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:

1.10

MCPR shall be ≥ 1.11 for two recirculation loop operation or ≥ 1.13 for single recirculation loop operation.

1.12

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:

2.2.1 Within 1 hour, notify the NRC Operations Center, in accordance with 10 CFR 50.72.

2.2.2 Within 2 hours:

2.2.2.1 Restore compliance with all SLs; and

2.2.2.2 Insert all insertable control rods.

2.2.3 Within 24 hours, notify the Plant Manager and the Vice President — Peach Bottom Atomic Power Station.

(continued)

* MCPR values in TS 2.1.1.2 are applicable only for Cycle 12 operation

13

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5.6 Reporting Requirements (continued)

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

1. The Average Planar Linear Heat Generation Rate for Specification 3.2.1;

2. The Minimum Critical Power Ratio for Specifications 3.2.2 and 3.3.2.1;

3. The Linear Heat Generation Rate for Specification 3.2.3; and

4. The Control Rod Block Instrumentation for Specification 3.3.2.1.

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel" (latest approved version as specified in the COLR);*

2. NEDC-32162P, "Maximum Extended Load Line Limit and ARTS Improvement Program Analyses for Peach Bottom Atomic Power Station Units 2 and 3," Revision 1, February, 1993;

3. PECo-FMS-0001-A, "Steady-State Thermal Hydraulic Analysis of Peach Bottom Units 2 and 3 using the FIBWR Computer Code";

4. PECo-FMS-0002-A, "Method for Calculating Transient Critical Power Ratios for Boiling Water Reactors (RETRAN-TCPPECo)";

5. PECo-FMS-0003-A, "Steady-State Fuel Performance Methods Report";

6. PECo-FMS-0004-A, "Methods for Performing BWR Systems Transient Analysis";

(continued)

*For Cycle 13, specific documents were approved in the Safety Evaluation dated ( ) to support License Amendment No. ( ).

ATTACHMENT 3

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2

Docket No. 50-277

License No. DPR-44

LICENSE CHANGE APPLICATION
ECR 98-01403

Letter from S. B. Shelton (GENE) to
K. W. Hunt (PECO Energy), "Peach Bottom Unit 2
Cycle 13 Safety Limit MCPR," dated June 10, 1998

ATTACHMENT 4

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2

Docket No. 50-277

License No. DPR-44

LICENSE CHANGE APPLICATION
ECR 98-01403

Non-Proprietary Version

Attachment — Additional Information Regarding the 1.10 Cycle Specific SLMCPR for Peach Bottom Unit 2 Cycle 13 — June 9, 1998

References

[1] *General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application*, NEDO-10958-A, January 1977.

[2] *General Electric Standard Application for Reactor Fuel (GESTAR II)*, NEDE-24011-P-A-11, November 1995.

[3] *General Electric Standard Application for Reactor Fuel (GESTAR II)*, NEDE-24011-P-A-13, August 1996.

[4] *General Electric Fuel Bundle Designs*, NEDE-31152-P, Revision 6, April 1997.

[5] *Methodology and Uncertainties for Safety Limit MCPR Evaluations*, NEDC-32601P, Class III, December 1996.

[6] *R-Factor Calculation Method for GE11, GE12 and GE13 Fuel*, NEDC-32505P Revision 1, June 1997.

Control Rod Pattern Development for the Peach Bottom Unit 2 Cycle 13 SLMCPR Analysis

Projected control blade patterns for the rodded burn through the cycle were used to deplete the core to the cycle exposures to be analyzed. At the desired cycle exposures the bundle exposure distributions and their associated R-factors were utilized for the SLMCPR cases to be analyzed. The use of different rod patterns to achieve the desired cycle exposure has been shown to have a negligible impact on the actual calculated SLMCPR. An estimated SLMCPR was obtained for an exposure point near beginning of cycle (BOC), middle of cycle (MOC), and the end of cycle (EOC) in order to establish which exposure points would produce the highest (most conservative) calculated SLMCPR.

The Safety Limit MCPR is analyzed with radial power distributions that maximize the number of bundles at or near the Operating Limit MCPR during rated power operation. This approach satisfies the stipulation in Reference 1 that the number of rods susceptible to boiling transition be maximized. GENE has established criteria to determine if the control rod patterns and resulting radial power distributions are acceptable based on importance parameters described later. Different rod patterns were analyzed until the criteria on the above parameter was satisfied. The rod pattern search was narrowed by starting from a defined set of patterns known from prior experience to yield the flattest possible MCPR distributions. This was done for the two most limiting exposure points in the cycle since the BOC point was excluded by criteria as non-limiting based on the value from the estimation procedure. A Monte Carlo analysis was then performed for the MOC peak hot excess point and the EOC-1 GWd/STU exposure point to establish the maximum SLMCPR for the cycle.

