

1.0 Introduction

Section 6.7.A.1 of the Prairie Island Technical Specifications, Appendix A, specifies that a summary report shall be submitted following installation of fuel manufactured by a different fuel supplier. This report is to be submitted with 90 days following completion of the startup test program.

The Prairie Island Unit 2 reactor had 40 reload fuel assemblies manufactured by Exxon Nuclear Company installed in 1980 during the fourth refueling for that facility.

2.0 Startup Physics Tests - Introduction

Reference 1 identified the startup related tests conducted for the Unit 1 Cycle 5 startup. Tests described in detail with analytical results in that report included the following -

- (a) Zero Power Isothermal Temperature Coefficient
- (b) At Power Moderator Temperature Coefficient
- (c) Control Banks' Rod Worth
- (d) Critical Boron Concentration
- (e) Boron Worth
- (f) Power Distribution Measurements

This report provides test results for the above tests conducted during the startup of Prairie Island Nuclear Generating Plant, Unit 2. The procedures used in the startup test program were the most recent revision reviewed by the Plant Operations Committee.

3.0 Startup Physics Tests - Results

Table 1 summarizes the following data for each test performed.

- (a) Test
- (b) Procedure/Effective Revision
- (c) Parameter
- (d) Measured Value
- (e) Acceptance Criteria

4.0 Summary

The data presented in Table 1 show acceptable agreement with the acceptance criteria. The rod worths measured were less than the predicted values. This is attributed to a leakage current bias of the NIS detectors. Studies conducted indicate that when this bias was corrected for, the rod worth (for the bank retested) increased by approximately 9%, in very close agreement with the predicted value. Future startup physics testing will include correction for this leakage current bias.

5.0 Reference

- (1) Letter, L O Mayer (NSP) to J G Keppler (NRC) dated August 1, 1979.

Table 1
Unit 2 Cycle 5 Startup Test Results

1.0 HZP Isothermal Temperature Coefficient

Procedure: D32
Revision: 1 (9/6/79)

<u>Test Condition</u>	<u>Measured α_{iso}</u>	<u>Acceptance Criteria</u>
ARO	-3.45 pcm/F	<0 pcm/F
D	-5.63	<0
D & C in	-9.50	<0

2.0 At Power Moderator Temperature Coefficient

Procedure: D51
Revision: 1 (9/6/79)

<u>Test Condition</u>	<u>Measured α_{mod}</u>	<u>Acceptance Criteria</u>
70-100% power (Actual 99.4%)	-11.4 pcm/F	<0 pcm/F

3.0 Control Banks' Worth Measurements

Procedure: D30
Revision: 1 (9/6/79)

<u>Test Condition</u>	<u>Measured Worth</u>	<u>Acceptance Criteria</u>
Control Bank D	591.4 pcm	671 pcm \pm 15%
Control Bank C	1201.2	1265 pcm \pm 15%
Control Bank B	632.2	714 pcm \pm 15%
Control Bank A	2076.2	2316 pcm \pm 15%
All Control Banks	4501.0	4966 pcm \pm 10%

4.0 Critical Boron Concentration

Procedure: D34
Revision: 1 (9/6/79)

<u>Test Condition</u>	<u>Measured Value</u>	<u>Acceptance Criteria</u>
All Rods Out	1499 ppm	1479 \pm 50 ppm
Din	1420 ppm	1395 \pm 50 ppm
D + C in	1280 ppm	1236 \pm 50 ppm

5.0 Differential Boron Worth

Procedure: D30
 Revision: 1 (9/6/79)

<u>Test Condition</u>	<u>Measured</u> \times_B	<u>Acceptance Criteria</u>
<All Control Banks>	-8.54 pcm/ppm	-8.0 $\frac{\text{pcm}}{\text{ppm}} \pm 10\%$

6.0 Power Distribution Measurements

Procedure: SP2116
 Revision: 4 (9/6/79)

<u>Test Condition</u>	<u>Parameter</u>	<u>Measured Value</u>	<u>Acceptance Criteria</u>
HZP, ARO	Relative Fuel Assembly	6.2%	Note 1
	Power	11.2%	Note 2
	F_Q^N	2.33	Note 3
	$F_{\Delta H}^N$	1.47	Note 4
	QPTR	1.014	<1.02
48% Power	Relative Fuel Assembly	5.5%	Note 1
	Power	3.0%	Note 2
	F_Q^N	1.965	Note 3
	$F_{\Delta H}^N$	1.47	Note 4
	QPTR	1.009	<1.02
100% Power	Relative Fuel Assembly	-6.2%	Note 1
	Power	6.9%	Note 2
	F_Q^N	1.717	Note 3
	$F_{\Delta H}^N$	1.431	Note 4
	QPTR	1.009	<1.02

Note: (Acceptance Criteria for Power Distribution Measurement)

1. $\pm 10\%$ for $\rho_i \geq 0.9$
2. $\pm 15\%$ for $\rho_i < 0.9$
3. $\frac{2.145}{P} \times K(z)$ where P = fraction of rated power unless $P < 0.5$ in which case, $P = 0.50$
4. $(1.55) \times [1 + 0.2(1-P)] \times [1 - \text{RBP (BU)}]$

Legend

HZP	Hot Zero Power
ARO	All Rods Out
ARI	All Rods In
QPTR	Quadrant Power Tilt Ratio
NIS	Nuclear Instrument System
α_{iso}	iso thermal temperature coefficient, pcm/F
α_{mod}	moderator temperature coefficient, pcm/F
α_B	boron worth, pcm/ppm
<All Control Banks>	average value over all control banks