Entergy Nuclear Northeast
Entergy Nuclear Operations, Inc.
Vermont Yankee
185 Old Ferry Rd.
P.O. Box 500
Brattleboro, VT 05302
Tel 802-257-5271

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Vermont Yankee
Docket No. 50-271

BVY 04-068

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: **Vermont Yankee Cycle 24 Startup Test Report**

The purpose of this letter is to submit the Vermont Yankee Nuclear Power Station (VY) Cycle 24 Startup Test Report in accordance with section 6.7.A.1 of the VY Technical Requirements Manual.

There are no new commitments being made in this submittal.

If you have any questions or require additional information, please contact me at (802) 258-4236.

Sincerely,

James M. DeVincentis
Manager, Licensing
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station

IE26

cc: Mr. Richard B. Ennis, Project Manager
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation
Mail Stop O 8 B1
Washington, DC 20555

Mr. Samuel J. Collins
Regional Administrator, Region 1
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406-1415

USNRC Resident Inspector
Entergy Nuclear Vermont Yankee, LLC
320 Governor Hunt Road
P.O. Box 157
Vernon, Vermont 05354

Mr. David O'Brien, Commissioner
Department of Public Service
112 State Street – Drawer 20
Montpelier, Vermont 05620-2601

STARTUP TEST REPORT - VERMONT YANKEE CYCLE 24

In accordance with Vermont Yankee Technical Requirements Manual Section 6.7.A.1, this Startup Test Report is being submitted as a result of the following changes implemented in Cycle 24 which differ from Cycle 23:

1. Improved core physics code (PANAC11 - TGBLA 06) – NRC approved methodology
2. Reduced SLMCPR Uncertainty - NRC approved methodology
3. Process 8 cladding – Process enhancement
4. Improved LHGR limits for GE13 fuel – GE methodology improvement
5. ARTS-MELLLA – NRC approved methodology
6. Revised thermal limit calculation – part of ARTS
7. Statistically Based Rod Withdrawal Error Analysis – GE methodology improvement – part of ARTS

In accordance with USFAR Section 13.5.5, the following information is being provided in this Startup Test Report.

Overview:

Vermont Yankee Cycle 24 initial startup commenced on May 3, 2004 following a 30-day outage for refueling and maintenance activities. Steady state, full power conditions were reached on May 8, 2004.

The core loading for Cycle 24 consists of:

Quantity	Fuel Type	Description	Cycle loaded
8	GE-9B	GE9B-P8DWB335-10GZ-80U-150-T6	17
12	GE-9B	GE9B-P8DWB335-11GZ-80U-150-T6	17
88	GE-13	GE13-P9DTB386-11G4.0 / 1G3.0-100T-146-T6-3958	22
16	GE-13	GE13-P9DTB225-NOG-100T-146-T6-2571	22B
92	GE-14	GE14-P10DNAB394-7G5.0/6G4.0-100T-150-T6-2566	23
16	GE-14	GE14-P10DNAB394-8G5.0/6G4.0-100T-150-T6-2595	23
20	GE-14	GE14-P10DNAB394-12G5.0-100T-150-T6-2596	23
32	GE-14	GE14-P10DNAB426-16G6.0-100T-150-T6-2682	24
44	GE-14	GE14-P10DNAB390-14GZ-100T-150-T6-2683	24
40	GE-14	GE14-P10DNAB388-17GZ-100T-150-T6-2684	24

For Cycle 24, VY replaced 136 GE13 and GE9B fuel bundles with 116 new GE14 fuel bundles and 20 previously discharged GE9B fuel bundles.

Beginning of Cycle 24 start-up commenced on May 3, 2004 with steady-state full power conditions reached on May 8, 2004.

Core Verification:

An as-loaded Cycle 24 core map is included as Figure 1. Details of the Cycle 24 core loading are contained in the Global Nuclear Fuels (GNF) document 0000-0026-5068-CMR, Rev. 0, "Cycle Management Report for Vermont Yankee Nuclear Power Station Cycle 24," March 2004 (PROPRIETARY).

