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Dominion℠

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DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
STARTUP TEST REPORT FOR CYCLE 15

FEB 16 2012

Pursuant to Section 6.9.1.1 of the Millstone Power Station Unit 3 Technical Specifications, Dominion Nuclear Connecticut, Inc. hereby submits the enclosed Startup Test Report for Cycle 15.

If you have any questions or require additional information, please contact Mr. William D. Bartron at (860) 444-4301.

Sincerely,

Stephen Scace

Stephen E. Scace
Site Vice President – Millstone

Enclosure: (1)

Commitments made in this letter: None

IE26
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ENCLOSURE

STARTUP TEST REPORT FOR CYCLE 15

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3

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1.0 SUMMARY

This report summarizes the Cycle 15 startup testing performed following the completion of the October-November 2011 refueling outage.

2.0 INTRODUCTION

The Millstone Power Station Unit 3 Cycle 15 fuel reload was completed on October 29, 2011. The attached core map (Figure 1) shows the final core configuration. Reference [6.3] documents that Cycle 15 uses a low leakage loading pattern (L3P) consisting of 84 new Region 17 fuel assemblies, 85 Region 16 once-burned fuel assemblies, and 16 Region 15 and eight Region 14 twice-burned fuel assemblies. All 193 fuel assemblies in the Cycle 15 core are the Westinghouse 17x17 robust fuel assembly (RFA) design.

The 84 Region 17 assemblies are comprised of 56 assemblies enriched to 4.10 weight percent Uranium-235 (w/o U^{235}) and 28 assemblies enriched to 4.95 w/o U^{235}. The top and bottom regions of all fuel assemblies in the Cycle 15 core are comprised of a 6-inch annular blanket region enriched to 2.6 w/o U^{235}. Placement of the new fuel assemblies in the designated fresh fuel assembly locations was made in a random fashion in order to prevent power tilts across the core due to systematic deviations in the fresh fuel composition.

The 109 re-insert fuel assemblies were ultrasonically cleaned during the October-November 2011 refueling outage. The purpose of the ultrasonic fuel cleaning was to remove adhered crud (primarily nickel and iron-based deposits) from the surface of fuel rods that have previous core exposure in order to reduce the probability of occurrence of crud induced power shift (CIPS).

Every fuel assembly in Cycle 15 contains an insert. The inserts consist of 61 rod cluster control assemblies (RCCAs), 130 thimble plugs, and two secondary source assemblies. For Cycle 15, the decision to reintroduce two secondary sources was based on the future projected core cycles having lower burned fuel assemblies loaded in front of source range detectors. This may result in lower available neutron source strengths. Cycle 15 will be used to charge the secondary sources for use in future cycles.

Subsequent operational and testing milestones were completed as follows:

Initial Criticality	November 20, 2011
Low Power Physics Testing completed	November 20, 2011
Main Turbine Online	November 23, 2011
30% Power Testing completed	November 23, 2011
74% Power Testing completed	November 24, 2011
100% Power Testing completed	December 12, 2011

3.0 FUEL DESIGN

All of the 193 assemblies in the Cycle 15 core are the RFA-2 design. This fuel design is the same as Cycle 14 with the following exceptions:

- Standardized debris filter bottom nozzle (SDFBN) which eliminates the side skirt flow holes and improves debris resistance
- Robust protective bottom grid design which increases nominal height of grid and ligament length
- Low strain radius (LSR) to zirlo mid-grids and intermediate flow mixing grids to lower the strain on the formed features
- Modification to fabrication process for alloy 718 top nozzle leaf springs to allow for earlier identification of issues
- Increase in length of the integrated fuel burnable absorber (IFBA) coating from 120 inches to 122 inches in IFBA fuel rods which reduces the potential for predicted minimum FQ margin occurring in the surveillance exclusion zone

4.0 LOW POWER PHYSICS TESTING

The Low Power Physics Testing program for Cycle 15 was completed using the procedure in reference [6.1] based on the Westinghouse Dynamic Rod Worth Measurement (DRWM) technique described in Reference [6.4]. This program consisted of the following: control and shutdown bank worth measurements, critical boron endpoint measurements for all rods out (ARO), and ARO moderator/isothermal temperature coefficient measurements. Low power physics testing was performed at a power level below the point of nuclear heat to avoid nuclear heating reactivity feedback effects.

