Exelon Generation®

10 CFR 50.90

April 30, 2015

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

Peach Bottom Atomic Power Station, Unit 2
Renewed Facility Operating License No. DPR-44
NRC Docket No. 50-277

Subject: Safety Limit Minimum Critical Power Ratio Change – Supplement 1
Response to Request for Additional Information

Reference:
1. Exelon letter to the NRC, "License Amendment Request – Safety Limit Minimum Critical Power Ratio Change," dated December 5, 2014 (ADAMS Accession No. ML14342A229)
2. E-mail from R. Ennis (NRC) to D. Neff (Exelon), "Draft RAI – PBAPS Unit 2 SLMCPR Amendment Request (TAC MF5383)," dated April 13, 2015

In accordance with 10 CFR 50.90, Exelon Generation Company, LLC (Exelon) requested amendments to Facility Operating License No. DPR-44 for Peach Bottom Atomic Power Station (PBAPS) Unit 2 (Reference 1). Specifically, the proposed changes would revise the Technical Specifications (TS) Section 2.1.1 ("Reactor Core SLs") to incorporate revised Safety Limit Minimum Critical Power Ratios (SLMCPRs) due to the cycle specific analysis performed by Global Nuclear Fuel for PBAPS Unit 2 Cycle 21. The re-analysis was performed to accommodate operation in the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating domain as discussed in Reference 1.

Reference 2 provided NRC Requests for Additional Information (RAIs). The attachment to this letter provides responses to the Reference 2 RAIs.

Exelon has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the U.S. Nuclear Regulatory Commission in the referenced License Amendment Request. The supplemental information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Further, the additional information provided in this submittal does not affect the bases for concluding that, neither an environmental impact statement nor an

environmental assessment needs to be prepared in connection with the proposed amendment.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), Exelon is notifying the Commonwealth of Pennsylvania and the State of Maryland of this response by transmitting a copy of this letter along with the attachment to the designated State Officials.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this letter, please contact Mr. David Neff at (610) 765-5631.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 30th day of April 2015.

Respectfully,

James Barstow
Director, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachment:
1. Response to NRC Staff's Request for Additional Information

cc: USNRC Region I, Regional Administrator w/attachment
USNRC Senior Resident Inspector, PBAPS w/attachment
USNRC Project Manager, PBAPS w/attachment
R. R. Janati, Commonwealth of Pennsylvania w/attachment
S. T. Gray, State of Maryland w/attachment

Attachment

Safety Limit Minimum Critical Power Ratio Change – Supplement 1
Peach Bottom Atomic Power Station Unit 2
NRC Docket No. 50-277

Responses to NRC Staff's Request for Additional Information

Responses to NRC Staff's Request for Additional Information

By letter dated December 5, 2014, Exelon Generation Company, LLC (Exelon) submitted a License Amendment Request (LAR) for Peach Bottom Atomic Power Station (PBAPS), Unit 2. The proposed amendment would revise the Technical Specifications (TS) Section 2.1.1 ("Reactor Core SLs") to incorporate revised Safety Limit Minimum Critical Power Ratios (SLMCPRs) to accommodate operation in the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) operating domain.

In an email dated April 13, 2015, from the NRC (Rick Ennis) to Exelon (David Neff), the NRC provided Requests for Additional Information (RAIs) seeking clarification of certain issues related to the LAR. This attachment provides responses to those RAIs.

RAI-1

Provide the differences in design and geometrical considerations between GNF2 and GE14 fuel.

RESPONSE

The GNF2 fuel product is an evolutionary fuel product that is based on the GE14 design. As an evolutionary product, there are minor physical differences between the two designs. GNF2 uses two different part length rods compared to the one part length rod utilized in GE14. Additionally, GNF2 uses slightly longer fuel rods as well as a slightly thinner cladding, while maintaining the same outside diameter. More importantly, however, GNF2 maintains the previously established 10x10 array and 2 centrally located water rods and is therefore not considered a new fuel design (see Table 2-1 of Reference 1). The US Nuclear Regulatory Commission has previously recognized the applicability of GNF's Critical Power Correlation for GNF2 in an audit report based on maintaining these same physical dimensions (see Section 2.5 of Reference 2).

