



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO THE USE OF APPROVED GENERAL ELECTRIC METHODS
FOR CYCLE MANAGEMENT CALCULATIONS
LIMERICK GENERATING STATION, UNITS 1 AND 2
PHILADELPHIA ELECTRIC COMPANY
DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated November 18, 1991 (Reference 1), Philadelphia Electric Company (PECo) requested to use NRC-approved General Electric Company (GE) reactor analysis methods (GESTAR-11, Reference 2) for Limerick Generating Station (LGS) cycle management calculations, specifically for core reload 4 of Unit 1 scheduled for startup in June 1992. This reload will utilize an advanced GE fuel product line (GE-11, Reference 3) which cannot currently be modeled with the existing NRC-approved PECo reactor analysis methods (Reference 4).

Consequently, PECo has obtained a license to use GE nodal physics methods and models that have been accepted for application to the GE-11 design. This acceptance is documented in Reference 3 which demonstrates the GE-11 compliance with the licensing criteria established by Amendment 22 (Reference 5) of GESTAR-11.

2.0 EVALUATION

In order to qualify the use of the GE reactor analysis software and models for application to PECo-specific cycle management evaluations, PECo engineers performed a set of verification calculations using both the NRC-approved GE methods and the NRC-approved PECo methods. The specific cycle management calculations included the evaluation of the cold shutdown margin demonstration conditions and the generation of the reactivity anomaly curve for the Peach Bottom Atomic Power Station (PBAPS), Unit 3, Cycle 8 reload core (Reference 6).

The beginning-of-cycle (BOC), cold shutdown margin model inter-qualification calculations demonstrated the consistency of the two independent models for calculating cold control rod reactivity worths (ΔK_{eff}) with a mean of 0.0009 ΔK and a sample standard deviation of 0.0009. This is within the differences normally observed from self-consistent independent models and methods and is therefore acceptable.

The hot operating reactivity anomaly curve calculations demonstrated the consistency of the two model packages for calculating hot reactivity worths as a function of operating cycle exposure. Although the GE model consistently predicts slightly lower hot control rod worths than the PECO model, this difference is again within the normal expected tolerance band and is therefore acceptable.

In order to verify PECO's qualifications for the application of the GE reactor analysis software and models to reload cores containing the GE-11 reload fuel design, PECO engineers have performed a steady-state evaluation of a nominal LGS, Unit 1, Cycle 5 reload core for both BOC cold and hot operating conditions. These calculations demonstrated the ability of PECO to generate results identical to those obtained by GE for the same reload core design.

3.0 CONDITIONS

Based on the review discussed above, the staff concludes that the PECO engineering staff have demonstrated sufficient ability to apply the NRC-approved GE steady-state nodal analysis methods and models to reactivity anomaly and cold shutdown margin demonstration evaluations, specifically for the support of core Reload 4 for LGS, Unit 1.

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REFERENCES

1. Letter from G. J. Beck (PECo) to USNRC, "Request for Approval to use General Electric Company Reactor Analysis Methods," dated November 18, 1991.
2. "General Electric Standard Application for Reactor Fuel (GESTAR-II)," NEDE-24011-P-A-10, June 1991.
3. "GE-11 Compliance with Amendment 22 of NEDE-24011-P-A (GESTAR-II)," NEDE-31917P, April 1991.
4. "Methods for Performing BWR Steady-State Reactor Physics Analysis," PECO-FMS-0005-A, 1989.
5. Letter from A. C. Thadani (NRC) to J. S. Charnley (GE), "Acceptance for Referencing of Amendment 22 to General Electric Licensing Topical Report NEDE-24011-P-A," General Electric Standard Application for Reactor Fuel" (TAC NO. 71444), July 23, 1990.
6. "Supplemental Reload Licensing Submittal for Peach Bottom Atomic Power Station, Unit 3, Reload 7, Cycle 8," GE Report 23A5889, Revision 0, January 1988.