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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 64 TO FACILITY OPERATING LICENSE NO. NPF-14

PENNSYLVANIA POWER & LIGHT COMPANY

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 1

DOCKET NO. 50-387

1.0 INTRODUCTION

By letter dated December 12, 1986, Pennsylvania Power and Light Company (PP&L or the licensee) proposed to amend Appendix A of Susquehanna Steam Electric Station (SSES) Unit 1 Facility Operating License No. NPF-14. The requested amendment furnished information to support extended operation with the resident GE 8x8 fuel up to a fuel exposure of 40,675 MWD/MT and provided a revision to single loop operation (SLO) provisions in the Technical Specifications. Furthermore, Technical Specification changes were made to the previous Exxon fuel Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limits and operating limit Minimum Critical Power Ratios (MCPRs) to reflect present ENC methodology and analyses.

2.0 EVALUATION

The staff evaluation of the licensee's proposed Technical Specification changes follows:

(1) MAPLHGR limits for the resident GE fuel bundle types 8CR233 are extended from an average planar exposure limit of 33,069 MWD/MT to 40,675 MWD/MT. The resulting peak cladding temperature (PCT) limit and local oxidation fraction were calculated by GE based on the same plant conditions and systems analysis used to derive the current MAPLHGR limits defined in the SSES FSAR. The calculated values are well within the 10 CFR 50.46 Appendix K limits.

During review of a proposed revision to GESTAR II (NEDE-24011-P-A-1, "Generic Reload Fuel Application," dated August 1979), the staff approved an increase in the peak pellet exposure limit used as a fuel design analysis input parameter to 50,000 MWD/STU (Letter, R. Tedesco, NRC, to R. Engel, GE, dated November 7, 1980), which typically corresponds to a peak average planar exposure of 50,000 MWD/MTU. Although this limit bounds the proposed extension of average planar exposure in the SSES MAPLHGR limit Technical Specification figure to 40,675 MWD/MTU for the GE fuel, in review of future reload amendments, the staff will consider extended burnup experience, methods and surveillance data for specific methodology for extended burnup (NEDE-22148(P), "Extended Burnup Evaluation-Methodology, General Electric Company, June 1982) in approval of exposure levels above batch average burnups of 40,000 MWD/MTU. In addition, the staff will review and evaluate the radiological consequences of the Fuel Handling Accident involving both ENC and GE fuel

assemblies for future proposed burnup levels above those proposed in this amendment. Based on the application of approved methodology and design criteria for LOCA analyses and our previous approval of the proposed extended burnup level, the staff finds the proposed changes to the MAPLHGR limit curves for GE fuel to be acceptable.

(2) The proposed MAPLHGR limits for the EXXON nuclear fuel are based on LOCA analysis results which were reviewed and approved in the most recent reload amendment for SSES Unit 1 Cycle 3 (S1C3) (Amendment 57 to License No. NPF-14, dated April 11, 1986). Since the calculated values for PCT and local oxidation fraction are within the 10 CFR 50.46 Appendix K limits, the staff finds the proposed change acceptable.

It is noted that the SSES Unit 1 proposed change results in separate Linear Heat Generation Rate and MAPLHGR versus average planar exposure Figures to distinguish between the fuel mechanical design analyses results and the Loss of Coolant Accident (LOCA) analysis results as related to the Limiting Conditions for Operation. This is consistent with the staff Safety Evaluation for the S1C3 reload amendment (Amendment 57) which approved the LHGR limit as a function of burnup for the ENC fuel types XN-1 and XN-2. The LHGR operating limit is based on a power profile used in the fuel design analysis as prescribed in XN-NF-81-21(A), Revision 1 "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel," September 1982. In addition, the staff notes that the design and analysis methodologies for the Exxon fuel design are the same as those used and approved for both Cycle 2 and Cycle 3 reload amendments. These methodologies include a modified RODEX 2 calculation as required by the staff safety evaluation of XN-NF-81-21. This modified analysis is necessary to confirm that the calculated end of life rod internal pressure does not exceed the system pressure. Thus, the previous approval of the present LHGR curve remains in effect. As stated in the staff safety evaluation for the previous reload amendments, the LHGR operating limit assures compliance with fuel design assumptions.

(3) The Minimum Critical Power Ratio (MCPR) operating limits have been reevaluated by the licensee to reflect the results of transient thermal-hydraulic core analyses with the XCOBRA-T computer code. The staff has found the use of this code acceptable for BWR licensing calculations (Letter, G. Lainas, NRC to G. N. Ward, ENC dated October 27, 1986 "Acceptance for Referencing of Licensing Topical Report XN-NF-84-105, XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis").

