c) to determine if any significant hazards consideration is involved. FPC has concluded that this proposed LAR does not involve a significant hazards consideration. The following is a discussion of how each of the 10 CFR 50.92(c) criteria is satisfied.

(1) Does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The revision to the Shutdown Margin (SDM) definition will result in analytical flexibility for determining SDM. Changes in the definition will not have an impact on the probability of an accident.

The introduction of this definition change does not change continued compliance with all applicable regulatory requirements and design criteria (e.g., train separation, redundancy, and single failure). Therefore, since all plant systems will continue to function as designed, all plant parameters will remain within their design limits. As a result, the proposed change will not increase the consequences of an accident.

Based on this discussion, the proposed LAR does not significantly increase the probability or consequences of an accident previously evaluated.

(2) Does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Revising the definition of SDM in the Crystal River Unit 3 (CR-3) Improved Technical Specifications (ITS) would not require core designers to revise any SDM calculation. Rather, it would afford the analytical flexibility for determining SDM for a particular circumstance.

The proposed change does not involve any change in the design, configuration, or operation of the nuclear plant. The current plant safety analyses, therefore, remain complete and accurate in addressing the design basis events and in analyzing plant response and consequences.

The Limiting Conditions for Operation, Limiting Safety System Settings and Safety Limits specified in the CR-3 ITS are not affected by the proposed change. As such, the plant conditions for which the design basis accident analysis were performed remain valid.

The LAR does not introduce a new mode of plant operation or new accident precursors, does not involve any physical alterations to the plant configuration, or make changes to system setpoints that could initiate a new or different kind of accident.

Therefore, the LAR does not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) Does not involve a significant reduction in a margin of safety.

Margin of safety is related to the confidence in the ability of the fission product barriers to perform their accident mitigation functions. These barriers include the fuel and the fuel cladding, the reactor coolant system and the reactor containment building and containment related systems. The proposed change will not impact the reliability of these barriers to function. Radiological dose to plant operators or to the offsite public will not increase as a result of the proposed change. The change to the CR-3 ITS definition for SDM will not impact the safety barriers of the plant. Adequate SDM will continue to be assured for all operational conditions.

Additionally, the current SDM calculation requires the consideration of the worth of the most reactive control rod to remain out of the core. This provides a margin of safety in that additional boron has to be injected to assure the reactor is shut down and remains shut down. This requirement will remain. However, once all control rods are verified to

be fully inserted by two independent means, the conservatism of the additional boron concentration is balanced by the additional reactive worth of the inserted control rod and the additional boron will not be necessary to maintain the required SDM. The independent verification of all rods in will provide a very high confidence that adequate SDM will continue to be assured.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, FPC concludes that the proposed LAR does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly a finding of no significant hazards consideration is justified.

3.2 Environmental Impact Evaluation

10 CFR 51.22 (c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if the amendment changes a requirement with respect to use of a facility component within the restricted area provided that (i) the amendment involves no significant hazards consideration, (ii) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, and (iii) there is no significant increase in individual or cumulative occupational radiation exposure.

Florida Power Corporation (FPC) has reviewed this License Amendment Request (LAR) and has determined that it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22, no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the proposed license amendment. The following is the basis for this determination:

(i) The proposed license amendment does not involve a significant hazards consideration, as described in the significant hazards consideration.

(ii) As discussed in the Technical Analysis and the No Significant Hazards Consideration, this change does not result in a significant change or significant increase in the release associated with any Design Basis Accident. There will be no significant change in the types or a significant increase in the amounts of any effluents released offsite during normal operation. There will be no significant change in the types or significant increase in the amounts of any effluents that may be released offsite and does not involve irreversible environmental consequences beyond those already associated with the Final Environmental Statement.

(iii) The proposed LAR does not result in a significant increase to the individual or cumulative occupational radiation exposure because this is a change to the Crystal River Unit 3 Improved Technical Specifications (ITS) that does not increase plant radiation fields and does not require operator or other plant personnel activities that could increase occupational radiation exposure. This reduction in water and acid processing will provide a benefit of reduced occupational and public dose,

since less primary water will have to be processed and less effluent will be discharged to the CR-3 discharge canal. Therefore, the proposed LAR does not result in a significant increase to the individual or cumulative occupational radiation exposure.