4.1 Critical Boron Concentration

The critical boron concentration was measured for the ARO configuration. The measured values include corrections to account for differences between the measured critical rod configuration and the ARO configuration. The review and acceptance criteria of ±500 and ±1000 percent milliRho (pcm), respectively, were met for the ARO configuration.

Summary of Boron Endpoint Results

	Measured (ppm)	Predicted (ppm)	M-P (ppm)	Acceptance Criteria (pcm)
All Rods Out (ARO)	2059	2068	-9 (-53.7 pcm)	± 1000

4.2 Moderator Temperature Coefficient

Isothermal temperature coefficient (ITC) data was measured with Control Bank D at 203 steps withdrawn. The review criteria of ±2 pcm/degrees Fahrenheit (°F) to the predictions were met.

The ARO moderator temperature coefficient (MTC) of -0.41 pcm/°F was calculated by subtracting the design Doppler temperature coefficient (-1.72 pcm/°F) from the measured ARO isothermal temperature coefficient of -2.47 pcm/°F, and adding the delta (Δ) ITC correction value of +0.34 pcm/°F (ΔITC corrects the MTC at the measurement conditions to the minimum temperature for criticality value of 551°F). The technical specification limit of MTC < +5.0 pcm/°F at ARO hot zero power (HZP) was met.

Isothermal/Moderator Temperature Coefficient Results

	Measured (pcm/°F)	Corrected Predicted (pcm/°F)	M-P (pcm/°F)	Acceptance Criteria (pcm/°F)
ARO ITC	-2.47	-3.10	+0.63	NA
ARO MTC	-0.41	NA	NA	MTC < +5.0

4.3 Control Rod Reactivity Worth Measurements

The integral reactivity worths of all RCCA control and shutdown banks were measured using the DRWM technique. The review criteria of the measured worth is ±15% or 100 pcm of the individual predicted worth, whichever is greater and sum of the measured worth is ±8% of the predicted worth. The DRWM rod worth acceptance criteria is defined as: the sum of the measured worths (M) of all banks shall be greater than or equal to 90% of the sum of their predicted worths (P).

Control Bank Integral Worth Results

	Measured (pcm)	Predicted (pcm)	M-P (pcm)	% Difference (M-P) / P
Control Bank A	623.1	612.4	10.7	1.7
Control Bank B	788.6	794.6	-6.0	-0.8
Control Bank C	678.2	697.1	-18.9	-2.7
Control Bank D	662.4	615.8	46.6	7.6
Shutdown Bank A	480.1	472.2	7.9	1.7
Shutdown Bank B	1033.2	1050.1	-16.9	-1.6
Shutdown Bank C	460.5	440.5	20.0	4.5
Shutdown Bank D	456.8	439.6	17.2	3.9
Shutdown Bank E	83.5	86.7	-3.2	-3.7
Totals	5266.4	5209.0	57.4	1.1

The measured results of the individual bank worths and the total control bank worth showed excellent agreement with the predicted values. All individual and total worth review criteria were met. The acceptance criteria for sum of the measured rod worths (greater than or equal to 90% of the sum of the predicted worths) was met.

5.0 POWER ASCENSION TESTING

Testing was performed at specified power plateaus of 30%, 73% and 100% Rated Thermal Power (RTP). Power changes were governed by operating procedures and fuel preconditioning guidelines.

Thermal-hydraulic parameters, nuclear parameters, and related instrumentation were monitored throughout the power ascension. Data was compared to previous cycle power ascension data and engineering predictions, as required, at each test plateau to identify calibration or system problems. The major areas analyzed were:

1. Core performance evaluation: Flux mapping was performed at 30%, 73% and 100% RTP using the moveable incore detector system. The resultant peaking factors and power distribution were compared to Technical Specification (TS) limits to verify that the core was operating within its design limits. All analysis limits were met and the results are summarized in Section 5.1.
2. Nuclear instrumentation indication: Overlap data was obtained between the intermediate and power range nuclear instrumentation channels. Secondary plant heat balance calculations were performed to verify the nuclear instrumentation indications.
3. Incore/Excore Calibration: Scaling factors were calculated from flux map data using the single point calibration methodology. The nuclear instrumentation power range channels were re-scaled at 30%, 73% and 100% RTP.
4. RCS Flow: The RCS flow rate was measured at approximately 93% RTP using a secondary calorimetric heat balance for each loop using the steam generators as the control volumes. The calculated RCS flow rate met the TS requirements and is reported in Section 5.3.

