



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

December 21, 2011
3F1211-10

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

Subject: Crystal River Unit 3 – Response to Request for Additional Information to Support
NRC Fire Protection Branch Technical Review of the CR-3 Extended Power
Uprate LAR (TAC No. ME6527)

- References:
1. CR-3 to NRC letter dated June 15, 2011, "Crystal River Unit 3 – License Amendment Request #309, Revision 0, Extended Power Uprate" (Accession No. ML112070659)
 2. Email from S. Lingam (NRC) to D. Westcott (CR-3) dated November 3, 2011, "Crystal River, Unit 3 EPU LAR - RAIs from Fire Protection Branch (AFPB) (TAC No. ME6527)"
 3. NRC to CR-3 letter dated December 7, 2011, "Crystal River Unit 3 Nuclear Generating Plant - Request for Additional Information for Extended Power Uprate License Amendment Request (TAC No. ME6527)" (Accession No. ML11326A231)

Dear Sir:

By letter dated June 15, 2011, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., requested a license amendment to increase the rated thermal power level of Crystal River Unit 3 (CR-3) from 2609 megawatts (MWt) to 3014 MWt. On November 3, 2011, via electronic mail, the NRC provided a draft request for additional information (RAI) needed to support the Fire Protection Branch (AFPB) technical review of the CR-3 Extended Power Uprate (EPU) License Amendment Request (LAR). By teleconference on December 7, 2011, CR-3 discussed the draft RAI with the NRC to confirm an understanding of the information being requested. On December 7, 2011, the NRC provided a formal RAI required to complete its evaluation of the CR-3 EPU LAR, which included the AFPB RAI.

The attachment, "Response to Request for Additional Information to Support NRC Fire Protection Branch Technical Review of the CR-3 EPU LAR," provides the CR-3 formal response to the RAI needed to support the AFPB technical review of the CR-3 EPU LAR.

This correspondence contains no new regulatory commitments.

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/gwe

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

A006
NRC

Attachment: Response to Request for Additional Information to Support NRC Fire Protection
Branch Technical Review of the CR-3 EPU LAR

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 21 day of December, 2011, by Jon A. Franke.



Signature of Notary Public
State of Florida



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

Personally ☒ Produced
Known _____ -OR- Identification _____

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 /LICENSE NUMBER DPR-72

ATTACHMENT

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
TO SUPPORT NRC FIRE PROTECTION BRANCH
TECHNICAL REVIEW OF THE CR-3 EPU LAR**

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Fire Protection Branch (AFPB)

1. (AFPB 1-1)

Attachment 1 to Matrix 5 (“Supplemental Fire Protection Review Criteria, Plant Systems”) of NRC RS-001, Revision 0, *Review Standard for Extended Power Uprates*, states that “power uprates typically result in increases in decay heat generation following plant trips. These increases in decay heat usually do not affect the elements of a fire protection program related to (1) administrative controls, (2) fire suppression and detection systems, (3) fire barriers, (4) fire protection responsibilities of plant personnel, and (5) procedures and resources necessary for the repair of systems required to achieve and maintain cold shutdown. In addition, an increase in decay heat will usually not result in an increase in the potential for a radiological release resulting from a fire. However, the licensee’s LAR should confirm that these elements are not impacted by the extended power uprate.”

The NRC staff notes that Attachment 5 of the LAR, “Crystal River Unit 3 Extended Power Uprate Technical Report,” Section 2.5.1.4.2, page 2.5.1.4-2, addresses all items (1) through (5). The NRC staff requests that the licensee provide statements to address that the additional decay heat will not result in an increase in the potential for a radiological release resulting from a fire at EPU.

Response:

As described in Section 2.8.5, “Accident and Transient Analyses,” and Section 2.9.2, “Radiological Consequences Analyses,” of the EPU Technical Report (TR) (Reference 1, Attachments 5 and 7), accidents and transient events at CR-3 that potentially result in radioactive release have been evaluated at EPU conditions and are within the applicable acceptance criteria. Radioactive release associated with these events is not altered by a fire. As such, additional decay heat as a result of EPU will not result in an increase in the potential for a radiological release resulting from a fire.

