Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

MAY 30 2001

Docket No. 50-423
B18403

Re: TS 6.9.1.1

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit No. 3
Startup Test Report for Cycle 8

Pursuant to Millstone Unit No. 3 Technical Specification 6.9.1.1, Dominion Nuclear Connecticut, Inc., hereby submits the enclosed Unit No. 3 Startup Test Report for Cycle 8.

There are no regulatory commitments contained within this letter.

If you have any additional questions concerning this submittal, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

Raymond P. Necci - Vice President
Nuclear Technical Services/Millstone

Enclosure: Startup Test Report, Cycle 8

cc: H. J. Miller, Region I Administrator
V. Nerses, NRC Senior Project Manager, Millstone Unit No. 3
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

IE26

Docket No. 50-423
B18403

Enclosure

Millstone Nuclear Power Station, Unit No. 3

Startup Test Report, Cycle 8

Millstone Nuclear Power Station
Unit No. 3
Startup Test Report
Cycle 8

April 2001

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1.0 SUMMARY

Low Power Physics Testing and Power Ascension Testing for Millstone Unit 3, Cycle 8 identified no unusual core response or reactivity anomalies. All measured core parameters were determined to be within their acceptance criteria. All Technical Specification surveillance requirements were met.

2.0 INTRODUCTION

The Millstone Unit 3 Cycle 8 fuel reload was completed on February 26, 2001. The attached core map (Figure 1) shows the final core configuration. Cycle 8 uses a low leakage loading pattern consisting of 76 new Region 10 fuel assemblies, 81 Region 9 once-burned fuel assemblies, 30 Region 8 twice burned fuel assemblies and 6 Region 7 twice burned fuel assemblies. The 76 feed fuel assemblies and 81 once-burned fuel assemblies are the Westinghouse 17x17 Robust Fuel Assembly (RFA) design and the remaining 36 re-inserted fuel assemblies are the Westinghouse 17x17 Vantage 5H (V5H) design.

The 76 Region 10 assemblies are comprised of 36 assemblies enriched to 4.40 weight percent Uranium-235 (w/o U^{235}) and 40 assemblies enriched to 4.8 w/o U^{235}. The top and bottom regions of the fresh and once-burned fuel are comprised of a 6 inch annular blanket region enriched to 2.6 w/o U^{235}. The region 7 and 8 fuel blanket regions are 6 inch natural enriched annular regions. The fuel assembly locations for the fresh fuel were randomly assigned to prevent power tilts across the core due to systematic deviations in the fresh fuel composition.

Other changes to the Cycle 8 core were the replacement of 4 rod control cluster assemblies (RCCA). These RCCAs were provided by Westinghouse. Secondary sources and their core locations remain unchanged from Cycle 7.

Every fuel assembly in Cycle 8 contains an insert from the following list of items:
4 secondary sources , 61 RCCAs, and 128 thimble plugs.

Subsequent operational and testing milestones were completed as follows:

Initial Criticality	March 21, 2001
Low Power Physics Testing completed	March 21, 2001
Main Turbine Online	March 31, 2001
30% Power Testing completed on	April 01, 2001
75% Power Testing completed on	April 03, 2001
100% Power Testing completed on	April 05, 2001

Cycle 8 operation is accomplished with a core loading of 193 Westinghouse manufactured fuel assemblies. The Safety Analysis is provided by Westinghouse and the Nuclear Design Report was generated by Millstone personnel.

3.0 FUEL DESIGN

The Robust Fuel Assembly (RFA) design comprises 157 out of the 193 assemblies in the Cycle 8 core. This fuel design differs from the previous fuel design in that it incorporates the Westinghouse protective bottom grid (P-Grid), thicker walled control rod guide tubes and instrument tube, and modifications to the mixing vane grids and Intermediate Flow Mixer (IFM) grids. The P-Grid improves the fuel assembly's resistance to debris and thus debris related failures. The thicker walled guide and instrument tubes make the fuel assembly more resistant to bowing and twisting, thereby further reducing the possibility of an incomplete rod insertion event. The modifications to the mixing vanes grids and IFM's improve the fuel assembly thermal performance and increase the margin to fuel-related design limits.