Vermont Yankee personnel verified the final as-loaded core loading in accordance with Vermont Yankee procedure OP-1411, "Core Verification." Three separate criteria were checked:

1. Proper bundle seating was checked, corrected as necessary and verified.
2. Proper bundle orientation, channel fastener integrity and upper tie plate cleanliness were checked and verified.
3. Proper core loading was verified by checking the serial number of each bundle against the final approved core-loading map.

This verification was performed independently by two separate teams.

Process Computer Data Checks:

Process computer data evaluation checks were completed in accordance with OP- 5401 "Data Shuffling and Data Checks for Process Computer at BOC." These checks included various manual and computer checks of the new databank.

Control Rod Drive System Testing:

Eight control blades and six control rod drives were replaced during RFO24. Control rod coupling and withdrawal speed verification was completed satisfactorily for all 89 control rods per OP-4111, "Control Rod Drive System Surveillance."

Strongest rod out sub-critical check was performed satisfactorily after the independent review of the core verification was completed. This was performed in accordance with OP-4430, "Reactivity Anomalies/Shutdown Margin Check."

Single rod scram timing was performed in accordance with OP-4424, "Control Rod Scram Testing and Data Reduction". Testing of all 89 control rods was completed during the Reactor Hydrostatic Test in accordance with Vermont Yankee Technical Specification Section 4.3.C.1. All insertion times were within the limits defined in the Vermont Yankee Technical Specifications Section 3.3.C.1. In accordance with Vermont Yankee Technical Specification Section 4.3.C.2, the results of the testing are included in Table 1.

Shutdown Margin Testing:

The cold shutdown margin calculation was performed using data collected during the in-sequence critical and information provided in GNF document 0000-0026-5068-CMR, Rev. 0, "Cycle Management Report for Vermont Yankee Nuclear Power Station Cycle 24," March 2004 (PROPRIETARY).

In accordance with Vermont Yankee Technical Specifications (3.3.A.1), the minimum shutdown margin required is 0.38% Δk/k. The actual demonstrated shutdown margin was 1.291% Δk/k as determined in accordance with OP-4430 "Reactivity Anomalies/Shutdown Margin Check."

In-Sequence Critical Eigenvalue:

The in-sequence critical test was performed as part of the reactor startup. Control rod sequence 24-A2-(1) was used to perform the in-sequence critical test. Criticality was achieved on the 10th (last) rod in group 2 (26-15) at notch position 36. The moderator temperature was 152.6 °F.

The actual critical rod pattern and the prediction agreed within +/- 1% Δk per OP-4430 "Reactivity Anomalies/Shutdown Margin Check."

LPRM Operability Check:

Four NA300 local power range monitors (LPRM) were replaced during RFO24. The new LPRM initial operating current was set in accordance with OP-1408, "LPRM Removal and Replacement" and electrically checked per OP-5307 "Electrical Checkout of Neutron Monitoring Detectors."

LPRM connection verification and hi and low trip alarm set points were performed satisfactorily in accordance with OP-4406, "LPRM Calibration and Functional Check".

The local power range monitors were calibrated at approximately 100% core thermal power (CTP) in accordance with OP-2425, "Core Power Distribution Calculation Utilizing the Traversing In-Core (TIP) System."

APRM Calibration:

In accordance with Vermont Yankee Technical Specification Section 2.1.A, Average Power Range Monitor (APRM) gain adjustments were performed as required in accordance with OP-4400 "Calibration of the Average Power Range Monitoring System to Core Thermal Power." In addition, APRM gain adjustments were performed throughout the reactor startup.

