



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

Ref: 10 CFR 50.90

October 1, 2003
3F1003-05

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

Subject: Crystal River Unit 3 – Supplemental Information and Proposed License Condition for License Amendment Request #277, Revision 0, "BHTP Departure From Nucleate Boiling Correlation" (TAC No. MB7035)

References: 1) PEF to NRC letter, dated December 19, 2002, Crystal River Unit 3 – License Amendment Request #277, Revision 0, "BHTP Departure From Nucleate Boiling Correlation"

2) PEF to NRC letter, dated July 15, 2003, Crystal River Unit 3 – "Response to Request For Additional Information Regarding Technical Specification Change Request For New Departure From Nucleate Boiling Correlation" (TAC No. MB7035)

Dear Sir:

Per discussions with the NRC Staff on September 23, 2003 and September 29, 2003, Progress Energy Florida, Inc. (PEF) submits the attached supplemental information and proposed License Condition for License Amendment Request (LAR) #277. The supplemental information provides confirmation that the Cycle 14 core was designed within the range of applicability for certain fuel parameters and reactor coolant conditions. An exception to one parameter, the range for reactor coolant local quality, is discussed and justification as to why this exception is conservative is provided. The proposed License Condition supports issuance of LAR #277 prior to the approval of a topical report that was listed Reference 1, BAW-10241P, Revision 0, "BHTP DNB Correlation Applied with LYNXT." The License condition also includes BAW-10164P-A, Revision 4, "RELAP/MOD2-B&W – An Advanced Computer Program for Light Water Reactor LOCA and Non-LOCA Transient Analysis," which has been previously approved by the NRC.

No new regulatory commitments are made in this letter.

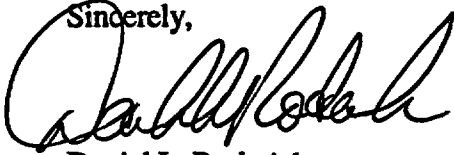
The CR-3 Plant Nuclear Safety Committee has reviewed this request and recommended it for approval.

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

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If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. L. Roderick', written over a horizontal line.

Daniel L. Roderick
Site Director
Crystal River Nuclear Plant

DLR/pei

Attachment: Supplemental Information and Proposed License Condition

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

STATE OF FLORIDA

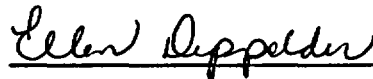
COUNTY OF CITRUS

Daniel L. Roderick states that he is the Site Director, Crystal River Nuclear Plant for 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.



Daniel L. Roderick
Site Director
Crystal River Nuclear Plant

The foregoing document was acknowledged before me this 1st day of October, 2003, by Daniel L. Roderick.



Signature of Notary Public
State of Florida

ELLEN DEPPOLDER

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

Personally Known ✓ -OR- Produced Identification



Ellen Deppolder
My Commission DD040101
Expires July 08, 2005

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50 - 302 / LICENSE NUMBER DPR - 72

ATTACHMENT

LICENSE AMENDMENT REQUEST #277, REVISION 0

**BHTP Departure From Nucleate Boiling Correlation
Supplemental Information and Proposed License Condition**

Supplemental Information and Proposed License Condition

Proposed License Condition

Progress Energy Florida, Inc. (PEF), also known as Florida Power Corporation, requests the addition of the following License Condition for Crystal River Unit 3 (CR-3) to allow use of the topical reports referenced in License Amendment Request (LAR) #277 for Cycle 14 core design and operation in addition to those already approved for use under Improved Technical Specification (ITS) 5.6.2.18.

Proposed License Condition 2.C.(12):

2.C.(12) Florida Power Corporation shall assure that the Cycle 14 core for CR-3 is designed using the methods specified in and operated within the Core Operating Limits Report limits developed from Topical Reports BAW-10164P-A, Revision 4, and BAW-10241P, Revision 0, in addition to those methods allowed by Improved Technical Specification 5.6.2.18.

This license condition is consistent with the request made in LAR #277 and does not impact the conclusions of the no significant hazards consideration or environmental evaluation.

Supplemental Information

1. Specify that CR-3 Mark-B-HTP fuel falls within the range of fuel design parameters in Table 1.2 of BAW-10241P, Revision 0.

PEF Response:

The Mark-B-HTP fuel design, scheduled for use in CR-3 Cycle 14, has geometry characteristics that fall within the applicability ranges defined in Table 1.2 of BAW-10241P, Revision 0, as shown below.

