



PECO ENERGY

PECO Energy Company  
Nuclear Group Headquarters  
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Docket Nos: 50-277

50-278

50-352

50-353

License Nos. DPR-44

DPR-56

NPF-39

NPF-85

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

Subject: Peach Bottom Atomic Power Station, Units 2 and 3  
Limerick Generating Station, Units 1 and 2  
Response to NRC Generic Letter 94-02, "Long Term Solutions  
and Upgrade of Interim Operating Recommendations For Thermal  
Hydraulic Instabilities in Boiling Water Reactors."

- References:
- 1) Letter from A. Thadani (NRC) to L. A. England (BWROG), "Acceptance for Referencing of Topical Reports NEDO-31960 and NEDO-31960 Supplement 1, BWR Owners' Group Long Term Stability Solutions Licensing Methodology"; July 12, 1993
  - 2) Letter from L. A. England to M. J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Action"; June 6, 1994
  - 3) Letter from L. A. England to M. J. Virgilio, "BWR Owners' Group Improved Guidelines for Stability Interim Corrective Action"; April 4, 1994

Dear Sirs:

The attachments to this letter provide PECO Energy Company's (PECO Energy) response to Generic Letter 94-02, "Long Term Solutions and Upgrade of Interim Operating Recommendations for Thermal Hydraulic Instabilities on Boiling Water Reactors," for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3 and Limerick Generating Station (LGS), Units 1 and 2.

As requested in Generic Letter 94-02, this response is being submitted under oath or affirmation. If you have any questions regarding this response, please feel free to contact us.

Very truly yours,

G. A. Hunger, Jr.  
Director - Licensing

## Attachments

cc: T. T. Martin, Administrator, Region I, USNRC  
N. S. Perry, Resident Inspector, LGS  
W. L. Schmidt, Senior Resident Inspector, PBAPS  
R. R. Janati, Commonwealth of Pennsylvania

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COMMONWEALTH OF PENNSYLVANIA

ss.

COUNTY OF CHESTER

D. M. Smith, being first duly sworn, deposes and says:


That he is Senior Vice President and Chief Nuclear Officer of PECO Energy Company; the Applicant herein; that he has read the attached response to Generic Letter 94-02 for Peach Bottom Facility Operating Licenses DPR-44 and DPR-56, and Limerick Facility Operating Licensees NPF-39 and NPF-85, and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.



Senior Vice President and  
Chief Nuclear Officer

Subscribed and sworn to

before me this 9th day  
of September 1994.

  
Notary Public

Notarial Seal  
Eric A. Santoni, Notary Public  
Tracytown Twp., Chester County  
My Commission Expires July 10, 1995

### Requested Actions

Generic Letter (GL) 94-02, "Long Term Solutions and Upgrade of Interim Operating Recommendations For Thermal Hydraulic Instabilities in Boiling Water Reactors," requested Boiling Water Reactor (BWR) licensees to review their current procedures and training programs and modify them as appropriate to strengthen the administrative provisions intended to avoid power oscillations or to detect and suppress them if they occur prior to implementation of the long-term solutions. In doing this each licensee should:

1.
  - a) Ensure that procedural requirements exist for initiation of a manual scram under all operating conditions when all recirculation pumps trip (or there are no pumps operating) with the reactor in the run mode, and ensure that operators are aware of the potential for very large power oscillations and the potential for exceeding core thermal safety limits before automatic protection systems function following the trip of all recirculation pumps (the procedural manual scram is not necessary after long-term solutions are approved and implemented for individual plants); and
  - b) Ensure that factors important to core stability characteristics (e.g., radial and axial peaking, feedwater temperature and thermal hydraulic compatibility of mixed fuel types) are controlled within appropriate limits consistent with the core design, power/flow exclusion boundaries, and core monitoring capabilities of the reactor in question, and that these factors are controlled through procedures governing changes in reactor power, including startup and shutdown, particularly at low-flow operating conditions. Each licensee should review its procedures and determine if instability can be avoided by these procedures and if the procedures can be carried out using existing instrument information. If it is concluded that a near-term upgrade of core monitoring capability is called for to ease the burden on operators, determine the need to incorporate on-line stability monitoring or monitors for stability sensitive parameters and inform the NRC of the schedule and technical evaluation for such upgrades found to be necessary.
2. All licensees of BWRs are requested to develop and submit to the NRC a plan for long term stability corrective actions, including design specifications for any hardware modifications or additions to facilitate manual or automatic protective response needed to ensure that the plant is in compliance with General Design Criteria (GDC) 10 and 12. An acceptable plan could provide for implementing one of the long-term stability solution options proposed by the BWR Owners' Group (BWROG) and approved by the NRC. The plan should include a description of the action proposed and a schedule of any submittal requiring plant specific design review and approval by the NRC and an installation schedule. The plan should also address the need for near-term and long-term technical specification modifications.

Interim Corrective Actions (ICA)

Response 1a

PECO Energy, at both LGS and PBAPS, has implemented the Interim Corrective Actions (ICA) specified in NRC Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors." These actions included a review of station procedures that ensured requirements existed to initiate a manual scram under the conditions described in Requested Action 1a, and a review of training material that ensured that operators were made aware of potential power oscillations and the potential to exceed core thermal safety limits under the conditions described in Requested Action 1a.

Response 1b

In addition to implementing the actions referenced in Response 1a, PECO Energy has supported the BWROG effort to develop improved guidelines for the ICA to better address startup and low power maneuvering conditions. A copy of the improved BWROG Guidelines, dated June 6, 1994, for stability ICA was reviewed by the NRC.

