Proprietary Information

Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

October 1, 2003

TVA-BFN-TS-445

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-296
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 - TECHNICAL SPECIFICATIONS (TS) CHANGE 445 - SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) - CYCLE 12 OPERATION

Pursuant to 10 CFR 50.90, the Tennessee Valley Authority (TVA) is submitting a request for a TS change (TS-445) to Operating License DPR-68 for BFN Unit 3. The proposed amendment revises the numeric value of SLMCPR in TS 2.1.1.2 for one and two recirculation loop operation to incorporate the results of the Unit 3 Cycle 12 core reload analysis. Unit 3 Cycle 12 operation, which begins in Spring 2004, will involve the first use of Framatome Advanced Nuclear Power (FANP) fuel at BFN.

This TS has been preceded by two other TS changes needed for the use of FANP fuel. TS-421, which was submitted February 13, 2003, revises TS 4.2.1, Fuel Assemblies, to modify the fuel design description to encompass FANP fuel and also modifies TS 4.3, Fuel Storage, to remove nomenclature specific to Global Nuclear Fuels analysis methods. TS-421 was approved on September 5, 2003. TS-425, which was submitted April 14, 2003, revises two Limiting Conditions for Operation regarding core thermal limits adjustments for inoperable equipment and modifies TS 5.6.5, COLR, to add references to the FANP analytical methods that will be used to determine core operating limits. TS-425 is being reviewed by NRC.

A P01

A proprietary version of a report prepared by FANP in support of this proposed TS change is provided in Enclosure 3. FANP has requested that the proprietary report be withheld from public disclosure pursuant to 10 CFR 2.790. In consideration, an affidavit, as required by 10 CFR 2.790(b)(1), is also included in Enclosure 3. Enclosure 4 provides a non-proprietary version of the same report.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Alabama State Department of Public Health.

Approval of TS-445 is needed for BFN Unit 3 Cycle 12 operation, which begins in Spring 2004. Therefore, TVA is asking that this TS change be approved by February 1, 2004, and that the implementation of the revised TS be made within 60 days of NRC approval.

There are no regulatory commitments associated with this submittal. If you have any questions about this TS change, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 1st day of October, 2003.

Sincerely,

T. E. Abney
Manager of Licensing
and Industry Affairs

Proprietary Information Enclosure 3

Enclosures:
1. TVA Evaluation of Proposed Change
2. Proposed Technical Specifications Changes (mark-up)
3. Affidavit and Proprietary Version of FANP Report
4. Non-proprietary Version of FANP Report

cc (Enclosures):
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Enclosure 1

Technical Specifications (TS) Change 445
Safety Limit Minimum Critical Power Ratio (SLMCPR)
Unit 3 Cycle 12 Operation

TVA Evaluation of Proposed Change

1.0 DESCRIPTION

This letter is a request to amend Operating License DPR-68 for Browns Ferry Nuclear Plant (BFN) Unit 3. The proposed change revises the SLMCPR values in TS 2.1.1.2 to incorporate the results of the cycle-specific core reload analysis for BFN Unit 3 Cycle 12 operation, which will start in early 2004.

2.0 PROPOSED CHANGE

The proposed TS change revises the SLMCPR value in Unit 3 TS 2.1.1.2 from 1.10 to 1.11 for single recirculation loop operation and from 1.08 to 1.09 for two recirculation loop operation. A marked-up TS page is provided in Enclosure 2, which shows the TS revision.

3.0 BACKGROUND

Safety Limits (SLs) are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity. One such SL included in BFN TS is the SLMCPR value in TS 2.1.1.2. The SLMCPR limit is established such that at least 99.9% of the fuel rods in the core would not be expected to experience the onset of transition boiling as a result of normal operation and abnormal operational transients, which in turn ensures fuel cladding damage does not occur. A general discussion of the SLMCPR parameter is maintained in Section 3.7.7.1.1, Fuel Cladding Integrity Safety Limit, of the BFN Updated Final Safety Analysis Report.