Exxon has reexamined certain transients discussed in the previous S1C3 submittal. These included Generator Load Rejection without Bypass (LRWB) and Feedwater Controller Failure (FWCF). These transients were

analyzed with End-of-Cycle Recirculation Pump Trip (EOC-RPT) operable and inoperable. The previous S1C3 analyses identified the Rod Withdrawal Error (RWE) as the limiting event for the determination of the operating limit MCPR. The previous analyses (reported in XN-NF-85-132, Rev 1, "Susquehanna Unit 1 Cycle 3 Reload Analysis" December 1985) were for Rod Block Monitor (RBM) setpoints of 106 and 108%. The proposed amendment considers an RBM setpoint of 108% only. Under this condition, the RWE remains the limiting event with a calculated delta-CPR of 0.23; this establishes the operating limit MCPR of 1.29 which is used in the revised Technical Specification Figures in the proposed Amendment. The XCOBRA-T analysis for the Generator Load Rejection transient without bypass and with inoperable EOC-RPT resulted in a calculated delta-CPR of 0.27 which is incorporated in the revised Technical Specification Figures as an operating limit MCPR of 1.33 for the additional conditions.

The licensee has taken into account the impact of reduced flow and reduced power on transient response. This is reflected in the new flow dependent and power dependent MCPR operating limits incorporated in the SSES Unit 1 Technical Specifications. The automatic flow control mode of operation is still not permitted for SSES Unit 1.

Our review of the transient and accident analyses done for the proposed amendment indicates that appropriate methodology and input have been used and the results provide a suitable basis for the SSES Unit 1 Technical Specification changes. The proposed MCPR operating limit changes are, therefore, acceptable.

(4) The licensee has proposed a modification to the present Technical Specification Limiting Condition for Operation (LCO) for the Single Loop Operation (SLO) mode. The proposed change consists of setting the MAPLHGR limit multiplier to 0.0 for extended SLO. The effect of this change is to preclude SLO for an extended period of time. This is an interim measure until ENC can provide revised analyses to justify applicability of the General Electric operating limits as specified in General Electric Service Information Letter 380 Revision 1 to Exxon fuel loadings. Revised analyses with current approved methodology are to be provided in a future submittal and should include a specific analysis of the one-pump seizure accident. The approach and changes to the Limiting Conditions for Operation are the same as those previously reviewed and approved by the staff in connection with our review of SSES Unit 2 reload submittal (Amendment No. 31 to Facility Operating License No. NPF-22, dated October 3, 1986) and are acceptable.

The following specification changes have been requested to accommodate the previously discussed extended MAPLHGR limits for GE 8x8 fuel, modified MAPLHGR limits for the Exxon 8x8 fuel, revised operating limit MCPR limits with consideration of approved ENC methodology, modifications to SLO operational limits and additional discussion in the Bases pages related to the above specifications.

(1) Figures 3.2.1-1 and 3.2.1-2: These revised Figures replace the previous Figures and reflect the results of additional GE and ENC LOCA analyses.

(2) Figures 3.2.3-1 and 3.2.3-2; Table 3.2.3-1: These Figures define core flow dependent MCPR operating limits and power dependent MCPR operating limits which consider the results of revised ENC analyses using recently approved methodology and the prior S1C3 analysis of the Rod Withdrawal Error transient. The licensee has proposed the deletion of Table 3.2.3-1 which summarized the MCPR results applicable to the S1C3 reload analysis. Since some of the conditions defined in this Table are no longer applicable (e.g., a Rod Block Monitor Trip Point setting of 106%), the staff finds the deletion acceptable. It is noted that this approach is consistent with that used and approved for Susquehanna, Unit 2 in Amendment 31 to License No. NPF-22 (October 1986).

(3) LCO 3.4.1.1.2 and Table 3.3.6-2: Changes were made to restrict operation in the single loop mode until additional analyses can be provided to justify applicability of the GE operating limits to Exxon fuel loadings.

(4) LCO page 3/4 2-6: Editorial changes were made to reflect references to the revised MCPR Figures and to provide consistency with the Susquehanna SES Unit 2 Technical Specifications.

(5) Bases pages B 3/4 2-2, B 3/4 4-1 and B 3/4 7-4: Revised and expanded text was provided to reflect the bases for the proposed changes.

The staff has reviewed the material submitted by the licensee for the proposed changes discussed above. Based on the results of our review, we find that, as discussed earlier, sufficient basis has been provided to allow extension of the MAPLHGR limits for the resident GE fuel, revision of the MAPLHGR limits for the resident ENC fuel, updated operating limit MCPR Figures and interim restrictions on operation in the single loop operation (SLO) mode. The proposed TS changes are therefore acceptable for SSES Unit 1.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation and use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The staff has 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 nor environmental assessment need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (52 FR 4414) on February 11, 1987, and consulted with the State of Pennsylvania. No public comments were received, and the state of Pennsylvania did not have any comments.

The staff has 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 nor to the health and safety of the public.

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Dated: May 7, 1987