4.0 LOW POWER PHYSICS TESTING

The low power physics testing program for Cycle 8 was completed using the Westinghouse Dynamic Rod Worth Measurement (DRWM) Technique described in Reference 6.6. 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 Concentrations

The critical boron concentration was measured for the All Rods Out configuration. The test results are provided in Table 1 along with the design predictions. All measured values include corrections to experimental data to account for differences between the critical rod configuration and the endpoint configuration. The acceptance criteria of $\pm$ 1000 percent milliRho (pcm), equivalent to $\pm$ 157 parts per million Boron (ppm), was met for the ARO configuration.

Table 1
Summary of Boron Endpoint Results

	Measured (ppm)	Predicted (ppm)	M-P (ppm)	Acceptance Criteria (ppm)
All Rods Out (ARO)	2062	2056	+6	$\pm$ 157

4.2 Isothermal/Moderator Temperature Coefficients

Isothermal Temperature Coefficient (ITC) data were measured at All Rods Out configuration. Controlled heat-ups and cool-downs were performed and the reactivity change was measured. These measurements were corrected for ARO conditions and the averages of the corrected results are presented in Table 2. They were then compared to the design predictions and acceptance criteria. The acceptance criteria were met.

The ARO Moderator Temperature Coefficient (MTC) of -1.36 pcm/°F was calculated by subtracting the design Doppler Temperature Coefficient (-1.78 pcm/°F) from the measured ARO Isothermal Temperature Coefficient of -3.14 pcm/°F. The Technical Specification Limit of MTC < +5.0 pcm/°F at ARO Hot Zero Power (HZP) was met. As shown in the data presented in Table 2, all temperature coefficient acceptance criteria were met.

Table 2
Isothermal/Moderator Temperature Coefficient Results

	Measured (pcm/°F)	Corrected Predicted (pcm/°F)	M-P (pcm/°F)	Acceptance Criteria (pcm/°F)
ARO ITC	-3.14	-3.24	+0.10	± 2.0
ARO MTC	-1.36	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 Dynamic Rod Worth Measurement Technique (DRWM). Data for measured and predicted individual bank worths as well as the sum of the worths of all banks are presented in Table 3. 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).

Table 3
Control Bank Integral Worth Results

	Measured (pcm)	Predicted (pcm)	M-P (pcm)	% Difference $\frac{M-P}{P}$
Control Bank A	649.6	655.1	-5.5	-0.8
Control Bank B	734.4	715.3	19.1	2.7
Control Bank C	761.5	739.2	22.3	3.0
Control Bank D	466.1	474.1	-8.0	-1.7
Shutdown Bank A	521.2	509.5	11.7	2.3
Shutdown Bank B	1067.9	1032.1	35.8	3.5
Shutdown Bank C	366.6	379.3	-12.7	-3.3
Shutdown Bank D	382.0	382.8	-0.8	-0.2
Shutdown Bank E	82.3	80.1	2.2	2.7
Totals	5031.6	4967.5	64.1	

The measured results of the individual bank worths and the total control bank worth showed excellent agreement with the predicted values. The sum of the measured rod worths was 1.3% greater than the sum of the predicted rod worths. This satisfies the acceptance criteria that the sum of the measured rod worths shall be greater than or equal to 90% of the sum of the predicted rod worths.

5.0 POWER ASCENSION TESTING

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 in order to ensure compliance with Technical Specifications. The results from the flux maps were used to verify compliance with the power distribution technical specifications.

Low power flux maps, at approximately 30% and 50% rated thermal power (RTP), were performed to determine if any gross neutron flux abnormalities existed. At the 30% power plateau flux map, data necessary to perform an INCORE to EXCORE calibration via the single point methodology was obtained. Per Technical Specification Surveillance 4.3.1.1, Table 4.3-1 Functional Unit 2 Note 6, a flux map at approximately 75% power was performed for INCORE to EXCORE calibration. Once hot full power equilibrium conditions were reached, another flux map was performed to verify core power distributions were within the design limits.

Table 4 presents a summary of the Measured Axial Flux Difference (AFD) and INCORE Tilt for the flux maps performed during the power ascension. Presented in Tables 5 and 6 are comparisons of the measured Heat Flux Hot Channel Factor ($\mathbf{F_Q}$) and Nuclear Enthalpy Rise Hot Channel Factor ($\mathbf{F_{\Delta}}$h), including uncertainties, to their respective limits from each of the flux maps performed during the power ascension.