As noted above, the SLMCPR limit is established such that fuel design limits are not exceeded during steady state operation, normal operational transients, and abnormal operational transients. As such, fuel damage is calculated not to occur if the limit is not violated. However, because fuel damage is not directly observable, a stepback approach is used to establish corresponding MCPR Operating Limits. In simple

terms, the MCPR Operating Limits are established by summing the cycle-specific core reload transient analyses adders and the calculated SLMCPR values. The MCPR Operating Limits are required to be established and documented in the Core Operating Limits Report (COLR) for each reload cycle by TS 5.6.5, COLR. TS 3.2.2, MCPR, specifies the Limiting Conditions for Operation and Surveillance Requirements for monitoring MCPR against the MCPR Operating Limits documented in the COLR.

The absolute value of SLMCPR tends to vary cycle-to-cycle, typically due to the introduction of improved fuel bundle types, changes in fuel vendors, and changes in core loading pattern. Following the determination of the cycle-specific SLMCPR values, the MCPR Operating Limits are derived. The MCPR Operating Limits are maintained by the Licensee in the COLR in accordance with TS 5.6.5.a(3). However, the SLMCPR numeric values are listed in TS 2.1.1.2 and must be revised using the License Amendment process, if the value changes.

In a meeting with the NRC staff on October 16, 2002 (Reference 1), TVA presented the schedule for the first use of Framatome Advanced Nuclear Power (FANP) ATRIUM-10 fuel at BFN. In concert with the use of ATRIUM-10 fuel, TVA also indicated that BFN core design analysis and transient analysis services for the next reload cores would be performed by FANP rather than the previous fuel vendor, Global Nuclear Fuels (GNF-formerly General Electric).

In support of the fuel vendor change, TS-445 has been preceded by two other TS submittals related to use of FANP fuel and fuel analysis methods. TS-421, which was submitted February 13, 2003 (Reference 2), revises TS 4.2.1, Fuel Assemblies, to modify the fuel design description to encompass FANP fuel and also modifies TS 4.3, Fuel Storage, to remove nomenclature specific to GNF fuel storage criticality analysis methods. TS-421 was approved by NRC on September 5, 2003 (Reference 3). TS-425, which was submitted April 14, 2003 (Reference 4), revises two Limiting Conditions for Operation regarding core thermal limits adjustments for inoperable equipment and modifies TS 5.6.5, COLR, to add references to the NRC-approved FANP analytical methods used to determine core operating limits, including SLMCPR. TS-425 is being reviewed by NRC.

The cycle-specific calculations for Unit 3 Cycle 12 core design have been recently completed and a change to the TS 2.1.1.2 SLMCPR values for one and two recirculation loop operation is needed for Unit 3 Cycle 12 operation. Therefore, this proposed TS change is requesting that the SLMCPR numeric values in

TS 2.1.1.2 be revised to reflect the results of the cycle-specific reload analysis.

This TS change is needed for BFN Unit 3 Cycle 12 operation, which will begin following the scheduled refueling outage in early 2004. Therefore, TVA is asking that this TS change be approved by February 1, 2004, and that the implementation of the revised TS be made within 60 days of NRC approval.

4.0 TECHNICAL ANALYSIS

The reactor core design for BFN Unit 3 Cycle 12 contains 764 fuel assemblies including 284 ATRIUM-10 fresh bundles, 284 previously irradiated GE14 fuel assemblies, and 196 previously irradiated GE13 fuel assemblies. There may be small changes in the final core configuration depending on fuel sipping test results during the Spring 2004 refueling outage. Any changes in core design will be evaluated to confirm that the TS change remains valid.

The SLMCPR values have been determined by FANP for TVA for Unit 3 Cycle 12 operation using plant- and cycle-specific fuel and core parameters. Enclosure 3 provides the proprietary version of a FANP report prepared for TVA, which summarizes the basis and results of the Unit 3 Cycle 12 SLMCPR analysis. This determination was made using the NRC-approved analytical methodologies referenced in the report. A non-proprietary version of the same report is provided in Enclosure 4.

The revised SLMCPR values for one and two recirculation loop operation for Unit 3 Cycle 12 have been calculated using NRC-approved methodologies and are, therefore, acceptable.

5.0 REGULATORY SAFETY ANALYSIS

The Tennessee Valley Authority (TVA) is submitting an amendment request to Operating License DPR-68 for the Browns Ferry Nuclear Plant Unit 3 Technical Specifications (TS). The proposed amendment will revise TS 2.1.1.2 to reflect the Safety Limit Minimum Critical Power Ratio (SLMCPR) values for Unit 3 Cycle 12 operations.