5.1 Power Distribution, Power Peaking and Tilt Measurements

The core power distribution was measured through the performance of a series of flux maps during the power ascension as specified in Reference [6.2]. The results from the flux maps were used to verify compliance with the power distribution TSs.

A low power flux map at approximately 30% RTP was performed to determine if any gross neutron flux abnormalities existed. At the 30% RTP plateau flux map and again at the 73% map, data necessary to perform an excore-to-incore calibration via the single point methodology, was obtained. Per TS Surveillance 4.3.1.1, Table 4.3-1, Functional Unit 2, Note 6, a flux map at approximately 100% RTP was performed for an excore-to-incore calibration. The 100% RTP map also verified core power distributions were within the design limits.

A summary of the measured axial flux difference (AFD) and incore tilt for the flux maps, performed during the power ascension, is provided below. Additional tables provide comparisons of the most limiting measured heat flux hot channel factor (F_Q) and nuclear enthalpy rise hot channel factor ($F_{\Delta}h$), including uncertainties, to their respective limits from each of the flux maps performed during the power ascension. The most limiting F_Q reported is based on minimum margin to the steady state limit that varies as a function of core height.

As can be seen from the data presented, all TS limits were met and no abnormalities in core power distribution were observed during power ascension.

Summary of Measured Axial Flux Difference and Incore Tilt

Power (%RTP)	Burnup (MWD/MTU)	Rod Position (steps)	AFD (%)	Incore Tilt
30.0	8	213	5.735	1.0136
73.2	30.3	216	2.839	1.0098
99.9	176.5	216	-0.124	1.0075

Comparison of Measured F_Q to F_Q^{RTP} Limit

Power (%RTP)	Burnup (MWD/MTU)	Measured F_Q	F_Q^{RTP} steady state limit	Margin to Transient Limit
30.0	8	N/A	N/A	N/A
73.2	30.3	1.997	3.552	43.8 %
99.9	176.5	1.999	2.603	23.2 %

Comparison of Measured $F_{\Delta}h$ to $F_{\Delta}h$ Limit

Power (%RTP)	Burnup (MWD/MTU)	$F_{\Delta}h$	$F_{\Delta}h$ Limit
30.0	8	1.580	1.919
73.2	30.3	1.525	1.714
99.9	176.5	1.506	1.586

Presented in Figures 2, 3 and 4 are measured power distribution maps showing percent difference from the predicted power for the 30%, 73% and 100% RTP plateaus. From these data it can be seen that there is good agreement between the measured and predicted assembly powers.

5.2 Boron Measurements

Hot full power ARO boron concentration measurements were performed after reaching equilibrium conditions. The measured ARO, hot full power, equilibrium xenon, boron concentration was 1400 ppm with a predicted value of 1392 ppm. The predicted to measured difference was - 42 pcm which met the acceptance criteria of ± 1000 pcm.

5.3 Reactor Coolant System Flow Measurement

The Reactor Coolant System (RCS) flow rate was determined using a secondary calorimetric heat balance for each loop using the steam generators as the control volumes. The following parameters were measured:

- RCS pressure
- Hot leg temperatures
- Cold leg temperatures
- Feedwater temperatures
- Feedwater flow rates
- Feedwater pressure
- Steam generator pressure

Steam generator blowdown was not isolated during the data acquisition period.

Per TS Surveillance 4.2.3.1.3, the RCS flow was measured within 24 hours after exceeding 90% RTP. The measured flow at 93.4% RTP was 400,167 gallons per minute (gpm) with a minimum required flow of 379,200 gpm. All TS limits were met.

6.0 REFERENCES

6.1 SP 31008, Rev. 004-01, "Low Power Physics Testing (ICCE)"

6.2 EN 31015, Rev. 003-02, "Power Ascension Testing of Millstone Unit 3"

6.3 ETE-NAF-2011-0159, Rev. 000, "Nuclear Design and Core Physics Characteristics of the Millstone Generating Station Unit 3, Cycle 15"

