Entergy

Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213-8298
Tel 601 368 5758

Michael A. Krupa
Director
Nuclear Safety & Licensing

July 23, 2001

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: River Bend Station – Unit 1
Docket No. 50-458
License No. NPF-47
Transmittal of Non-Proprietary version of Attachment 4 of Cycle 11 Reload License Amendment Request (LAR 2000-28)

Reference: License Amendment Request (LAR 2000-28), "Cycle 11 Reload" RBG-45738, dated May, 23 2001

CNRO-2001-00032

Gentlemen:

On May 23, 2001, Entergy Operations, Inc. (Entergy) applied for an amendment of Facility Operating License No. NPF-47 for the River Bend Station (RBS) in accordance with 10CFR50.91(a)(1). The request included information identified as proprietary to Framatome-ANP in Attachment 4 of that letter. Per NRC request, this letter transmits a non-proprietary version of the information in the referenced letter.

This letter does not change the no significant hazards considerations of the original License Amendment Request (LAR 2000-28) and does not introduce any new commitments. If you have any questions please contact Ms. Adrienne Smith at (601) 368-5275.

Very truly yours,

M. A Krupa

ABS/MAK
Attachment

A001

cc:

U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

NRC Senior Resident Inspector
P. O. Box 1050
St. Francisville, LA 70775

Mr. Robert E. Moody
Project Manager
U.S. Nuclear Regulatory Commission
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Washington, DC 20555

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P. O. Box 82215
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ATTACHMENT

TO

CNRO-2001-00032

NON-PROPRIETARY VERSION OF

ATTACHMENT 4 OF LETTER NO.

RBG-45738

IN THE MATTER OF AMENDING

LICENSE NO. NPF-47

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-458

FRAMATOME ANP

May 15, 2001
KVW:01:147

Mr. J. B. Lee
Fuel Fabrication Coordinator
Entergy Operations, Inc.
Echelon One
1340 Echelon Parkway
Jackson, MS 39213

Dear Mr. J. B. Lee:

Revised River Bend Station Cycle 11 MCPR Safety Limit
RBC-49462

Reference 1) K. V. Walters to J. B. Lee, "Transmittal of Condition Report 9369, Revision 0," GEXI: 2001:00090, RBC-49461, dated May 15, 2001.

FRA-ANP has completed a revised MCPR safety limit analysis to support River Bend Station Cycle 11. The revised analysis incorporates a correction for the error reported in FRA-ANP Condition Report 9369 which was transmitted to Entergy by the Reference 1 letter. The results of this analysis are provided in the Attachment to this letter. In summary, the results continue to support a two-loop operation MCPR safety limit of 1.06 and single-loop operation MCPR safety limit of 1.08. The radial power uncertainties used in this analysis support:

- 50% of the LPRMs out of service (LPRM bypass model on or off);
- Up to 40% of the TIP channels out of service (100% available at startup); and
- 2500 EFPH LPRM calibration interval.

The radial power uncertainties are documented in the FRA-ANP report EMF-2493(P), Revision 0, "MICROBURN-B2 Based Impact of Failed/Bypassed LPRMs and TIPs, Extended LPRM Calibration Interval, and Single Loop Operation on Measured Radial Bundle Power Uncertainty," December 2000. The radial power uncertainties as based on the methodology discussed in Reference A.9 of the Attachment.

The calculations performed for the analysis were documented and independently reviewed in accordance with FRA-ANP Quality Assurance Procedures.

Framatome ANP Richland, Inc.

2101 Horn Rapids Road
Richland, WA 99352
Tel: (509) 375-8100
Fax: (509) 375-8402

A proprietary information affidavit for the information included in the Attachment to this letter is also enclosed.