TABLE 1

CONTROL ROD SCRAM TESTING RESULTS
VERMONT YANKEE BEGINNING OF CYCLE 24

Scram Number: 210
Single Rod Scram testing performed on April 26, 2004
Reactor Pressure: 1020 Pisa
Reactor Power: 0%

Full Core Average - Number of Rods Averaged: 89

Dropout Position	Avg. Scram Time	Admin. Limit	Pass/Fail
46	0.291	0.347	PASS

Dropout from Notch Position	Average Scram Insertion Time	Tech. Spec. Criteria 3.3.C.1.1	Pass /Fail	Tech. Spec Criteria 3.3.C.1.2	Pass/Fail
46	0.291	0.358	PASS	0.358	PASS
36	0.794	0.912	PASS	1.096	PASS
26	1.312	1.468	PASS	1.860	PASS
6	2.405	2.686	PASS	3.419	PASS

Slowest 2X2 Average Summary for Each % Insertion *

Dropout Position	2 X 2 Average *	Admin. Limit	Pass/Fail
46	0.299	0.368	PASS

Notch Number	2 X 2 Average* Insertion time	Tech. Spec. Criteria 3.3.C.1.1	Pass /Fail	Tech. Spec. Criteria 3.3.C.1.2	Pass/ Fail
46	0.299	0.379	PASS	0.379	PASS
36	0.813	0.967	PASS	1.164	PASS
26	1.343	1.556	PASS	1.971	PASS
06	2.474	2.848	PASS	3.624	PASS

* The 2X2 Averages consist of the slowest arithmetic average of the three fastest rods in a 2X2 array.

Slowest Single Rod

Dropout Position	Rod Id.	Scram Time	Tech. Spec. Criteria 3.3.C.2.	Pass/ Fail
6	06-23	2.691	7.000	PASS

TABLE 2

CORE AVERAGE AXIAL POWER DISTRIBUTION
COMPARISON BETWEEN PROCESS COMPUTER (3D MONICORE) AND SIMULATE-3
VERMONT YANKEE BEGINNING OF CYCLE 24

Node	3D	Simulate
25	0.082	0.090
24	0.214	0.220
23	0.397	0.370
22	0.511	0.470
21	0.595	0.540
20	0.657	0.600
19	0.706	0.650
18	0.757	0.700
17	0.787	0.720
16	0.820	0.760
15	0.892	0.840
14	1.064	1.000
13	1.151	1.100
12	1.253	1.220
11	1.335	1.300
10	1.385	1.370
9	1.453	1.470
8	1.518	1.540
7	1.554	1.600
6	1.603	1.680
5	1.635	1.720
4	1.611	1.710
3	1.481	1.580
2	1.146	1.240
1	0.392	0.350