Parameter	BHTP Correlation Range of Applicability (from Table 1.2 of BAW-10241P)	Mark-B-HTP Fuel Design
Fuel Rod Diameter, in	0.360 – 0.440	0.430
Fuel Rod Pitch, in	0.496 – 0.580	0.568
Axial Spacer Span, in	10.5 – 26.2	19.3
Hydraulic Diameter, in	0.4571 – 0.5334	0.525
Heated Length, in	9.8 – 14.0	11.9

2. State that the ranges of operating conditions for CR-3 are within those stated in BAW-10241P, Revision 0, Table 1.1.

PEF Response:

The BHTP correlation range of applicability, as shown below, has been used in the establishment of DNB-based operational and safety limits. In almost all cases evaluated to define these limits, the limiting hot pin/hot subchannel local conditions for CR-3 Cycle 14 fall within the applicability range of conditions. For the few operating conditions when the limiting hot pin/hot subchannel local conditions for CR-3 fall outside the ranges, conservative actions or penalties are taken as described in PEF Response to Question 5 below.

Variable	Minimum Value	Maximum Value
Pressure, psia	1775	2425
Local Mass Flux, Mlb/hr-ft ²	0.897	3.549
Inlet Enthalpy, Btu/lb	383.9	644.3
Local Quality	-0.130	0.344

3. State that BHTP DNB correlation safety limit of 1.132, as described in BAW-10241P, Revision 0, is being used for CR-3.

PEF Response:

The 95/95 safety limit for the BHTP correlation is 1.132, as described in BAW-10241P, Revision 0. This safety limit, or correlation design limit, is being incorporated into Section 2.1.1.2 of the CR-3 Improved Technical Specifications for the implementation of the Mark-B-HTP fuel design. The reload licensing analyses supporting the Mark-B-HTP fuel design for Cycle 14 have used the BHTP correlation design limit of 1.132.

4. Confirm the DNB penalty for mixed cores has been applied as stated in PEF Request for Additional Information (RAI) dated July 15, 2003.

PEF Response:

The DNB penalty associated with the transition core conditions has been incorporated into the reload analyses for CR-3 Cycle 14. The DNB transition core penalty is based on the fuel assembly designs within the core and the core loading pattern. The penalty is being offset by DNB margin contained within the Thermal Design Limit (TDL). PEF has reviewed the analyses performed by Framatome ANP for CR-3 Cycle 14 and has confirmed the DNB penalty has been applied in the manner described in the PEF RAI, dated July 15, 2003.

5. Operation outside of the approved ranges in Question 2 have the proper core penalty applied or state that no parameters are outside those ranges.

PEF Response:

The DNB-based operational and safety limits for CR-3 provide hot pin/hot subchannel protection for acceptable plant operation based on the local coolant conditions satisfying the correlation range of applicability. As discussed in Response 8 of the BAW-10241P RAI (Framatome ANP to NRC letter, dated June 6, 2003), conservative actions, or penalties, are used for the treatment of low quality and high pressure when local conditions fall outside of the application ranges for the limiting hot pin/hot subchannel. The conservative actions taken confine the pressure to the correlation upper pressure limit when the hot subchannel pressure exceeds the upper limit. This is conservative because an increase in pressure increases margin to critical heat flux (CHF). Similarly, if the limiting hot pin/hot subchannel local quality is calculated to be below the correlation lower quality limit, the correlation lower local quality limit is used in the CHF calculation. This action is also conservative because a lower quality represents an increase in subcooling and maintaining the quality at the lower limit is conservative relative to CHF. This process effectively confines the CHF calculation to within the correlation parameter limits in a conservative manner. These actions are consistent with the actions defined in EMF-92-153(P)(A), Addendum 1, "HTTP: Departure from Nucleate Boiling Correlation for High Thermal Performance Fuel," March 1994, for the HTP correlation use when the local coolant quality exceeds the lower limit and the pressure exceeds the upper limit of the applicability range.

The application of the above actions was necessary for the CR-3 Cycle 14 core only for the quality applicability range. All other local conditions are within the specified application ranges. The operating conditions encountered in the CR-3 Cycle 14 reload analyses, where the local coolant conditions for the hot pin/hot subchannel exceed the applicability ranges for the BHTP correlation, occur when the plant is operating outside the nominal operating window as a result of a transient. The local coolant conditions of the hot pin/hot subchannel can exceed the lower limit of the quality applicability range for highly inlet-skewed axial power shapes for the CR-3 events where:

- 1) the plant is operating at the pressure-temperature conditions of the Reactor Coolant System DNB Safety Limits (presented in the Improved Technical Specifications as Figure 2.1.1-1 and used for establishing DNB-based trip setpoints), and
- 2) the plant experiences a limiting DNB event such as the one-pump coastdown or 4 pump coastdown (where the more limiting event is used in the generation of the DNB-based operating limits for establishing alarms).

The upper limit of the pressure acceptability range was not exceeded for CR-3 Cycle 14 for the limiting DNB events. In all DNB assessments for CR-3 Cycle 14 using the BHTP CHF correlation, the limiting hot pin/hot subchannel CHF calculations effectively utilized local coolant conditions within the correlation applicability ranges.