6.4 WCAP-13360-P-A, Revision 1, "Westinghouse Dynamic Rod Worth Measurement Technique"

7.0 FIGURES

FIGURE 1
CORE LOADING PATTERN
MILLSTONE UNIT 3 - CYCLE 15

R	P	N	M	L	K	J	H	G	F	E	D	C	B	A	
				15A R39	16A S26	15A R54	16A S33	15A R52	16A S04	15A R24					1
		14B P42	16A S12	17B T58	17B T70	17A T06	17B T65	17A T08	17B T72	17B T60	16A S09	14B P44			2
	14B P45	17A T01	17B T78	17A T15	16B S44	16B S73	16A S17	16B S85	16B S49	17A T28	17B T80	17A T02	14B P46		3
	16A S06	17B T81	16B S41	16B S64	17A T31	16B S51	17A T43	16B S54	17A T45	16B S69	16B S40	17B T82	16A S03		4
15A R38	17B T61	17A T14	16B S62	17A T53	16A S23	17A T20	16A S15	17A T38	16A S32	17A T39	16B S68	17A T35	17B T62	15A R47	5
16A S07	17B T73	16B S42	17A T36	16A S24	17A T27	16B S71	17A T30	16B S84	17A T13	16A S19	17A T42	16B S48	17B T74	16A S34	6
15A R32	17A T09	16B S70	16B S59	17A T26	16B S74	17A T22	16B S55	17A T50	16B S76	17A T48	16B S60	16B S82	17A T10	15A R50	7
16A S30	17B T66	16A S20	17A T41	16A S14	17A T56	16B S61	16A S27	16B S50	17A T40	16A S05	17A T37	16A S25	17B T67	16A S28	8
15A R56	17A T11	16B S72	16B S52	17A T47	16B S77	17A T21	16B S53	17A T52	16B S83	17A T19	16B S57	16B S75	17A T05	15A R37	9
16A S22	17B T75	16B S47	17A T29	16A S31	17A T46	16B S79	17A T34	16B S78	17A T49	16A S35	17A T51	16B S46	17B T69	16A S08	10
15A R43	17B T63	17A T55	16B S67	17A T16	16A S18	17A T54	16A S10	17A T17	16A S29	17A T24	16B S66	17A T18	17B T57	15A R29	11
	16A S13	17B T83	16B S39	16B S65	17A T25	16B S58	17A T33	16B S56	17A T32	16B S63	16B S38	17B T77	16A S01		12
	14B P47	17A T03	17B T84	17A T23	16B S45	16B S81	16A S37	16B S80	16B S43	17A T44	17B T79	17A T04	14B P41		13
		14B P48	16A S02	17B T64	17B T76	17A T12	17B T68	17A T07	17B T71	17B T59	16A S16	14B P43			14
				15A R51	16A S11	15A R33	16A S21	15A R45	16A S36	15A R49					15

