ATTACHMENT

Oyster Creek Nuclear Generating Station

Cycle 10 Fuel Performance Startup Test Report

CYCLE 10 FUEL PERFORMANCE STARTUP TEST REPORT

I. Summary

The Fuel Performance Startup Test Program conducted from July 27, 1984 to February 1, 1985 included the following tests:

Core Verification

Core Inspection

Control Rod Testing

Shutdown Margin Measurement Test

Shutdown Margin Demonstration

Estimated Critical Positions

Core Daily Checks

LPRM Calibrations

The purpose of these tests was to ensure the Cycle 10 core, including the new GE fuel design, performed as designed/analysed. These tests confirmed the Cycle 10 core, including the GE P8DRB239 and P8DRB265H fuel was performing satisfactorily. From January 2 to 30, 1985, the APLHGR thermal limit for the GE fuel was exceeded. That condition is attributed to operating the core with a large bottom peak which was beyond the limits of the Cycle 10 power distribution computer model. This resulted in under-calculating the flux peaks. At no time did the fuel fail to perform as expected.

Testing details are contained in the balance of this report.

II. Introduction

This report is submitted in compliance with Technical Specification 6.9.1.a. It is required because a different fuel design manufactured by a different fuel supplier has been loaded into the Cycle 10 core.

The composition of the Cycle 10 core, as analyzed in NEDO 24195, Appendix C, "General Electric Reload Application for Oyster Creek", consists of 388 original Exxon-VB 2.5% enriched fuel assemblies, 112 new GE P8DRB239 fuel assemblies, and 60 new GE P8DRB265H fuel assemblies.

The purpose of the Fuel Performance Startup Test Program is to determine if the Cycle 10 core and the new GE fuel is performing as expected. The program was conducted with the core in two major states of operation: (1) at or below rated temperature and pressure at 0% power; and (2) greater than 25% reactor power. Each test will be briefly described and the results presented below.

III. Testing at or Below Rated Temperature at 0% Power

A. Core Verification

Core verification was performed in accordance with Oyster Creek Procedure 1001.24, "Core Verification". The verification was performed by Core Engineers and verified by QA. The entire verification was recorded on video tape. In addition to verifying the fuel assemblies were loaded in the correct core locations, an additional inspection was conducted to ensure the

fuel assemblies were properly orientated, seated, and free from foreign matter. This additional inspection was also video taped. All video tapes are stored in the Oyster Creek Document Control Center. The verification/inspection found no discrepancies. The core verification was completed on July 27, 1984.

B. Control Rod Testing

To ensure proper control rod drive operation, each control rod was scram timed, function tested, and the coupling was checked to ensure compliance with Technical Specification 3.2.B.3. The scram timing was performed in accordance with Oyster Creek Procedure 617.4.003. The results of the testing were:

% Inserted	Technical Specification Limit, Sec.	As found, Sec.
5	0.375	0.341
20	0.90	0.776
50	2.00	1.75
90	5.00	3.04

The scram times were also checked to ensure the three fastest control rods in a 2 X 2 control rod array complies with Technical Specification 3.2.B.3. The check determined that the average of the scram insertion times for the 3 fastest control rods in all combinations of 2 X 2 arrays were less than the requirement of the Technical Specification.

The successful control rod scram time testing was completed on August 24, 1984.

C. Shutdown Margin Measurement Test

Shutdown margin measurement test was conducted on July 31, 1984. The purpose of the test was to demonstrate that the Cycle 10 core will meet the Technical Specification 4.2.A shutdown requirement of 0.0025 Keff (2.5 mk), plus 0.9 mk for a reduction in control rod worth due to possible inverted tubes. Since the minimum shutdown margin occurs at the beginning of cycle, R-value is zero. An additional .19 mk was required to account for a coolant temperature of 93°F during the test.

The shutdown margin measurement test was conducted in accordance with procedure 1001.27, "Shutdown Margin Measurement Test". The measurement was performed by achieving a series of nine control rod cold local criticals with both negative and positive periods.