Very truly yours,

K. V. Walters
Project Manager

Enclosure

cc: Echelon:
J. B. Lee (Original plus one copy), w/ Att. & Encl.
D. K. Stringer, w/o Att. & Encl.
R. M. Wilkins, w/o Att. & Encl.

cc: RBS:
(c/o Donna Fancher)
H. A. Goodman w/ Att. & Encl.
P. A. Sicard, w/ Att. & Encl.
P. Vo, w/ Att. & Encl.
RBS-PPF G25.4.3, w/ Att. & Encl. [10]

Revised River Bend Station Cycle 11
MCPR Safety Limit Analysis

A MCPR safety limit (SLMCPR) analysis was performed to support River Bend Station (RBS) Cycle 11. This analysis was based on the neutronic fuel design, core loading pattern, and control rod step-through for Cycle 11 developed in response to the FSDD notice and documented in Reference A.1. An analysis was also performed to confirm the TLO and SLO SLMCPR for the Cycle 11 final design basis step-through. For the ATRIUM™-10* fuel to be loaded in Cycle 11, the analysis used the SPCB critical power correlation and the additive constants and additive constant uncertainty reported in Reference A.2. For the coresident GE11 fuel, the analysis used the edge form of the ANFB-10 critical power correlation (Reference A.3) and the additive constants and additive constant uncertainty reported in Reference A.4. The additive constants and additive constant uncertainty for the GE11 fuel were determined using the direct method discussed in Reference A.5. The uncertainties used in the analysis are presented in Table 1. Effects of fuel channel bow were explicitly accounted for in the analysis which assumed fuel channels manufactured by Carpenter Special Products for the ATRIUM-10 fuel and GE-manufactured fuel channels for the GE11 fuel. The analysis also assumed that no fuel channels were used for more than one fuel bundle lifetime.

Radial power uncertainties applied in the analyses support the following scenarios:

- 50% of the LPRMs out of service (LPRM bypass model on or off);
- up to 40% of the TIP channels out-of-service with 100% available at startup; and
- 2500 EFPH LPRM calibration interval.

The radial power uncertainty presented in Reference A.6 was adjusted to account for the impact of these scenarios using the process described in Reference A.9.

The results support a two-loop operation (TLO) MCPR safety limit of 1.06. Table 2 presents a summary of the analysis results including the MCPR safety limit and the percentage of rods expected to experience boiling transition. The safety limit radial power histogram for the limiting cycle exposure of 12,100.0 MWd/MTU is presented in Figure 1. Results for single-loop operation (SLO) are also presented in Table 2 and support a MCPR safety limit of 1.08, a 0.02 increase relative to the TLO MCPR safety limit.

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* ATRIUM is a trademark of Framatome ANP.

References:

A.1 Letter, K. V. Walters (FRA-ANP) to J. B. Lee (Entergy), "River Bend Station Cycle 11 Final Core Design Report (Reload Batch RBA-10) RBC-49024," KVW:01:030(P), February 12, 2001.

A.2 EMF-2209(P)(A) Revision 1, *SPCB Critical Power Correlation*, Siemens Power Corporation, July 2000.

A.3 EMF-1997(P)(A) Revision 0, *ANFB-10 Critical Power Correlation*, Siemens Power Corporation, July 1998.

A.4 Letter, J. B. Lee (Entergy) to K. V. Walters (SPC), "Grand Gulf Nuclear Station Unit 1 and River Bend Station Unit 1, Reload Transition Data – GE11 Additive Constants," CEXO 2000-00293, July 25, 2000.

A.5 EMF-2245(P)(A) Revision 0, *Application of Siemens Power Corporation's Critical Power Correlations to Co-Resident Fuel*, Siemens Power Corporation, August 2000.

A.6 EMF-2158(P)(A) Revision 0, *Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2*, Siemens Power Corporation, October 1999.

A.7 Letter, J. B. Lee (Entergy) to K. V. Walters (SPC), "River Bend Station Unit 1, Reload SLMCPR Data," CEXO2001-00056, January 23, 2001.

A.8 ANF-524(P)(A) Revision 2 and Supplements 1 and 2, *ANF Critical Power Methodology for Boiling Water Reactors*, Advanced Nuclear Fuels Corporation, November 1990.

A.9 Letter, H. D. Curet (SPC) to H. J. Richings (USNRC), "POWERPLEX® Core Monitoring: Failed or Bypassed Instrumentation and Extended Calibration," HDC:96:012, May 6, 1996.