90°

0°

LEGEND

R ID	Region Identifier Fuel Assembly Identifier

REGION	ASSEMBLIES	ENRICHMENT
14B	8	4.95
15A	16	4.10
16A	37	4.10
16B	48	4.95
17A	56	4.10
17B	28	4.95

FIGURE 2
INCORE Power Distribution - 30%
MILLSTONE UNIT 3 - CYCLE 15

R	P	N	M	L	K	J	H	G	F	E	D	C	B	A	
				0.317 -3.6	0.454 -3.4	○ 0.432 -3.4	0.477 -3.2	0.440 -1.3	○ 0.473 0.4	0.331 0.6					1
		○ 0.334 -4.0	0.599 -4.0	1.161 -3.5	○ 1.260 -3.4	1.138 -2.9	○ 1.279 -2.7	1.164 -0.7	1.321 1.2	1.223 1.6	0.639 2.4	0.355 2.0			2
	0.341 -2.0	0.943 -2.0	1.261 -3.1	1.230 -3.5	1.279 -3.4	1.217 -2.6	○ 1.084 -2.4	1.235 -1.2	○ 1.352 2.0	1.302 2.1	○ 1.331 2.3	0.981 2.0	○ 0.353 1.4		3
	○ 0.618 -1.0	○ 1.286 -1.2	1.349 -1.0	1.263 0.2	1.203 0.2	1.146 -2.1	○ 1.114 -1.6	1.164 -0.6	1.218 1.3	1.290 2.4	1.403 3.0	1.335 2.6	0.641 2.7		4
0.329 0.0	1.205 0.1	1.277 0.2	1.264 0.3	○ 1.150 -0.6	0.978 -0.6	1.033 -1.7	0.948 -1.4	○ 1.039 -1.2	0.996 1.1	○ 1.186 2.5	1.302 3.3	○ 1.317 3.3	1.244 3.4	0.337 2.4	- 5
○ 0.470 -0.2	1.322 1.3	○ 1.351 2.0	1.217 1.2	0.983 -0.2	○ 1.011 -1.0	0.994 -1.4	○ 1.003 -1.1	1.001 -0.8	1.025 0.4	0.993 0.9	1.244 3.6	1.373 3.7	○ 1.351 3.6	0.482 2.6	- 6
0.444 -0.4	1.181 0.8	1.270 1.6	○ 1.188 1.5	1.054 0.2	1.001 -0.8	○ 1.005 -1.5	1.011 -1.3	1.005 -1.5	○ 0.994 -1.4	1.050 -0.1	1.213 3.7	○ 1.287 3.0	1.206 2.9	0.454 1.6	- 7
○ 0.492 -0.2	1.319 0.3	○ 1.119 0.7	1.143 1.0	○ 0.971 1.0	1.008 -0.6	○ 1.011 -1.3	0.915 -1.0	1.013 -1.1	○ 1.004 -1.0	0.961 0.0	○ 1.164 2.8	○ 1.144 3.0	○ 1.350 2.7	0.499 1.2	- 8
0.446 -0.2	○ 1.175 0.3	1.258 0.6	1.185 1.3	1.065 1.3	1.010 0.2	1.007 -1.3	1.015 -0.9	○ 1.007 -1.3	1.001 -0.8	○ 1.058 0.6	1.197 2.2	1.280 2.4	1.198 2.2	○ 0.452 1.3	- 9
0.473 0.6	1.311 0.5	1.328 0.3	1.214 1.1	○ 0.995 1.1	1.024 0.3	○ 1.004 -0.5	1.009 -0.5	1.007 -0.1	1.020 -0.1	0.991 0.6	○ 1.210 0.7	1.347 1.7	1.331 2.0	0.480 1.9	- 10
○ 0.331 0.6	1.212 0.7	1.281 0.5	1.274 1.1	○ 1.161 0.3	0.984 -0.1	1.045 -0.7	○ 0.953 -0.8	1.042 -0.9	0.976 -0.8	○ 1.169 1.0	1.276 1.3	1.297 1.7	1.229 2.1	○ 0.336 2.1	- 11
	0.630 1.0	1.317 1.2	1.366 0.3	1.254 -0.5	○ 1.194 -0.7	1.161 -0.9	1.119 -1.1	○ 1.156 -1.2	1.189 -1.0	1.274 1.1	○ 1.379 1.2	1.305 0.3	0.625 0.2		12
	0.348 0.0	○ 0.963 0.1	1.296 -0.4	○ 1.261 -1.1	1.300 -1.9	1.223 -2.2	○ 1.084 -2.4	1.221 -2.3	1.288 -2.7	1.263 -0.9	1.308 0.5	0.961 -0.1	○ 0.343 -1.4		13
		○ 0.348 0.0	0.620 -0.6	1.187 -1.4	1.276 -2.2	○ 1.135 -3.2	1.274 -3.1	1.136 -3.1	○ 1.259 -3.5	1.176 -2.2	○ 0.618 -1.0	0.344 -1.1			14
				○ 0.324 -1.5	0.458 -2.8	0.429 -3.8	○ 0.474 -3.9	0.430 -3.8	0.454 -3.4	0.321 -2.4					15