RAI-2

a) Discuss the methodology and the scheme used for the PBAPS Unit 2 Cycles 20 and 21 core reloads. Is there a noticeable change in the core radial and axial power shapes between the Cycles 20 and 21 reloads?

b) For the initial core loadings of Cycles 20 and 21, specify the fuel type, number of fresh, once burned, twice and thrice burned fuel.

RESPONSE
RAI-2a

RELOAD METHODOLOGY:
The methods used to analyze the core loading pattern are in accordance with the methods and processes defined in GESTAR II (Reference 3). There is no change in approved core design or

SLMCPR methodologies. This Technical Specification (TS) change, based on the PBAPS Unit 2 Cycle 21 MELLLA+ design, was completed within approved methodologies. The SLMCPR is not the primary driver in developing fuel cycle core designs. The energy plan, reactivity and thermal margins are the primary drivers.

SAFETY LIMIT METHODOLOGY:
The SLMCPR methodology uses sets of random perturbations (Monte Carlo) in the calculation process to determine the cycle-specific SLMCPR. For each cycle, cycle-specific SLMCPR calculations are performed for the specific fuel bundle design and core loading used in the cycle reload design. The core radial power distribution must represent a reasonable bound on the number of fuel bundles at or near thermal limits, and the fuel assembly local power distribution must be based on the actual bundle design. The cycle-specific analysis is performed at multiple exposure points throughout the cycle and the most limiting calculated SLMCPR is compared to the TS value. In most cycles, the SLMCPR does not change to the extent that a request for a TS change is necessary. If the calculated cycle specific SLMCPR is bounded by the TS value, then no TS change is required. A reduction in the SLMCPR TS could be requested if the calculated value is lower than the existing TS. This methodology response applies to all plant-cycles.

LOADING SCHEMES:
The loading pattern is developed by GNF based on Exelon inputs. Among the inputs are:

- Batch size and cycle energy – fuel bundle design (nuclear) and loading patterns are developed together
- Thermal limit design margins
- Reactivity margins – Minimum shutdown margin, minimum and maximum hot excess reactivity
- Discharge exposure limitations and other limits as established by safety analysis
- Desired control rod patterns – sequences and durations
- Minimize preconditioning limitations

Both Cycles 20 and 21 use a conventional scatter load core design. Due to differences in the schedules and rated power levels, both cycles were designed to deliver a different final energy. Cycle 20 was designed to operate for 719 Effective Full Power Days (EFPD) at 3514 MWth, while Cycle 21 is designed to operate for 664 EFPD at 3951 MWth.

Although the core loading strategy for PBAPS Unit 2 has remained the same between the two cycles, axial and radial power shapes will vary from cycle to cycle. As a result of minor variations in the actual core loadings between the two cycles, there are differences between the two. Cycle 21 is slightly more bottom peaked than Cycle 20, within acceptable cycle-to-cycle variation. Additionally, the radial power shapes between Cycles 20 and 21 are similar with Cycle 21 having a somewhat flatter core.

RAI-2b

PBAPS Unit 2 Cycle 20 initial core loading consisted of 288 fresh GNF2, 272 once-burnt GNF2, 204 twice-burnt GE14, 0 thrice-burnt fuel.

PBAPS Unit 2 Cycle 21 initial core loading consisted of 328 fresh GNF2, 288 once-burnt GNF2, 148 twice-burnt GNF2, 0 thrice-burnt fuel.

References

1. GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-33270P Rev. 5, May 2013.
2. GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, 001N0184.3-P, November 6, 2014.
3. General Electric Standard Application for Reactor Fuel, NEDE-24011-P-A-20, December 2013; and the U.S. Supplement, NEDE-24011-P-A-20-US, December 2013.