5.1 No Significant Hazards Consideration

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed amendment establishes a revised SLMCPR value for one and two recirculation loop operation. The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. The proposed SLMCPR values preserve the existing margin to transition boiling and the probability of fuel damage is not increased. Since the change does not require any physical plant modifications or physically affect any plant components, no individual precursors of an accident are affected and the probability of an evaluated accident is not increased by revising the SLMCPR values.

The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. The revised SLMCPR values have been determined using NRC-approved methods and procedures. The basis of the MCPR Safety Limit is to ensure no mechanistic fuel damage is calculated to occur if the limit is not violated. These calculations do not change the method of operating the plant and have no effect on the consequences of an evaluated accident. Therefore, the proposed TS change does not involve an increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed license amendment involves a revision of the SLMCPR value for one and two recirculation loop operation based on the results of an analysis of the Cycle 12 core. Creation of the possibility of a new or different kind of accident would require the creation of one or more new precursors of that accident. New accident precursors may

be created by modifications of the plant configuration, including changes in the allowable methods of operating the facility. This proposed license amendment does not involve any modifications of the plant configuration or changes in the allowable methods of operation. Therefore, the proposed TS change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3.0 Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The margin of safety as defined in the TS bases will remain the same. The new SLMCPR values were calculated using NRC-approved methods and procedures, which are in accordance with the fuel design and licensing criteria. The SLMCPR remains high enough to ensure that greater than 99.9 percent of all fuel rods in the core are expected to avoid transition boiling if the limit is not violated, thereby preserving the fuel cladding integrity. Therefore, the proposed TS change does not involve a reduction in the margin of safety.

Based on the above, TVA concludes that the proposed amendment presents no 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.

5.2 Applicable Regulatory Requirements/Criteria

The SLMCPR values included in this TS submittal have been determined in accordance with the NRC-approved methodologies. Accordingly, applicable regulatory requirements and criteria are met.

In conclusion, based on the considerations discussed above, (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 the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. October 22, 2002, NRC Summary of October 16, 2002, Meeting Regarding the Extended Power Uprate and Fuel Transition Activities for Browns Ferry Units 2 and 3 (TAC Nos. MB6381 and MB6382) (ML022950470).
2. February 13, 2003, Letter from TVA to NRC, Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - Technical Specifications (TS) Change 421 - Framatome Fuel Design and Storage (ML030560671).
3. September 5, 2003, Letter from NRC to TVA, Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3, Re: Issuance of Amendments (TAC Nos. MB7743, MB7744, and MB7745) (ML032520003).
4. April 14, 2003, Letter from TVA to NRC, Browns Ferry Nuclear Plant (BFN) - Units 2 and 3 - Technical Specifications (TS) Change 425 - Framatome Fuel - Core Operating Limits Report (COLR) References (ML031130513).

Enclosure 2

Technical Specifications (TS) Change 445
Safety Limit Minimum Critical Power Ratio (SLMCPR)
Unit 3 Cycle 12 Operation

Proposed Technical Specifications Changes (mark-up)

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:

MCPR shall be ≥ 1.09 for two recirculation loop operation or ≥ 1.11 for single loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

Enclosure 3

Technical Specifications (TS) Change 445
Safety Limit Minimum Critical Power Ratio (SLMCPR)
Unit 3 Cycle 12 Operation

Affidavit and Proprietary Version of FANP Report

Proprietary Information

AFFIDAVIT

STATE OF WASHINGTON)
) ss.
COUNTY OF BENTON)

1. My name is Jerald S. Holm. I am Manager, Product Licensing, for Framatome ANP, Inc. ("FANP"), and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by FANP to determine whether certain FANP information is proprietary. I am familiar with the policies established by FANP to ensure the proper application of these criteria.

3. I am familiar with the FANP information in the report denoted as Attachment A, Browns Ferry Unit 3 Cycle 12 MCPR Safety Limit Analysis, dated September 18, 2003, and referred to herein as "Document." Information contained in this Document has been classified by FANP as proprietary in accordance with the policies established by FANP for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by FANP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure.

6. The following criteria are customarily applied by FANP to determine whether information should be classified as proprietary:

(a) The information reveals details of FANP's research and development plans and programs or their results.