2. (AFPB 1-2)

The NRC staff notes that Attachment 5 of the LAR, Section 2.5.1.4.2, states that CR-3 has reviewed the impact of EPU on various elements of the CR-3 fire protection program. The review concluded that the EPU does not adversely affect the elements of fire protection program including the procedures and resources necessary for the repair of systems required to achieve and maintain cold shutdown. The NRC staff requests the licensee to verify that additional heat in the plant environment from the EPU will not (1) interfere with required operator manual actions being performed at their designated time, or (2) require any new operator actions to maintain hot shutdown and then place the reactor in a cold shutdown condition.

Response:

The primary sources of heat that impact plant areas requiring fire protection operator manual actions originate from the Main Steam System or Feedwater System equipment and associated fluids. At EPU conditions, main steam temperature is lower and feedwater temperature is essentially unchanged (i.e., increases approximately 2°F). An evaluation considering EPU conditions was performed to assess the impact to the CR-3 building temperature profiles that support access requirements during an Appendix R fire. The evaluation concluded environmental temperature changes are bounded by the current analysis. As a result, existing CR-3 fire protection operator manual actions are not adversely impacted by additional heat in the plant environment from EPU conditions. Additional heat in the plant environment resulting from EPU conditions will not interfere with required operator manual actions being performed within their associated designated times and will not require new operator actions to maintain hot shutdown conditions or place the plant in a cold shutdown condition.

3. (AFPB 1-3)

The NRC staff notes that Attachment 5 of the LAR, Section 2.5.1.4.2, page 2.5.1.4-2, states that, "...EPU does not introduce any plant equipment failure modes which will adversely impact the ability to achieve any of the alternate shutdown functions..." It is unclear to the NRC staff whether there are fire protection program plant modifications planned (e.g., adding new cable trays, or re-routing existing cables, or increases in combustible loading affecting fire barrier ratings, or changes to administrative controls) at EPU conditions. Clarify whether this request involves plant modifications, or changes to the fire protection program, including any proposed modifications to implement transition to Title 10 "Energy" of the *Code of Federal Regulations* (10 CFR), Section 50.48(c). If any, the NRC staff requests the licensee to identify proposed modifications and discuss the impact of these modifications on the plant's compliance with the fire protection program licensing basis, 10 CFR 50.48, or applicable portions of 10 CFR 50, Appendix R.

Response:

To support EPU operation, the existing atmospheric dump valves (ADV) are being replaced with larger ADVs to achieve cold shutdown conditions within 72 hours with offsite power unavailable and the Inadequate Core Cooling Mitigation System and Fast Cooldown System are being designed and installed to automatically open the ADVs to support accident mitigation. These planned modifications potentially impact the plant fire protection program (FPP). Specifically, a fire in portions of the CR-3 control complex could result in an inadvertent opening of the ADVs, thereby challenging the ability to achieve and maintain safe shutdown

during a fire in the control complex. New ADV manual override switches are to be installed in the main control room to ensure the ADVs cannot spuriously open during a fire in the control complex. Refer to Section 2.5.1.4, "Fire Protection," and Section 2.11.1, "Human Factors," of the EPU TR (Reference 1, Attachments 5 and 7) for additional description of the ADV override feature. Refer to Appendix E, "Major Plant Modifications," of the CR 3 EPU TR (Reference 1, Attachments 5 and 7) for a description of the modifications associated with EPU.

CR-3 License Condition 2.C.(9), "Fire Protection," allows FPC to make changes to the approved CR-3 FPP without prior approval of the Commission if those changes do not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

The CR-3 engineering and regulatory change processes require an FPP review of plant modifications to determine the impact to the FPP and to ensure the ability to achieve and maintain safe shutdown, in the event of a fire, is not adversely affected as required by License Condition 2.C.(9). These FPP evaluations are required for modifications that impact the CR-3 Appendix R fire study; including, addition of components or circuits, deletion or re-routing of cables identified in the fire study, and modification of combustible loading in a fire area. Also, the EPU modification designs will ensure impacts to the plant FPP and associated administrative controls are minimized or eliminated.