As can be seen from the data presented in Tables 5 and 6, all acceptance criteria were met and no abnormalities in core power distribution were observed during power ascension.

Table 4
Summary of Measured Axial Flux Difference and INCORE Tilt

Power (%RTP)	Burnup (MWD/MTU)	Rod Position (steps)	AFD (%)	INCORE Tilt
32.3	9.9	146	0.590	1.0034
46.9	25.0	160	1.032	1.0044
74.0	45.0	195	1.191	1.0060
99.8	137.0	215	-1.600	1.0060

Table 5
Comparison of Measured F_Q to F_Q^{RTP} limit

Power (%RTP)	Burnup (MWD/MTU)	Measured F_Q	F_Q^{RTP} steady state limit
32.3	9.9	2.072	5.200
46.9	25.0	2.003	5.200
74.0	45.0	1.947	3.514
99.8	137.0	1.938	2.605

Table 6
Comparison of Measured $F_{\Delta}h$ to $F_{\Delta}h$ limit for each Fuel Type

Power (%RTP)	Burnup (MWD/MTU)	Type 1 (V5H)	Type 1 Limit	Type 2 (RFA)	Type 2 Limit
32.3	9.9	0.814	1.853	1.578	1.901
46.9	25.0	0.803	1.785	1.530	1.832
74.0	45.0	0.787	1.660	1.502	1.703
99.8	137.0	0.780	1.541	1.475	1.581

Presented in Figures 2, 3, 4, and 5 are measured Power Distribution Maps showing percent difference from the predicted power for the 30%, 50%, 75% and 100% power 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 all rods out boron concentration measurements were performed after reaching equilibrium conditions. The measured All Rods Out, Hot Full Power, equilibrium xenon, boron concentration was 1396 ppm with a predicted value of 1390 ppm. The predicted to measured difference was +48 pcm which met the acceptance criteria of ± 1000 pcm.

5.3 Reactor Coolant System Flow Measurement

The Reactor Coolant 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:

- Reactor Coolant System 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 Technical Specification Surveillance 4.2.3.1.2, the Reactor Coolant System Flow was measured prior to operation above 75% rated thermal power. The measured flow at approximately 75% rated thermal power was 401,779 gallons per minute (gpm) with a minimum required flow of 372,292 gpm. The reactor coolant system flow measurement was re-performed after reaching 100% rated thermal power. The measured flow at 100% power was 400,841 gpm with a minimum required flow of 372,292 gpm. All acceptance criteria were met.

6.0 REFERENCES

6.1 SP 31008, Rev. 000-03, "Low Power Physics Testing (IPTE)" performed for Cycle 8

6.2 SPROC ENG99-3-22, Rev. 001, "Cycle 8 Power Ascension Testing"

6.3 Nuclear Design and Core Physics Characteristics of the Millstone Generating Station Unit 3, Cycle 8

6.4 ANSI/ANS 19.6.1 (1997) "Reload Startup Physics Tests for Pressurized Water Reactors"

6.5 Design Change Record M3-00-019, "Reload Design for Millstone Unit 3 Cycle 8"

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

6.7 Millstone Unit 3 Cycle 8 Reload Safety Evaluation, Revision 2, dated February 2001

6.8 Millstone Automated Work Order M3-99-18598 for Cycle 8 Fuel Offload Reload Activities

6.9 NEU-01-023, Letter from M. P. Osborne (Westinghouse) to Steven Scace, "Millstone Unit 3 Final Report for Dynamic Rod Worth Measurement," dated March 28, 2001.