(b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.

(c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for FANP.

(d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for FANP in product optimization or marketability.

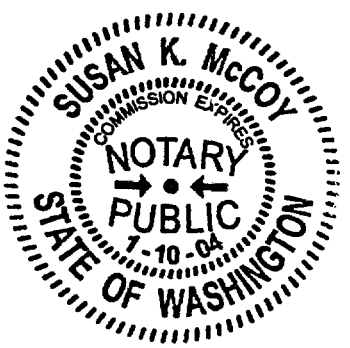
(e) The information is vital to a competitive advantage held by FANP, would be helpful to competitors to FANP, and would likely cause substantial harm to the competitive position of FANP.

7. In accordance with FANP's policies governing the protection and control of information, proprietary information contained in this Document has been made available, on a limited basis, to others outside FANP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. FANP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

SUBSCRIBED before me this 24th day of September, 2003.



Susan K. McCoy
NOTARY PUBLIC, STATE OF WASHINGTON
MY COMMISSION EXPIRES: 1/10/04

Enclosure 4

Technical Specifications (TS) Change 445
Safety Limit Minimum Critical Power Ratio (SLMCPR)
Unit 3 Cycle 12 Operation

Non-proprietary Version of FANP Report

Attachment A

Browns Ferry Unit 3 Cycle 12
MCPR Safety Limit Analysis

NONPROPRIETARY
VERSION

September 18, 2003

Browns Ferry Unit 3 Cycle 12
MCPR Safety Limit Analysis

Reactor system measurement uncertainties are statistically convolved with MCPR calculational uncertainties to determine a MCPR safety limit that ensures that at least 99.9% of the fuel rods in the reactor core would not be expected to experience boiling transition during normal operation or an anticipated operational occurrence. [

] The MCPR safety limit is used in conjunction with transient analysis results to establish the MCPR operating limit. The MCPR safety limit methodology is described in Reference A.1.

The final core design and step-through, developed to meet the operating requirements specified by TVA, was used in the Browns Ferry Unit 3 Cycle 12 (BF3C12) MCPR safety limit analysis. The 24-month Cycle 12 design supports licensed rated power of 3458 MWt and operation to nominal EOFP (cycle exposure of approximately 16,700 MWd/MTU) and includes post-EOFP final feedwater temperature reduction (FFTR) and coastdown extensions.

The BF3C12 MCPR safety limit analysis used the SPCB critical power correlation additive constants and additive constant uncertainty for the ATRIUM™-10* fuel reported in Reference A.2. FANP developed the SPCB additive constants and additive constant uncertainty for the GE13 and GE14 fuel using the indirect approach described in Reference A.3. The effects of channel bow were explicitly accounted for in the analysis consistent with the process described in Reference A.1. The local power peaking uncertainty is based upon the monitoring computer code as reported in Reference A.4. The relationship between assembly flow rate and assembly power was determined for each fuel type using the methodology and assembly flow rate uncertainty reported in Reference A.1.

The analysis supports:

- Fuel- and plant-related uncertainties for BF3C12 presented in Table A.1.
- 50% of the LPRMs out of service (LPRM bypass model on or off).
- Up to 2 TIP machines out of service, or the equivalent number of TIP channels.
- 2500 EFPH LPRM calibration interval.
- No reused channels.

[

* ATRIUM is a trademark of Framatome ANP.

]

The results support a two-loop operation (TLO) MCPR safety limit of 1.09. Table A.2 presents a summary of the analysis results including the MCPR safety limit and the percentage of rods expected to experience boiling transition. Analyses were performed using the power distributions from each exposure in the design step-through. The safety limit radial power histogram for the limiting cycle exposure of 0.0 MWd/MTU (i.e., the exposure that results in the highest number of rods expected to experience boiling transition) is presented in Figure A.1. Results for single-loop operation (SLO) are also presented in Table A.2 and support a MCPR safety limit of 1.11. The Cycle 12 core loading is presented in Table A.3.

References:

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

A.3 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.4 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.5 Letter, H. Donald Curet (SPC) to H. J. Richings (USNRC), "POWERPLEX® Core Monitoring: Failed or Bypassed Instrumentation and Extended Calibration," HDC:96:012, May 6, 1996.

