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RECIP.NAME RECIPIENT AFFILIATION
BUTLER,W.R. Project Directorate I-2

see Rpt

SUBJECT: Forwards proposed Amend 87 to License NPF-22,changing TS to support Cycle 5 reload.Reload summary rept also encl.

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SEP 24 1990

Director of Nuclear Reactor Regulation
Attention: Dr. W. R. Butler, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENT 87 TO LICENSE
NO. NPF-22: UNIT 2 CYCLE 5 RELOAD
PLA-3445 FILES A7-8C/A17-2/R41-2 Docket No. 50-388

References:
1. PLA-3407, H.W. Keiser to W.R. Butler, "Proposed Amendment 132 to License No. NPF-14: Unit 1 Cycle 6 Reload", dated July 2, 1990.
2. PLA-3328, H.W. Keiser to W.R. Butler, "Submittal of Topical Report PL-NF-89-005", dated January 22, 1990.
3. PLA-3420, H.W. Keiser to W.R. Butler, "Submittal of Topical Report PL-NF-90-001", dated August 8, 1990.
4. Letter, W.R. Butler to H.W. Keiser, "Topical Report PL-NF-87-001, 'Qualification of Steady State Core Physics Methods for BWR Design and Analysis' (TAC Nos. 65171 and 65172)", dated April 28, 1988.

Dear Dr. Butler:

The purpose of this letter is to propose changes to the Susquehanna SES Unit 2 Technical Specifications in support of the ensuing Cycle 5 reload. Changes to the following Technical Specifications and bases are requested:

Index
1.0 Definitions
2.0 Safety Limits and Limiting Safety System Settings
B 2.1 Safety Limits
3/4.2.3 Minimum Critical Power Ratio
3/4.4.1 Recirculation System
B 3/4.1 Reactivity Control Systems
B 3/4.2 Power Distribution Limits
B 3/4.4.1 Recirculation System
5.3.1 Fuel Assemblies
5.3.2 Control Rod Assemblies

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The following attachments to this letter are provided to illustrate and technically support each of the changes:

- Marked-up Technical Specification Changes
- No Significant Hazards Considerations
- PL-NF-90-005, "Susquehanna SES Unit 2 Cycle 5 Reload Summary Report," September 1990
- Susquehanna SES Unit 2 Cycle 5 Proposed Startup Physics Tests Summary Description, September 1990

In addition to the normal analyses and considerations for Unit 2 Cycle 5, the following specific analyses and issues deserve special mention:

- This is the first reload cycle where the licensing analyses were performed by PP&L using the safety analysis methods previously approved or currently being reviewed by the NRC (References 2,3 and 4). Advanced Nuclear Fuels (ANF) provided some supporting analyses. This is the second reload cycle for Unit 2 that PP&L designed by using our NRC approved Steady State Physics methods (Reference 4). Additional discussion and results are provided in the attached Unit 2 Cycle 5 Reload Summary Report.

- Approximately 50 original equipment control blades will be replaced prior to Unit 2 Cycle 5 with equivalent worth Duralife 160C control blades. A detailed evaluation of the control blade replacements is provided in the attached Unit 2 Cycle 5 Reload Summary Report.

- To support single loop operation for Unit 2 Cycle 5 and future operating cycles, ANF performed the recirculation pump seizure accident from single loop operating conditions on a generic basis for the Susquehanna Units. This generic analysis was part of the Unit 1 Cycle 6 Reload License submittal (Reference 1). This approach should eliminate the need to have the single loop pump seizure accident analyzed for each reload. Further discussion is provided in the attached Unit 2 Cycle 5 Reload Summary Report.

- As a result of the issuance of NRC Bulletin No. 90-02, entitled "Loss of Thermal Margin Caused by Channel Box Bow," licensees who use channels, including those who use them for only a single bundle lifetime, have been required to take into account the effects of channel bow in analyses supporting reload applications. ANF has addressed this issue for Unit 2 Cycle 5 through a generic analysis and in a separate letter to the NRC. Additional detail is provided in the attached Unit 2 Cycle 5 Reload Summary Report.