□ Measured Power
% Difference (M-P)/P

○ Measured Location

FIGURE 3
INCORE Power Distribution - 74%
MILLSTONE UNIT 3 - CYCLE 15

R	P	N	M	L	K	J	H	G	F	E	D	C	B	A	
				0.320 -3.6	0.462 -2.5	○ 0.440 -2.9	0.486 -2.8	0.446 -1.3	○ 0.480 1.1	0.336 1.2					1
		○ 0.340 -3.4	0.600 -3.5	1.133 -3.3	○ 1.237 -2.5	1.125 -2.6	○ 1.261 -2.3	1.147 -0.7	1.290 1.7	1.187 1.3	0.624 0.3	0.354 0.6			2
	0.345 -2.0	0.930 -1.9	1.227 -2.7	1.201 -3.5	1.252 -3.5	1.199 -3.0	○ 1.078 -2.8	1.216 -1.7	○ 1.322 1.8	1.257 1.0	○ 1.266 0.4	0.954 0.6	○ 0.355 0.9		3
	○ 0.615 -1.1	○ 1.247 -1.1	1.303 -1.0	1.240 -0.2	1.198 -0.2	1.151 -2.4	○ 1.124 -2.0	1.168 -1.0	1.208 0.6	1.256 1.0	1.339 1.7	1.281 1.6	0.634 1.9		4
0.335 0.9	1.179 0.6	1.243 -0.1	1.241 -0.2	○ 1.151 -1.0	0.999 -1.3	1.063 -1.8	0.983 -1.5	○ 1.068 -1.5	1.012 0.0	○ 1.177 1.2	1.270 2.3	○ 1.279 2.8	1.207 3.0	0.340 2.4	- 5
○ 0.485 2.1	1.296 2.1	○ 1.317 1.5	1.211 0.8	1.006 -0.6	○ 1.047 -1.1	1.041 -1.0	○ 1.051 -0.7	1.048 -0.4	1.060 0.1	1.019 0.7	1.234 2.7	1.340 3.3	○ 1.311 3.3	0.486 2.5	- 6
0.456 0.9	1.172 1.5	1.256 1.5	○ 1.197 1.4	1.085 0.1	1.046 -0.6	○ 1.057 -0.8	1.068 -0.4	1.062 -0.4	○ 1.047 -0.5	1.084 0.1	1.218 3.3	○ 1.273 3.0	1.193 3.3	0.462 2.0	- 7
○ 0.500 0.0	1.302 0.9	○ 1.121 1.1	1.163 1.4	○ 1.009 1.1	1.059 0.1	○ 1.066 -0.6	0.965 -0.2	1.070 -0.2	○ 1.056 -0.2	0.999 0.1	○ 1.176 2.5	○ 1.143 3.1	○ 1.336 3.5	0.511 2.2	- 8
0.453 0.0	○ 1.163 0.7	1.250 1.1	1.196 1.4	1.096 1.2	1.055 0.3	1.060 -0.6	1.070 -0.2	○ 1.061 -0.5	1.048 -0.4	○ 1.088 0.4	1.202 1.9	1.267 2.4	1.191 3.1	○ 0.462 2.2	- 9
0.480 1.3	1.285 1.3	1.302 0.4	1.201 0.0	○ 1.012 0.0	1.056 -0.3	○ 1.051 -0.1	1.059 0.1	1.056 0.4	1.059 0.0	1.016 0.4	○ 1.208 0.6	1.319 1.6	1.307 3.0	0.488 2.7	- 10
○ 0.338 1.8	1.198 2.2	1.232 -1.0	1.243 0.1	○ 1.155 -0.7	1.004 -0.8	1.077 -0.6	○ 0.997 -0.1	1.083 0.0	1.007 -0.5	○ 1.175 1.0	1.258 1.2	1.268 1.9	1.210 3.2	○ 0.342 3.0	- 11
	0.627 0.8	1.258 -0.2	1.304 -0.9	1.222 -1.7	○ 1.180 -1.7	1.165 -1.3	1.139 -0.7	○ 1.171 -0.7	1.196 -0.4	1.255 1.0	○ 1.334 1.4	1.271 0.8	0.628 1.0		12
	0.349 -0.9	○ 0.941 -0.7	1.248 -1.0	○ 1.220 -1.9	1.269 -2.2	1.207 -2.4	○ 1.088 -1.9	1.214 -1.8	1.275 -1.7	1.239 -0.4	1.273 1.0	0.950 0.2	○ 0.348 -1.1		13
		○ 0.349 -0.9	0.616 -1.0	1.162 -0.9	1.249 -1.6	○ 1.125 -2.6	1.260 -2.4	1.126 -2.5	○ 1.234 -2.8	1.153 -1.6	○ 0.618 -0.6	0.349 -0.9			14
				○ 0.332 0.0	0.467 -1.7	0.440 -2.7	○ 0.486 -2.8	0.441 -2.6	0.461 -2.7	0.326 -1.8					15