Comparison of the Peach Bottom Unit 2 Cycle 13 SLMCPR to the Generic GE13 SLMCPR Value

Table 1 summarizes the relevant input parameters and results of the SLMCPR evaluation for both the generic GE13 and the Peach Bottom Unit 2 Cycle 13 core. The generic evaluation and the plant/cycle specific evaluations all were performed using the methods described in GETAB[1]. The evaluations yield different calculated SLMCPR values because the inputs that are used are different. The quantities that have been shown to have some impact on the determination of the safety limit MCPR (SLMCPR) are provided. Much of this information is redundant but is provided in this case because it has been provided previously to the NRC to assist them in understanding the differences between plant/cycle specific SLMCPR evaluations and the generic values calculated previously for each fuel product line. [[ ]]

Prior to 1996, GESTAR II[2] stipulated that the SLMCPR analysis for a new fuel design be performed for a large high power density plant assuming a bounding equilibrium core. The GE13 product line generic SLMCPR value was determined according to this specification and found to be 1.09. Later revisions to GESTAR II[3] that have been submitted to the NRC describe how plant/cycle specific SLMCPR analyses are used to confirm the calculated SLMCPR value on a plant/cycle specific basis using the uncertainties defined in Reference [4].

The Peach Bottom Unit 2 Cycle 13 core is a mixed core with GE11and GE13 fuel. The latest reload consists of GE13 fuel making up [[ ]] of the total bundles in the core. The fresh GE13 fuel has an average bundle enrichment of [[ ]], as compared to a core average enrichment of [[ ]]. By way of comparison, the generic GE13 equilibrium core has batch and core average enrichments of [[ ]]. Higher enrichment in the fresh GE13 fuel for the Peach Bottom Unit 2 Cycle 13 core (compared to the average of the core) produces slightly higher power in the fresh bundles relative to the rest of the core. [[ ]]

[[ ]]

[[ ]]

[[ ]]

The core MCPR distribution for the Peach Bottom Unit 2 Cycle 13 analysis is by all measures much flatter than the MCPR distribution assumed for the generic GE13 evaluation. [[ ]]

[[ ]]

[[ ]] From this comparison [[ ]] **it can be concluded that the core MCPR distribution for Peach Bottom Unit 2 Cycle 13 is flatter overall than the MCPR distribution evaluated generically for GE13 and that based on this reason alone the calculated SLMCPR for Peach Bottom Unit 2 Cycle 13 should be higher than the 1.09 generic GE13 SLMCPR.**

The uncontrolled bundle pin-by-pin power distributions were compared between the Peach Bottom Unit 2 Cycle 13 bundles and the b. dles used for the generic GE13 evaluation. Pin-by-pin power distributions are characterized in te.ms of R-factors using the methodology defined in Reference [6]. [[ ]]

The flatness of the pin R-factor distribution within a particular bundle is characterized [[ ]]

[[ ]]

Table 1 Comparison of Generic GE13 and Peach Bottom Unit 2 Cycle 13 Core and Bundle Quantities that Impact the SLMCPR [[ ]]

Summary

The calculated nominal 1.10 Monte Carlo SLMCPR for Peach Bottom Unit 2 Cycle 13 is consistent with what one would expect [[ ]] the 1.10 SLMCPR value is appropriate.

Various quantities [[ ]] have been used over the last year to compare quantities that impact the calculated SLMCPR value. These other quantities have been provided to the NRC previously for other plant/cycle specific analyses using a format such as that given in Table 1. These other quantities have also been compared for this core/cycle [[ ]] **The key parameters in Table 1 support the conclusion that the Peach Bottom Unit 2 Cycle 13 core/cycle has a much flatter radial power distribution than was used to perform the GE13 generic SLMCPR evaluation. This fact is significant enough to more than compensate for the fact that the Peach Bottom Unit 2 Cycle 13 bundles are less flat than the bundles used for the generic GE13 SLMCPR evaluation.**

Based on all of the facts, observations and arguments presented above, it is concluded that the calculated SLMCPR value of 1.10 for the Peach Bottom Unit 2 Cycle 13 core is appropriate. It is reasonable that this value is higher than the generic GE13 SLMCPR evaluation.

For single loop operations (SLO) the safety limit MCPR is 0.02 greater than the two-loop value. [[ ]]

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