- A repaired fuel assembly that failed during U2C2, was repaired during U2C3, and returned to use for U2C4, will be used once again during U2C5. This fuel assembly was repaired by replacing the failed rod with a solid zircaloy-2 rod. A fuel assembly that failed during U2C3 was inspected during U2C4, and is not being reused during U2C5. However, its three symmetric fuel assemblies will be used during U2C5. (Neither the fuel assembly that failed during U2C3 nor the three symmetric assemblies were used during U2C4.) This results in a minor asymmetry in the core loading pattern because no exact match for the three fuel assemblies was available. This asymmetry was evaluated and no significant effects on the core analyses, core operation, or core monitoring are expected. Both of these issues are addressed in more detail in the attached Unit 2 Cycle 5 Reload Summary Report.

Susquehanna SES Unit 2 is currently scheduled to be shutdown for refueling and inspection on March 9, 1991 and to restart as early as May 10, 1991. Based on previous discussions with the NRC staff, it is PP&L's understanding that the NRC believes that the review of References 2 and 3 will be completed in sufficient time to support review and approval of this proposed amendment. PP&L appreciates the NRC staff's efforts to review these documents, and is prepared to meet with the NRC at any time to facilitate the NRC reviews.

We request that your approval of the attached proposed Technical Specifications supporting U2C5 operation be conditioned to become effective upon startup after this outage, and we will keep you informed of any schedule changes. Any questions regarding this proposed amendment should be directed to Mr. R. Sgarro at (215) 770-7916.

Very truly yours,

H Keiser

H. W. Keiser

Attachments

cc: NRC Document Control Desk (original)
NRC Region I
Mr. M. C. Thadani, NRC Project Manager-Rockville
Mr. G. S. Barber, NRC Sr. Resident Inspector-SSES
Mr. K. D. Desai, NRC/SRXB - Rockville
Mr. T. M. Gerusky, Pennsylvania DER

SUSQUEHANNA SES UNIT 2 CYCLE 5

PROPOSED STARTUP PHYSICS TESTS SUMMARY DESCRIPTION

SEPTEMBER 1990

PENNSYLVANIA POWER & LIGHT COMPANY

PP&L

SUSQUEHANNA SES UNIT 2 CYCLE 5

PROPOSED STARTUP PHYSICS TESTS
SUMMARY DESCRIPTION

Susquehanna SES Unit 2 is planned to be shut down for its fourth refueling and inspection outage on March 9, 1991. During startup and initial Cycle 5 operation, PP&L plans to perform a series of startup activities and tests to assure that the reload core conforms to the design. A list of these proposed activities and tests along with a brief description for each is provided below.

1) Core Loading Verification

Purpose: To assure the core is correctly loaded per design.

Description: The core will be visually checked to verify correct loading. An underwater video camera or suitable device will be used to record fuel assembly serial numbers, orientations, core locations, and proper core plate seating. A review of the videotape will be performed and will serve as an independent verification of the core loading. Any discrepancies discovered will be promptly corrected and the affected areas reverified prior to Unit 2 Cycle 5 (U2C5) startup.

2) POWERPLEX Input Deck Validation

Purpose: To ensure the POWERPLEX Core Monitoring System input deck is updated correctly before the start of the new operating cycle.

Description: The validation will ensure that POWERPLEX, the ANF software system designed to perform in-core monitoring of BWR cores, is correctly updated for monitoring U2C5 operation. Core monitoring calculations within POWERPLEX are performed by XTGBWR, a three-dimensional reactor simulation code. The POWERPLEX input deck consists of all data needed for the execution of this code and subsequent calculation of the margin to each fuel thermal limit. This data must be updated to reflect the new core loading prior to the start of a reload operating cycle in order to ensure satisfactory core monitoring. The deck will be updated by PP&L and verified jointly by members of the PP&L Reactor Engineering group located at Susquehanna SES and the Nuclear Fuels Engineering group located at the corporate headquarters.

3) Control Rod Functional (Insert and Withdrawal Checks)

Purpose: To assure proper control rod function.

Description: A control rod functional test, which includes mobility and overtravel checks, will be performed on each control cell

loaded in its final configuration. Core subcriticality will be demonstrated and documented as each control rod is functionally tested.