The critical period measurement data was then used to determine the minimum shutdown margin. The shutdown margin calculation, C-1302-226-5411-029, "Oyster Creek Cycle 10 Shutdown Margin Analysis", August 28, 1984, concluded the minimum shutdown margin exceeds the Technical Specification requirement of 3.59 mk by 0.03 mk, i.e., 3.62 mk.

D. Shutdown Margin Demonstration

The shutdown margin demonstration confirms the shutdown measurement has been calculated/measured correctly. It is performed in accordance with Oyster Creek Procedure 1001.26, "Shutdown Margin Demonstration". This test demonstrates that with any control rod fully withdrawn from the core, the reactor will meet the shutdown margin requirements. This is accomplished by demonstrating that any fully withdrawn control rod and a diagonally adjacent control rod will not exceed (i.e., notches withdrawn) the critical configuration of the Shutdown Margin Measurement Test. The shutdown margin requirements of Technical Specification 4.2.A were confirmed when the core did not achieve criticality during the test. The demonstration was completed on August 1, 1984.

E. Estimated Critical Position

Although this test is not required by Technical Specification, Oyster Creek Procedure 1001.2, "Estimated Critical Position", provides a method for estimating the critical rod configuration for reactor startup using the Banked Position Withdrawal Sequences (BPWS). The ECP is considered satisfactory if the prediction is with $\pm$ 1% Δ K/K as determined by the established rod worth curves.

During the startup test program ten (10) criticals were predicted. All criticals were predicted well within the acceptance criteria of $\pm$ 1% Δ K/K.

IV. Testing Greater Than 25% Power

A. Core Daily Checks

As directed by Technical Specification 3.10, daily core thermal limits were determined in accordance with Oyster Creek Procedure 1001.33, "Core Daily Checks Using PSMS/NODE-B", once reactor power was equal to or greater than 25%.

Oyster Creek is using for the first time a new core monitoring system called the Power Shape Monitoring System, PSMS. This computer program does not normally require Local Power Range Monitoring (LPRM) or Traversing In-core Probe (TIP) data to calculate the power distribution. During the first two months of the startup, November and December, 1984, reactor power was limited to approximately 60% power. Core limits were determined to be satisfactory during this period. From January 2 to January 30, 1985, the reactor power increased to 98% power. During this period PSMS power distribution and thermal limits calculations were inadequately monitoring core conditions as a result of the large flux peaking which exceeded APLHGR limits. Exceeding APLHGR went undetected until such time when the PSMS model performance was adjusted to be within the established acceptance criteria. Immediate action was taken to reduce APLHGR below the technical specification limits. Other thermal limits were not exceeded.

Details of the APLHGR incident are contained in the Oyster Creek Licensee Event Report (LER) number 85-04 dated March 4, 1985.

To prevent similar incidents from recurring, operating practices have been revised to include:

(1) Immediate corrective action to adjust the PSMS model when its error is greater than the established acceptance criteria. The model is corrected by feeding back into the model either or both LPRM and TIP measurements.

(2) More frequent evaluation of PSMS model.

(3) Core operations guidelines have been established to:

a. Reduce measured TIP peaks.

b. Reduce the average relative axial power shape.

c. Perform individual tip measurements during power maneuvering.

B. <u>LPRM Calibrations</u>

LPRM calibrations are performed to adjust LPRM reading to agree with the measured flux for that particular core location. The calibrations are conducted in accordance with Oyster Creek

Procedure 1001.39, "LPRM Adjustments Using PSMS". During the Cycle 10 startup, LPRM calibrations were performed on the following dates at the indicated power/flow conditions:

DATE	% POWER	% FLOW
November 28, 1984	44	45
December 6, 1984	54	54
December 12, 1984	[illegible]	89
January 4, 1985	93	94
January 24, 1985	97	98

At the completion of the startup testing program, two (2) LPRMs were bypassed. The remaining 122 LPRMs are performing satisfactorily.