□ Measured Power
% Difference (M-P)/P

○ Measured Location

FIGURE 4
INCORE Power Distribution - 100%
MILLSTONE UNIT 3 - CYCLE 15

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					0.319 -4.8	0.463 -3.1	○ 0.441 -3.5	0.488 -3.2	0.448 -2.0	○ 0.482 0.8	0.338 0.9				
2			○ 0.343 -3.7	0.602 -3.5	1.110 -4.5	○ 1.216 -3.2	1.113 -3.1	○ 1.246 -2.7	1.134 -1.2	1.267 0.9	1.163 0.0	0.613 -1.8	0.353 -0.8		
3		0.347 -2.5	0.923 -2.4	1.208 -3.4	1.178 -4.5	1.225 -4.6	1.186 -3.3	○ 1.074 -2.8	1.203 -2.0	○ 1.294 0.8	1.228 -0.6	○ 1.228 -1.8	0.940 -0.6	○ 0.357 0.3	
4		○ 0.612 -1.9	○ 1.225 -2.0	1.283 -1.4	1.240 0.5	1.206 0.5	1.157 -1.8	○ 1.138 -1.2	1.172 -0.6	1.212 0.9	1.237 0.2	1.312 0.8	1.256 0.5	0.633 1.4	
5	0.336 0.3	1.159 -0.3	1.222 -1.1	1.227 -0.6	○ 1.169 0.3	1.023 0.2	1.094 -0.2	1.011 0.0	○ 1.097 0.0	1.032 1.1	○ 1.185 1.6	1.260 2.1	○ 1.254 1.6	1.180 1.5	0.336 0.3
6	○ 0.485 1.5	1.272 1.3	○ 1.298 1.1	1.211 0.8	1.026 0.5	○ 1.078 0.4	1.076 0.9	○ 1.088 1.2	1.081 1.4	1.088 1.3	1.038 1.7	1.229 2.4	1.310 2.0	○ 1.281 2.0	0.479 0.2
7	0.459 0.4	1.159 1.0	1.242 1.2	○ 1.198 1.6	1.110 1.2	1.079 1.2	○ 1.094 1.0	1.103 1.4	1.099 1.5	○ 1.080 1.3	1.111 1.4	1.215 3.1	○ 1.252 2.1	1.173 2.1	0.459 0.4
8	○ 0.501 -0.6	1.283 0.2	○ 1.112 0.6	1.173 1.8	○ 1.031 2.0	1.093 1.7	○ 1.100 1.1	0.996 1.3	1.103 1.4	○ 1.090 1.4	1.025 1.4	○ 1.183 2.7	○ 1.133 2.5	○ 1.316 2.7	0.512 1.6
9	0.454 -0.7	○ 1.149 0.0	1.229 0.2	1.205 2.3	1.122 2.4	1.085 1.8	1.096 1.2	1.102 1.3	○ 1.096 1.2	1.080 1.3	○ 1.113 1.5	1.207 2.4	1.254 2.2	1.177 2.5	○ 0.464 1.5
10	0.478 0.0	1.257 0.1	1.269 -1.2	1.206 0.5	○ 1.027 0.6	1.081 0.7	○ 1.082 1.5	1.092 1.6	1.085 1.8	1.086 1.1	1.034 1.3	○ 1.216 1.2	1.309 1.9	1.296 3.2	0.493 3.1
11	○ 0.338 0.9	1.177 1.3	1.219 -1.2	1.239 0.4	○ 1.164 -0.2	1.022 0.1	1.103 0.5	○ 1.021 1.0	1.105 0.8	1.021 0.0	○ 1.176 0.9	1.245 0.9	1.249 1.1	1.205 3.6	○ 0.347 3.6
12		0.622 -0.3	1.230 -1.6	1.278 -1.8	1.212 -1.8	○ 1.179 -1.8	1.173 -0.5	1.150 -0.2	○ 1.176 -0.2	1.200 0.0	1.239 0.4	○ 1.308 0.5	1.245 -0.4	0.630 1.0	
13		0.351 -1.4	○ 0.932 -1.5	1.227 -1.8	○ 1.209 -2.1	1.252 -2.5	1.197 -2.4	○ 1.082 -2.1	1.202 -2.0	1.259 -1.9	1.218 -1.3	1.248 -0.2	0.940 -0.6	○ 0.350 -1.7	
14			○ 0.351 -1.4	0.614 -1.6	1.144 -1.6	1.228 -2.2	○ 1.116 -2.8	1.246 -2.7	1.117 -2.8	○ 1.212 -3.5	1.137 -2.2	○ 0.618 -1.0	0.351 -1.4		
15					○ 0.333 -0.6	0.468 -2.1	0.443 -3.1	○ 0.489 -3.0	0.444 -2.8	0.461 -3.6	0.327 -2.4				

☐ Measured Power
% Difference (M-P)/P

○ Measured Location