4) Subcritical Shutdown Margin Demonstration

Purpose: To assure that at least the minimum required Shutdown Margin exists with the analytically determined strongest worth control rod fully withdrawn.

Description: This test will verify that at least the required amount of Shutdown Margin is maintained without determining the actual amount of Shutdown Margin in the core. The analytically determined strongest worth control rod (or its symmetric counterpart) is fully withdrawn. One or more diagonally adjacent control rods are then slowly notched out (one at a time) and sub-criticality verified at each step, until the analytically determined reactivity worth of the diagonally adjacent control rods at their respective notch position just equals or slightly exceeds the required amount of Shutdown Margin. Verification at this step that the core is still subcritical demonstrates that at least the required amount of Shutdown Margin exists.

5) In-Sequence Critical and Shutdown Margin Determination

Purpose: a) To determine the actual amount of Shutdown Margin.

b) To compare predicted versus actual critical control rod positions.

Description: This test will be performed as part of the normal startup. Control rods are pulled in group order in their normal sequence until criticality is achieved. Taking into account the period and moderator temperature coefficient corrections, the Shutdown Margin is determined by calculation. In addition, to assure that there is no reactivity anomaly, the actual critical control rod position is verified to be within 1% $\Delta k/k$ of the predicted critical control rod position.

6) Control Rod Scram Time Testing

Purpose: To demonstrate that the scram insertion times are within the appropriate Technical Specification requirements following core alterations.

Description: This test satisfies Susquehanna SES Technical Specifications 3/4.1.3.2, 3/4.1.3.3 and 3/4.1.3.4. These specifications place limits on control rod scram performance. The results of the control rod scram time testing will be used to determine the necessary MCPR operating limits described in Technical Specification 3/4.2.3.

7) TIP Asymmetry

Purpose: a) To assure proper operation of the TIP system.

b) To check core symmetry.

Description: A gross asymmetry check will be performed as well as a detailed statistical uncertainty evaluation of the TIP system. A complete set of TIP data will be obtained at a steady-state power level greater than 75% of rated power. A total average deviation or uncertainty will be determined for all symmetric TIP pairs as well as a maximum absolute deviation. The results will be analyzed to assure proper operation of the TIP system and symmetry of the core loading.

SUSQUEHANNA SES UNIT 2 CYCLE 5

PROPOSED ADDITIONAL STARTUP ACTIVITIES
SUMMARY DESCRIPTION

The following is a short summary of additional activities performed during the Startup Testing Program.

Thermal Limits Monitoring

The margin to each fuel thermal limit will be checked throughout the startup period through review of the POWERPLEX core monitoring system output.

TIP System - OD-1 Performance

A full set of TIPs will be run at a low power level to update the core power distribution before the first POWERPLEX core performance calculation is initiated. Subsequent TIP sets will be performed in conjunction with LPRM calibrations. The LPRM currents will be updated and the LPRM GAFS verified to be within the acceptable range.

Power Distribution Comparison with Offline Monitoring

Actual online core power distribution data from the POWERPLEX Core Monitoring System will be compared to SIMULATE-E core simulation code calculations. The SIMULATE-E code, approved by the NRC (PL-NF-87-001-A) for use in the Susquehanna SES core design and licensing, was used by PP&L Nuclear Fuels Engineering personnel in the design of the U2C5 core and will be used for operations support applications throughout the cycle.

Core Flow Calibration

A core flow calibration will be performed at ~100% core flow. Jet pump and recirculation loop flow instrumentation will be adjusted, if necessary, to ensure correct core flow indication and correct calculation of the flow biased Rod Block Monitor, APRM Scram, and APRM Rod Block setpoints.

Recirculation Loop Baseline Data Acquisition

Recirculation loop data will be collected throughout the startup program to provide baseline information for plant performance monitoring in two loop and single loop operation.

PP&L Analytical Methods Benchmarking

Core physics data obtained from startup testing will be used for the continued benchmarking of PP&L's CPM-2/SIMULATE-E core analysis methodology, as recommended by the NRC in its safety evaluation on PP&L's Topical Report PL-NF-87-001-A ("Qualification of Steady State Core Physics Methods for BWR Design and Analysis").

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