It should be noted that the BWROG guidelines are consistent with and more conservative than the ICA which were previously implemented as a result of NRC Bulletin 88-07, Supplement 1. The regions defined in the 1988 BWROG ICA (and included in the NRC Bulletin 88-07, Supplement 1) were based on stability tests and events known at the time. Subsequent work identified a sensitivity to reactor power shape and/or feedwater temperature conditions. Because of this, the BWROG included an expanded stability region and power distribution control definition in their June 6, 1994 guidelines. These changes provide a higher degree of protection against unacceptable power oscillations.

PECO Energy is currently reviewing the ICA developed by the BWROG and will complete implementation at both LGS and PBAPS by January 31, 1995. To simplify plant operations and provide additional conservatism to the ICA, the Controlled Entry Region III, proposed in the June 6, 1994 BWROG guidelines, will be treated as part of the Exit Region II. When Power Distribution Controls (PDC), consistent with Appendix B of the June 6, 1994 BWROG guidelines are implemented, the Exit Region II may be amended to include a Controlled Entry region.

During transition to the Long-Term Solution (LTS), revisions to the ICA will be considered. Specifically, ICA curves defining plant specific exclusion and restricted operating regions on the power/flow map may be established consistent with the methodology described in NEDO-32339, "Reactor Stability Long-Term Solution: Enhanced Option I-A." If such a revision to the ICA is pursued, it will include PDC in the restricted region, as defined by Appendix B of the June 6, 1994 BWROG guidelines (i.e., Core Average Boiling Boundary greater than or equal to 4.0 feet). PECO Energy will ensure that the NRC receives written notification in accordance with the conditions of GL 94-02, should any changes to the ICA changes be implemented.

Because the ICA guidelines are intended for use only until the LTS can be implemented, changes to the Technical Specifications (TS) will not be pursued at this time. The LTS will require changes to the TS and these changes will be submitted in accordance with the schedule in Enclosure 2.

Long Term Solutions

Response 2

The NRC requirement for long term stability solutions to ensure compliance with GDC 10 and 12 was originally presented in NRC Bulletin 88-07, Supplement 1 (December 30, 1988). The Bulletin acknowledged that the NRC was working with the BWROG to develop generic approaches to resolve the reactor stability issue. These efforts led to the solution concepts and supporting methodology described in NEDO-31960, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology" and NEDO-32339, "Reactor Stability Long Term Solution: Enhanced Option I-A."

For both PBAPS and LGS, PECO Energy has elected to proceed with the Enhanced Option I-A, as described in NEDO-32339, "Reactor Stability Long Term Solution: Enhanced Option I-A." This solution introduces new plant hardware and software to ensure that reactor coupled neutronic/thermal-hydraulic instabilities will not result in fuel thermal limit violations during reasonably limiting anticipated operating conditions. PECO Energy is participating with other utilities and GE Nuclear Energy, under a BWROG program, to conduct initial application activities and to develop the design of the modification. Generic recommendations for TS changes are provided as part of this BWROG program. Plant specific versions of these TS changes will be incorporated as part of the Enhanced Option I A modification. Implementation of the long term stability solution plan is contingent upon NRC acceptance of the BWROG methodology (NEDO-32339) and the PECO Energy hardware and software submittals.

The schedule for completion of the joint design and licensing activities is provided in Enclosure 1. Plans for plant specific activities are indicated in Enclosure 2. These schedules were based on an NRC review period of six months for plant specific submittals.



ENCLOSURE 1

ENHANCED OPTION I-A STABILITY PROGRAM  
DESIGN AND LICENSING ACTIVITIES  
NRC/BWROG MILESTONES

|   |                  |
|---|------------------|
| Letter on Enhanced Option 1-A, NEDO-32339,                      | 4/11/94 (actual) |
| NRC issues Safety Evaluation Report on NEDO-32339, Supplement 1 | Oct. 1994        |
| BWROG Issues Enhanced Option I-A Hardware topical report        | 1st Q 1995       |
| NRC issues Enhanced Option I-A SER                              | May 1995         |
| Enhanced Option I-A first plant implemented                     | 1st Q 1996       |
| Enhanced Option I-A implemented at all plants                   | 1998             |

ENCLOSURE 2

ENHANCED OPTION 1-A STABILITY PROGRAM  
PBAPS UNIQUE ACTIVITIES  
NRC/PBAPS MILESTONES

|  | <u>Unit 2</u> | <u>Unit 3</u> |
|--|---------------|---------------|
| Implement Improved ICAs Based on BWROG Recommendations | 1/31/95       | 1/31/95       |
| Submit Technical Specification Change                  | 1Q/1997       | 1Q/1998       |
| Implement BWROG Enhanced Option 1-A                    | 3Q/1997       | 3Q/1998       |

ENCLOSURE 2

ENHANCED OPTION 1-A STABILITY PROGRAM  
LGS UNIQUE ACTIVITIES  
NRC/LGS MILESTONES

|   | <u>Unit 1</u> | <u>Unit 2</u> |
|---|---------------|---------------|
| Implement Improved ICAs Based on BWROG<br>Recommendations | 1/31/95       | 1/31/95       |
| Submit Technical Specification Change                     | 3Q/1996       | 3Q/1997       |
| Implement BWROG Enhanced Option 1-A                       | 1Q/1997       | 1Q/1998       |