Table 1 Fuel- and Plant-Related Uncertainties for RBS Cycle 11 MCPR Safety Limit Analyses

Parameter	Standard Deviation (% of Nominal)	Reference
Fuel-Related Uncertainties		
Correlation additive constants		
GE11	[ ]	A.4
ATRIUM-10	[ ]	A.2
Assembly radial peaking		
TLO	[ ]	A.6, A.9*
SLO	[ ]	NA†
Rod local peaking	[ ]	A.6
Assembly flow rate	[ ]	A.8
System-Related Uncertainties		
Feedwater flow rate	1.80	A.7
Feedwater temperature	0.80	A.7
Core pressure	0.70	A.7
Total core flow rate		
TLO	2.50	A.7
SLO	6.00	A.7

* The TLO radial power uncertainty is based on the [ ] uncertainty from Reference A.6 and adjustments (based on the process described in Reference A.9) to account for up to 40% of the TIP channels out of service, up to 50% of the LPRMs out of service and an extended LPRM calibration interval of 2500 EFPH.

† The SLO radial power uncertainty is based on an SLO TIP uncertainty of [ ] and the corresponding TLO uncertainty is [ ].

**Table 2 Results Summary for
RBS Cycle 11 MCPR Safety Limit Analysis**

SLMCPR	Percentage of Rods in Boiling Transition
TLO – 1.06	0.0841
SLO – 1.08	0.0620

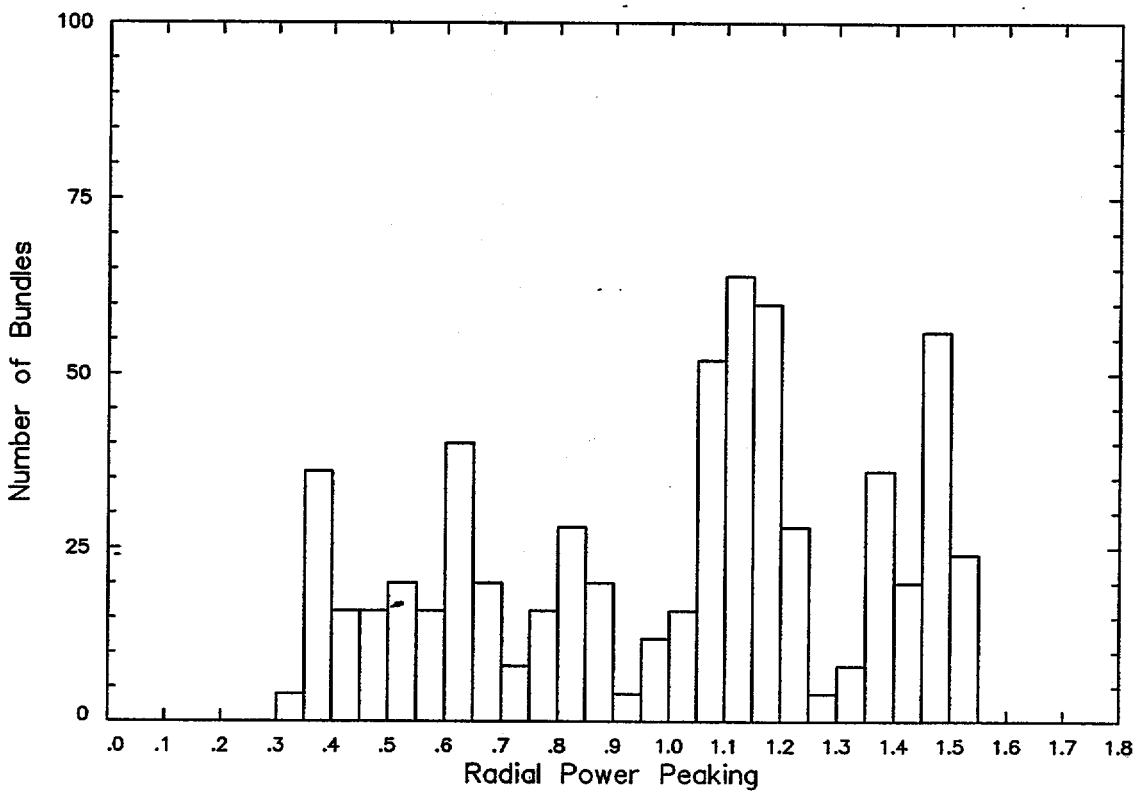

Figure 1 RBS Cycle 11
Radial Power Distribution for SLMCPR
Determination at 12,100.0 MWd/MTU