3.3 Applicable Regulatory Requirements / Criteria

The Principle Architectural and Design Criteria (PADC) discussed in the Crystal River Unit 3 Final Safety Analysis Report (FSAR), Section 1.4, notes the following, "Crystal River Unit 3 (CR3) has been designed and constructed taking into consideration the proposed 10 CFR 50.34 Appendix A, "General Design Criteria for Nuclear Power Plant Construction Permits," as published in the Federal Register (32FR10213) on July 11, 1967, which are applicable to this unit."

On September 18, 1992, the NRC published SECY-92-223, "Resolution of Deviations Identified During the Systematic Evaluation Program," which established the NRC's position regarding the applicability of the current 10 CFR 50, Appendix A, General Design Criteria (GDC). SECY 92-223 stated that the NRC would not apply the GDC to plants with construction permits issued prior to May 21, 1971. Furthermore, SECY 92-223 went on to state that plants with construction permits issued prior to May 21, 1971, did not need exemptions from the GDC. Since the CR-3 construction permit is dated September 25, 1968, the SECY-92-223 position is applicable to CR-3.

The following FSAR, Section 1.4, Criteria apply:

Criterion 6 – Reactor Core Design

"The reactor core shall be designed to function throughout its design lifetime without exceeding acceptable fuel design limits which have been stipulated and justified. The core design, together with reliable process and decay heat removal systems, shall provide for this capability under all expected conditions of normal operation with appropriate margins for uncertainties and for transient situations which can be anticipated, including the effects of the loss of power to recirculation pumps, tripping out of a turbine generator set, isolation of the reactor from its primary heat sink, and loss of all offsite power."

This proposed request does not change the way the core is designed, and only revises the way that Shutdown Margin (SDM) is defined. Revising the CR-3 ITS definition would not require any changes to the core design methodology used for calculating the shutdown boron. Rather, it would afford the analytical flexibility for determining SDM for a particular circumstance. Therefore, the ability to meet this criterion is not reduced.

Criterion 27 – Redundancy of Reactivity Control

"At least two independent reactivity control systems, preferably of different principles shall be provided."

The change to the SDM definition has no impact on the reactivity control system and thus does not compromise reactivity control system redundancy or capability. Therefore, the proposed

change will not result in the inability to reliably control reactivity changes. This criterion will continue to be met.

Criterion 29 – Reactivity Shutdown Capability

"At least one of the reactivity control systems provided shall be capable of making the core subcritical under any condition (including anticipated operational transients), sufficiently fast to prevent exceeding acceptable fuel damage limits. Shutdown margins, greater than the maximum worth of the most effective control rod when fully withdrawn, shall be provided."

This proposed amendment revises the way in which SDM is defined. This revised definition has no adverse impact on the plant's ability to meet the criteria of making the core subcritical under any conditions. Concurrently, this change does obviate the need to assume one stuck control rod, as adequate indication from two independent trains allow for flexibility in being able to avoid this overly conservative requirement. Therefore, the ability to meet this criterion is not compromised.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #313, REVISION 0

ATTACHMENT B

PROPOSED ITS PAGE CHANGE – STRIKEOUT AND SHADOWED TEXT FORMAT

1.1 Definitions

SHUTDOWN MARGIN (SDM) (continued)	would be subcritical from its present condition assuming: a. All CONTROL RODS (safety and regulating) are fully inserted except for the single CONTROL ROD of highest reactivity worth, which is assumed to be fully withdrawn~~;~~. However, with all CONTROL RODS verified fully inserted by two independent means, it is not necessary to account for a stuck CONTROL ROD in the SDM calculation. ~~and~~ With any CONTROL ROD not capable of being fully inserted, the reactivity worth of these CONTROL RODS must be accounted for in the determination of SDM. b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the post-trip RCS average temperature. ~~With any CONTROL RODS not capable of being fully inserted, the reactivity worth of these CONTROL RODS must be accounted for in the determination of SDM.~~
STAGGERED TEST BASIS	A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during *n* Surveillance Frequency intervals, where *n* is the total number of systems, subsystems, channels, or other designated components in the associated function.
THERMAL POWER	THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #313, REVISION 0