FIGURE 1
CORE LOADING PATTERN
MILLSTONE UNIT 3 - CYCLE 8

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					8 H23	8 H58	8 H47	8 H08	8 H34	8 H67	8 H07				
2			8 H31	9B J71	10B K38	10B K51	10B K56	10B K73	10B K58	10B K67	10B K40	9B J61	7 G26		
3		7 G22	10B K41	10B K68	10A K03	9A J18	9B J48	9B J26	9B J47	9A J15	10A K11	10B K50	10B K46	8 H33	
4		9B J81	10B K71	9A J11	9A J10	10A K14	9B J49	10A K24	9B J57	10A K25	9A J12	9A J02	10B K52	9B J73	
5	8 H03	10B K47	10A K02	9A J04	10A K33	9B J37	9B J23	9B J60	9B J25	9B J56	10A K06	9A J09	10A K19	10B K37	7 G23
6	8 H57	10B K62	9A J21	10A K20	9B J55	10A K16	9B J77	10A K17	9B J59	10A K10	9B J54	10A K13	9A J13	10B K63	8 H30
7	8 H60	10B K59	9B J50	9B J42	9B J32	9B J72	10A K01	9B J76	10A K23	9B J68	9B J22	9B J40	9B J46	10B K60	8 H70
8	8 H01	10B K74	9B J29	10A K09	9B J69	10A K08	9B J62	9A J20	9B J80	10A K30	9B J64	10A K28	9B J31	10B K75	7 G12
9	8 H50	10B K55	9B J36	9B J45	9B J33	9B J66	10A K22	9B J74	10A K36	9B J58	9B J24	9B J44	9B J52	10B K57	8 H61
10	8 H35	10B K49	9A J19	10A K21	9B J53	10A K18	9B J79	10A K27	9B J78	10A K07	9B J35	10A K32	9A J17	10B K66	8 H40
11	8 H28	10B K48	10A K05	9A J05	10A K12	9B J38	9B J27	9B J70	9B J28	9B J39	10A K26	9A J06	10A K15	10B K39	8 H02
12		9B J65	10B K54	9A J07	9A J01	10A K29	9B J43	10A K31	9B J41	10A K35	9A J08	9A J03	10B K53	9B J67	
13		7 G27	10B K44	10B K70	10A K04	9A J16	9B J51	9B J30	9B J34	9A J14	10A K34	10B K69	10B K45	8 H29	
14			8 H51	9B J63	10B K42	10B K65	10B K72	10B K76	10B K64	10B K61	10B K43	9B J75	8 H32		
15					7 G13	8 H69	8 H74	8 H04	8 H48	8 H64	8 H18				

90° (left side); 0° (bottom)