In summary, required modifications to support EPU operation, including changes to the plant FPP, will continue to comply with CR-3 License Condition 2.C.(9), applicable portions of 10 CFR 50.48(a) and (b), and applicable portions of 10 CFR 50, Appendix R.

Additionally, 10 CFR 50.48(c) and National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition," (NFPA 805) requirements are considered in the design of the plant modifications associated with EPU. A separate independent LAR regarding CR-3 compliance with 10 CFR 50.48(c) and NFPA 805 is scheduled for submittal in 2014. This LAR will include modifications required to comply with 10 CFR 50.48(c) and will, as necessary, assess impacts as a result of operation at EPU conditions. To avoid duplication of NRC reviews regarding 10 CFR 50.48(c) and NFPA 805 compliance, FPC proposes to not address 10 CFR 50.48(c) further as part of the CR-3 EPU LAR review.

4. (AFPB 1-4)

The NRC staff notes that Attachment 5, "Crystal River Unit 3 Extended Power Uprate Technical Report," Section 2.5.1.4.2, on page 2.5.1.4-2, states that, "...Safe Shutdown (SSD) Thermal-Hydraulic (T-H) results are impacted due to increased decay heat..." The NRC staff requests the licensee to verify that the plant can meet the 72-hour requirements in both 10 CFR Part 50, Appendix R, Sections III.G.1.b and III.L, with increased decay heat at EPU conditions.

Response:

As noted in Section 2.5.1.4 of the EPU TR (Reference 1, Attachments 5 and 7), a SSD T-H analysis was performed assuming EPU conditions. With the changes cited in Section 2.5.1.4, the cooldown analysis demonstrates that the plant will continue to be capable of achieving cold shutdown conditions within 72 hours as required by 10 CFR 50, Appendix R, Sections III.G.1.b, III.L.1(d), III.L.3, and III.L.5 with the increased decay heat at EPU conditions.

5. (AFPB 1-5)

Some plants credit aspects of their fire protection system for other than fire protection activities (e.g., utilizing the fire water pumps and water supply as backup cooling or inventory for nonprimary reactor systems). If CR-3 credits its fire protection system in this way, the LAR should identify the specific situations and discuss to what extent, if any, the EPU affect these “nonfire-protection” aspects of the plant fire protection system. If CR-3 does not take such credit, the NRC staff requests that the licensee verify this as well.

In your response discuss how any nonfire suppression use of fire protection water will impact the ability to meet the fire protection system design demands.

Response:

CR-3 utilizes the fire service tanks for the following non-fire protection uses: 1) an inventory source to the Emergency Feedwater (EFW) System; 2) temporary storage for contaminated water following a steam generator tube rupture event; and 3) an alternate source of makeup water to the Service Water (SW) System surge tank, spent fuel pools, and cask area. The minimum inventory required for fire protection equipment at CR-3 is conservatively calculated to be 300,000 gallons and includes the required automatic sprinkler and hose stream demand for a 2-hour fire duration.

There are no new identified uses of fire protection equipment or water sources due to EPU operation. Temporary storage requirements for contaminated water following a steam generator tube rupture event are not expected to increase as a result of EPU and inventory requirements associated with the SW System surge tank, spent fuel pools, and cask area are not expected to significantly increase as a result of EPU. As noted in Section 2.5.1.4 of the EPU TR (Reference 1, Attachments 5 and 7), the EFW System inventory requirement increases from 390,943 gallons to 563,773 gallons to meet the 10 CFR 50 Appendix R 72-hour cooldown requirement at EPU conditions. This increased EFW System inventory requirement does not adversely impact the minimum required fire protection volume of 300,000 gallons. As indicated in Table 10-2, “Sources of Emergency Feedwater (EFW) at the Crystal River Site,” of the CR-3 Final Safety Analysis Report, 1,020,000 gallons are available to the EFW System from the preferred EFW sources and an additional 3,700,000 gallons are available from other sources. Therefore, the minimum required fire protection inventory will continue, at EPU conditions, to be available to the fire protection equipment during a 10 CFR 50 Appendix R fire.

Reference

1. CR-3 to NRC letter dated June 15, 2011, “Crystal River Unit 3 – License Amendment Request #309, Revision 0, Extended Power Uprate.” (Accession No. ML112070659)