ATTACHMENT C

PROPOSED ITS PAGE CHANGE – REVISION BAR FORMAT

1.1 Definitions

SHUTDOWN MARGIN (SDM) (continued)	would be subcritical from its present condition assuming: a. All CONTROL RODS (safety and regulating) are fully inserted except for the single CONTROL ROD of highest reactivity worth, which is assumed to be fully withdrawn. However, with all CONTROL RODS verified fully inserted by two independent means, it is not necessary to account for a stuck CONTROL ROD in the SDM calculation. With any CONTROL ROD not capable of being fully inserted, the reactivity worth of these CONTROL RODS must be accounted for in the determination of SDM. b. In MODES 1 and 2, the fuel and moderator temperatures are changed to the post-trip RCS average temperature.
STAGGERED TEST BASIS	A STAGGERED TEST BASIS shall consist of the testing of one of the systems, subsystems, channels, or other designated components during the interval specified by the Surveillance Frequency, so that all systems, subsystems, channels, or other designated components are tested during *n* Surveillance Frequency intervals, where *n* is the total number of systems, subsystems, channels, or other designated components in the associated function.
THERMAL POWER	THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #313, REVISION 0

ATTACHMENT D

PROPOSED ITS BASES PAGE CHANGE – STRIKEOUT AND SHADOWED TEXT FORMAT

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.1 SHUTDOWN MARGIN (SDM)

BASES

BACKGROUND

CR-3 FSAR Section 1.4, Criteria 27 and 28 state the reactivity control systems must be independent and capable of holding the reactor core subcritical from any hot standby or hot operating condition (Ref. 1). SDM requirements provide sufficient reactivity margin to ensure that acceptable fuel design limits will not be exceeded for normal shutdown and anticipated operational occurrences (AOOs). The SDM defines the degree of subcriticality that would be obtained immediately following the insertion of all safety and regulating rods, assuming the single CONTROL ROD assembly of highest reactivity worth is fully withdrawn. However, with all CONTROL RODS verified fully inserted by two independent means, it is not necessary to account for a stuck CONTROL ROD in the SDM calculation.

The system design requires that two independent reactivity control systems be provided. One of these systems is capable of maintaining the core subcritical under cold conditions. These requirements are provided by the use of movable control assemblies and soluble boric acid in the Reactor Coolant System (RCS). The CONTROL RODS can compensate for the reactivity effects of the fuel and water temperature changes accompanying power level changes over the range from full load to no load. In addition, the CONTROL RODS, together with the Chemical Addition and Makeup and Purification Systems, provide SDM during power operation and are capable of making the core subcritical rapidly enough to prevent exceeding acceptable fuel damage limits, assuming that the rod of highest reactivity worth remains fully withdrawn.

The Chemical Addition and Makeup and Purification Systems can compensate for fuel depletion during operation and all xenon burnout reactivity changes, and maintain the reactor subcritical under cold conditions.

During power operation, SDM control is ensured by operating with the safety rods fully withdrawn (LCO 3.1.5, "Safety Rod Insertion Limits") and the regulating rods within the limits of LCO 3.2.1, "Regulating Rod Insertion Limits." When the unit is in the shutdown and refueling modes, the SDM requirements are met by means of adjustments to the RCS boron concentration. Adjusted SDM limits defined in the COLR preclude recriticality in the event of a main steam line break (MSLB) in MODE 3, 4, or 5 when high steam generator levels exist.

(continued)

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

LICENSE AMENDMENT REQUEST #313, REVISION 0

ATTACHMENT E

LIST OF REGULATORY COMMITMENTS

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Florida Power Corporation (FPC) in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please notify the Superintendent, Licensing and Regulatory Programs of any questions regarding this document or any associated regulatory commitments.

Regulatory Commitments	Due Date/Event
None	