



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION SUPPORTING
AMENDMENT NO. 108 TO FACILITY OPERATING LICENSE NO. DPR-44

PHILADELPHIA ELECTRIC COMPANY
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DELMARVA POWER AND LIGHT COMPANY
ATLANTIC CITY ELECTRIC COMPANY

PEACH BOTTOM ATOMIC POWER STATION, UNIT NO. 2

DOCKET NO. 50-277

1.0 INTRODUCTION

By letter dated September 7, 1984, Philadelphia Electric Company (the licensee) made application to amend the Technical Specifications of Peach Bottom Atomic Power Station, Unit 2, to permit reloading and operation of the unit for Cycle 7. In support of this application the licensee submitted a reload report (Reference 1), an update of the Loss of Coolant Accident (LOCA) analysis (Reference 2) and a single loop operation report (Reference 3).

1.1 Description of the Proposed Amendment Changes Relating to the Cycle 7 Core

The proposed amendment to the Peach Bottom Unit 2 Technical Specifications would:

- 1) Modify the bases of the Standby Liquid Control System to specify the required core boron concentration rather than the required shutdown margin,
- 2) Change the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) reduction factor to be applied during single loop operation,
- 3) Revise the Minimum Critical Power Ratio (MCPR) limits for Cycle 7 operation,
- 4) Provide MAPLHGR limits for the two new fuel types inserted for Cycle 7, and
- 5) Revise the Design Features section of the Technical Specifications to permit introduction of the improved Hybrid I control rods.

Each of these changes to the Technical Specifications is discussed in Section 2.5 below.

2.0 EVALUATION

2.1 Fuel Mechanical Design

The fuel to be inserted into the core for Cycle 7 is similar to that customarily used for BWR reloads and is described in Reference 4. This report has been approved by the NRC staff (Reference 5), and we conclude that no further review of the fuel mechanical design is required.

2.2 Nuclear Design

The nuclear design and analysis of the Cycle 7 reload was performed with methods and techniques which are described in Reference 4 and which are used in all reload analyses performed by General Electric. The results of the analyses are within the range of those customarily found for reload cores and are acceptable. We conclude that the nuclear design and analysis of the Cycle 7 reload is acceptable.

2.3 Thermal-Hydraulic Design

The methods and procedures employed in the thermal-hydraulic design and analysis of the Cycle 7 core are described in Reference 4. The value of 1.07 for the safety limit MCPR, approved in that reference, is used for Cycle 7. The methods and procedures used to obtain the operating limit MCPR were those described in Reference 4 and are acceptable.

Thermal-hydraulic stability for BWRs is presently the subject of a generic study and the General Electric design methods for prediction of core stability are under review. Our review of the design methods using FABLE has progressed sufficiently that we have assigned a 20 percent uncertainty to the calculated decay ratio. Thus, we expect that Peach Bottom 2 Cycle 7, which has a calculated core stability decay ratio of 0.87, may be unstable under certain abnormal, but possible, operating conditions in the low flow-high power region of the operating map. However, we have also concluded that the core stability characteristics are essentially unchanged from the previous cycle, which had a calculated decay ratio of 0.85. Therefore, any corrective measures required upon completion of our generic study are unrelated to this reload and may be implemented separately. In the interim, we conclude that there is reasonable assurance that continued operation of Peach Bottom 2 will not result in power oscillations leading to violation of specified acceptable fuel design limits (SAFDL) for the reasons that follow:

- 1) Peach Bottom 2 and other reactors with comparable core designs have many years of operating history without known incidents of power oscillations which resulted in exceeding the SAFDL.
- 2) Philadelphia Electric Company is aware of the operating recommendations provided in the General Electric Service Information Letter (SIL-380) to avoid operating regions of potential instability and to detect and suppress power oscillations if they should occur.

We conclude that the thermal-hydraulic design and analysis of the Peach Bottom 2 Cycle 7 core is acceptable.

2.4 Transient and Accident Analyses

The transient and accident analyses for Cycle 7 have been performed with the methods described in Reference 4 and are reported in Reference 1. The limiting non-pressurization event is the Rod Withdrawal Error resulting in a required operating limit MCPR (OLMCPR) of 1.23. The limiting pressurization event for option A is the Load Rejection without Bypass resulting in a required OLMCPR of 1.30 during the early part of the cycle and 1.39 at the end of cycle. For option B the limiting event is Feedwater Controller Failure (OLMCPR = 1.15) during the early part of the cycle and is Load Rejection without Bypass (OLMCPR = 1.27) at end of cycle.

The LOCA has been reanalyzed to obtain MAPLHGR curves for the new fuel assembly types to be inserted for Cycle 7. A cycle specific rod drop accident analysis has been performed for Cycle 7 resulting in a peak fuel enthalpy of 241 calories per gram. This meets our acceptance criterion of 280 calories per gram and is acceptable. Because the transient and accident analyses have been performed by previously approved methods and the results meet our acceptance criteria, we conclude that they are acceptable.

2.5 Technical Specifications

2.5.1 Basis for Standby Liquid Control System

The basis for meeting the boron concentration and volume limits in the Standby Liquid Control System has been altered to require the system to be capable of inserting boron to a given concentration in the core within a given time rather than to provide a fixed shutdown margin. Cycle specific calculations are then performed to determine the shutdown margin obtained. The revised procedure is more straightforward and is common practice in BWR reloads. We find it acceptable for Peach Bottom Unit 2.

2.5.2 MAPLHGR Reduction Factor

When operating with a single loop, it is necessary to reduce the OLMAPLHGR values in order to maintain the margin to peak clad temperature limits in the LOCA analysis. The reduction factor has been calculated by methods described in Reference 3, and the Technical Specification value is consistent with the results in that reference. It is therefore acceptable.

2.5.3 OLMCPR Values

The proposed Technical Specification values of the OLMCPR are conservative with respect to the values reported in Reference 1 and are acceptable.

2.5.4 MAPLHGR Limits for New Fuel

The MAPLHGR limits in the Technical Specifications are consistent with those given in Reference 2 and are acceptable.

2.5.5 Hybrid I Control Rods

Use of Hybrid I control rods in BWRs has been reviewed by the NRC staff and found to be acceptable. Their use in Peach Bottom Unit 2 is therefore acceptable. The description of control rods is being deleted from the Technical Specifications. Since the standard control rods are described in the FSAR and the Hybrid I rods are described in approved Topical Report NEDE-22290-A, we find this to be acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. We have determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: March 19, 1985

The following NRC personnel have contributed to this Safety Evaluation:
W. Brooks and G. Schwenk.

References

1. "Supplemental Reload Licensing Submittal for Peach Bottom Atomic Power Station Unit 2, Reload 6", General Electric, Report 22A8597, June, 1984.
2. Errata and Addenda Sheet No. 10 to NEDO-24081, "LOCA Analysis for Peach Bottom APS Unit 2," June, 1984.
3. Errata and Addenda Sheet No. 2 to NEDO-24229-1, "Peach Bottom Atomic Power Station Units 2 and 3 Single Loop Operation," June, 1984.
4. GESTAR II - "General Electric Standard Application for Reactor Fuel" - NEDE-24011-P-A-6, April, 1983.
5. GESTAR II - "General Electric Standard Application for Reactor Fuel" - NEDE-24011-P-A-6, April, 1983. Appendix C.