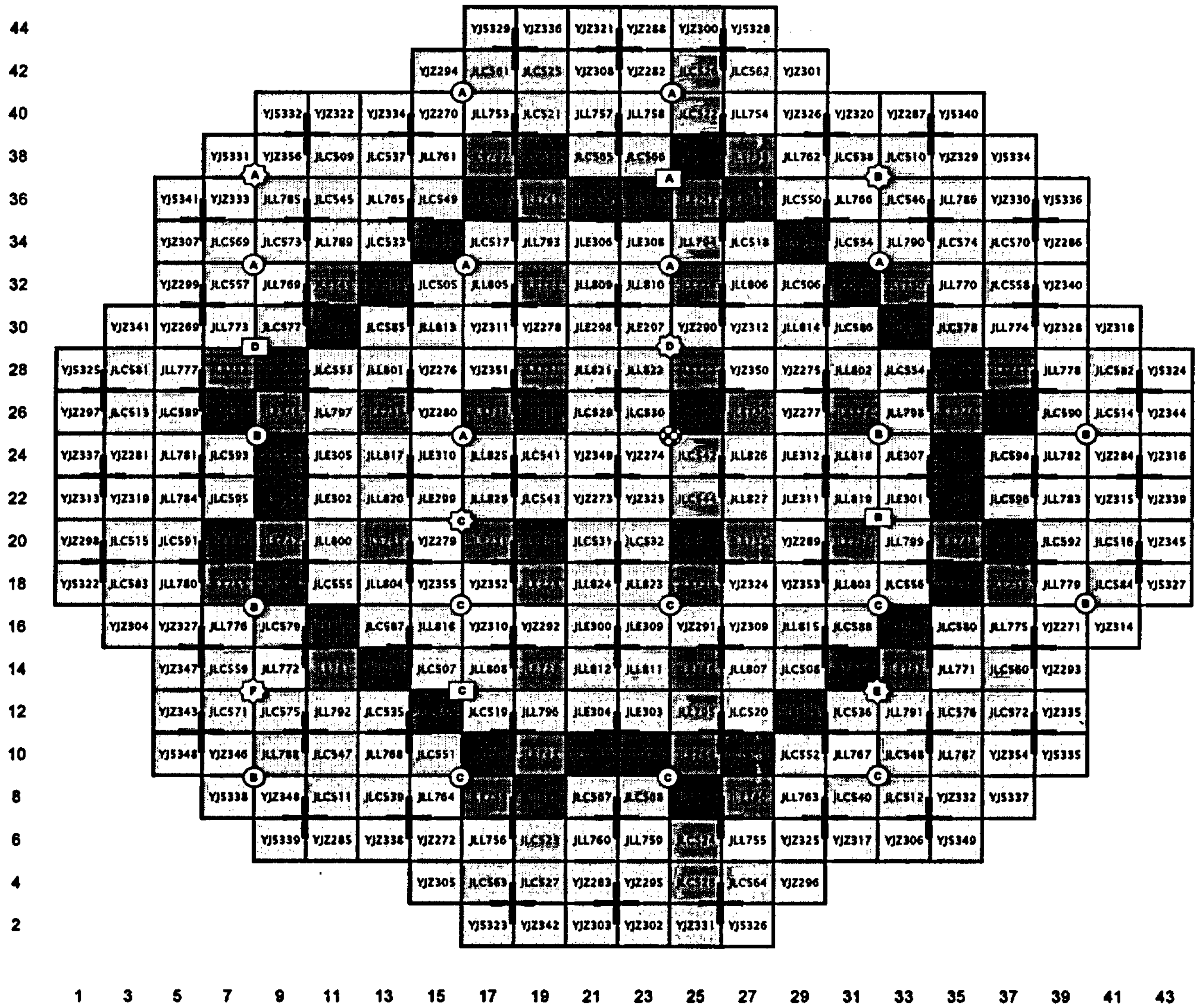
TABLE 3

RELATIVE RADIAL POWER DISTRIBUTION
COMPARISON BETWEEN PROCESS COMPUTER (3D MONICORE) AND SIMULATE-3
VERMONT YANKEE BEGINNING OF CYCLE 24

Ring	3D	Simulate
1	0.935	0.929
2	1.347	1.368
3	1.172	1.201
4	1.138	1.142
5	1.120	1.115
6	0.673	0.655

FIGURE 1

VERMONT YANKEE CYCLE 24 CORE MAP



Core loading reference document: Cycle 24 Core Management Report

YJZ 269-356	---	C-22: GE-13 386-11G4.0/1G3.0 (88 bundles)
JLE 297-312	---	C-22B: GE-13 225-NO Gad (16 bundles)
JLC 505-596	---	C-23: GE-14 394-7G5.0/6G4.0 (92 bundles)
[illegible]	---	C-23: GE-14 394-8G5.0/6G4.0 (16 bundles)
[illegible]	---	C-23: GE-14 394-12G5.0 (20 bundles)
JLL 753-784	---	C-24: GE-14 426-16G6.0 (32 bundles)
JLL 785-828	---	C-24: GE-14 390-14GZ (44 bundles)
[illegible]	---	C-24: GE-14 388-17GZ (40 bundles)
YJ5 ***	---	C-24: GE-9B 335-10/11GZ (20 Re-insert bundles originally loaded in Cycle 17)

Form completed by: *Original 1401.03 Signed* / Mar. 16, 2004
Chip Dean date

Verified By: *Original 1401.03 Signed* / Mar. 16, 2004
Jesse Anderson date

Core Weight: 72.145 ST