Table A.1 Fuel- and Plant-Related Uncertainties for Browns Ferry Unit 3 Cycle 12 MCPR Safety Limit Analyses

Parameter	Standard Deviation
Fuel-Related Uncertainties	
[	
	]
Plant-Related Uncertainties	
Feedwater flow rate	1.8%
Feedwater temperature	0.8%
Core pressure	0.7%
Total core flow rate	
TLO	2.5%
SLO	6.0%

[ ]

Table A.2 Results Summary for Browns Ferry Unit 3 Cycle 12 MCPR Safety Limit Analysis

SLMCPR	Percentage of Rods in Boiling Transition
TLO – 1.09	0.098
SLO – 1.11	0.080

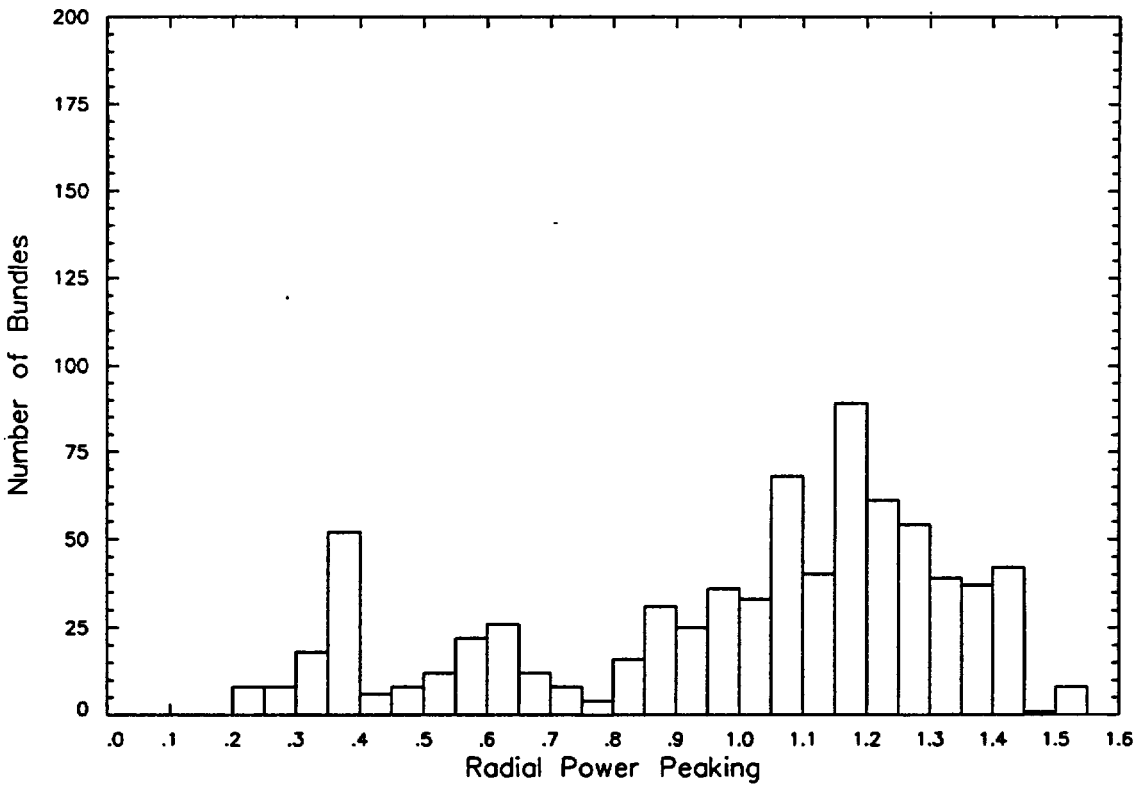


Figure A.1 Browns Ferry Unit 3 Cycle 12 Radial Power Distribution for SLMCPR Determination at 0.0 MWd/MTU

Table A.3 Browns Ferry Unit 3 Cycle 12 Core Loading

Fuel Description	Cycle Loaded	Nuclear Fuel Type	Total Number of Assemblies
GE13	10	21	124
GE13	10	22	72
GE14	11	25	220
GE14	11	26	64
ATRIUM-10	12	31	64
ATRIUM-10	12	32	152
ATRIUM-10	12	33	68