LEGEND

R ID	Region Identifier Fuel Assembly Identifier

REGION	ASSEMBLIES	ENRICHMENT
7	6	4.40
8	30	4.60
9A	21	4.40
9B	60	4.80
10A	36	4.40
10B	40	4.80

FIGURE 2
INCORE Power Distribution - 30%
MILLSTONE UNIT 3 - CYCLE 8

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					.296 3.5	.420 3.7	.453 3.2	.408 3.0	.449 2.7	.418 3.0	.301 3.1				
2			.297 .0	.641 -.2	1.127 -.2	1.320 3.7	1.350 2.9	1.236 2.7	1.338 2.6	1.306 2.9	1.141 1.2	.626 -2.3	.292 -1.7		
3		.295 -.7	1.014 -.7	1.272 .0	1.191 -2.6	1.156 2.7	1.270 1.8	1.345 2.0	1.261 2.1	1.150 2.7	1.221 .2	1.240 -2.3	1.003 -1.8	.294 -1.0	
4		.632 -1.4	1.252 -1.3	.911 -3.0	.994 -2.7	1.196 -2.7	1.234 1.7	1.348 2.1	1.236 2.3	1.232 .7	1.003 -1.4	.909 -3.2	1.246 -2.0	.630 -1.9	
5	.292 .0	1.133 .4	1.222 .2	1.011 -.6	1.142 -2.1	1.118 -2.1	1.181 -.8	1.188 .9	1.200 1.0	1.136 -.4	1.122 -3.9	.987 -3.4	1.213 -.8	1.123 -.5	.290 1.4
6	.411 1.2	1.288 1.5	1.137 1.5	1.226 .2	1.128 -1.1	1.173 -2.5	1.069 -2.1	1.166 -.7	1.097 .5	1.199 -.3	1.119 -2.0	1.210 -1.5	1.129 .3	1.279 .5	.412 1.7
7	.447 2.3	1.330 2.0	1.256 1.7	1.225 1.4	1.189 .1	1.072 -1.7	1.095 -2.3	.966 -2.4	1.101 -1.8	1.073 -1.7	1.174 -1.3	1.230 1.4	1.263 1.3	1.335 1.8	.445 1.4
8	.407 2.8	1.233 2.5	1.345 2.0	1.336 1.2	1.187 .8	1.153 -1.8	.962 -2.8	.766 -3.4	.964 -2.6	1.152 -1.9	1.167 -.8	1.335 1.1	1.336 1.3	1.228 2.1	.404 2.0
9	.452 3.0	1.346 2.6	1.274 2.2	1.223 .8	1.193 .3	1.086 -.5	1.107 -1.2	.969 -2.1	1.078 -3.8	1.066 -2.3	1.177 -.9	1.214 .5	1.241 .5	1.332 2.1	.447 2.3
10	.411 1.5	1.291 1.4	1.153 2.4	1.205 -2.0	1.121 -1.8	1.187 -1.3	1.097 .5	1.163 -.9	1.076 -1.5	1.179 -2.0	1.130 -.9	1.213 -.8	1.111 -.8	1.296 2.1	.414 2.0
11	.287 .3	1.132 .3	1.174 -4.0	1.001 -2.1	1.140 -2.3	1.120 -1.8	1.183 -.4	1.193 1.4	1.213 1.9	1.142 .0	1.148 -1.6	1.001 -1.6	1.206 -1.1	1.137 .8	.295 1.0
12		.644 .3	1.260 -.9	.906 -3.5	.983 -3.3	1.184 -3.2	1.210 .2	1.346 2.0	1.238 2.1	1.230 .1	1.002 -2.0	.926 -1.4	1.268 -.1	.646 .8	
13		.295 -.7	1.011 -1.0	1.245 -1.9	1.184 -2.9	1.102 -1.6	1.238 .2	1.345 2.0	1.275 2.2	1.152 2.3	1.232 .7	1.276 .3	1.026 .5	.299 .7	
14			.294 -1.0	.629 -1.9	1.096 -2.8	1.259 -.8	1.338 2.6	1.235 2.7	1.352 3.0	1.300 2.1	1.149 1.8	.652 1.6	.301 1.3		
15					.284 -2.7	.411 1.2	.451 3.2	.409 3.3	.455 3.6	.414 2.2	.291 1.7				

Measured Power
% Difference (M-P)/P

Measured Location

FIGURE 3

INCORE Power Distribution - 50%

MILLSTONE UNIT 3 - CYCLE 8

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					.301 3.8	.422 3.7	.453 2.7	.410 2.8	.449 2.3	.419 2.7	.305 2.7				
2			.307 .7	.650 .5	1.117 .4	1.284 3.4	1.314 3.0	1.207 2.9	1.305 2.8	1.275 2.8	1.127 1.3	.637 -1.4	.301 -1.3		
3		.305 .0	1.015 -.4	1.263 -.1	1.176 -3.2	1.161 4.1	1.247 2.0	1.316 2.0	1.241 2.3	1.147 3.3	1.220 .7	1.240 -1.7	1.004 -1.5	.302 -1.0	
4		.643 -.5	1.252 -.8	.951 -2.7	1.005 -3.2	1.194 -2.8	1.232 2.2	1.335 2.1	1.233 2.6	1.233 .7	1.024 -.9	.942 -3.6	1.242 -1.7	.638 -1.4	
5	.298 .3	1.118 .5	1.214 .2	1.027 -.6	1.146 -3.0	1.121 -2.7	1.175 -1.8	1.184 .0	1.196 .2	1.143 -.6	1.137 -3.8	1.008 -2.9	1.215 .0	1.117 .4	.299 3.1
6	.415 1.7	1.260 1.6	1.131 1.9	1.229 .3	1.135 -1.3	1.180 -3.1	1.079 -3.1	1.177 -1.6	1.110 -.3	1.211 -.6	1.128 -2.1	1.222 -.6	1.132 1.5	1.262 1.6	.419 2.9
7	.447 1.8	1.297 2.2	1.244 2.6	1.226 2.0	1.192 -.2	1.085 -2.5	1.114 -3.5	.993 -3.7	1.121 -2.9	1.086 -2.5	1.171 -2.1	1.232 2.2	1.251 2.3	1.312 2.8	.452 2.5
8	.409 2.5	1.205 2.7	1.327 2.9	1.331 1.8	1.195 .9	1.167 -2.4	.990 -4.0	.814 -5.3	.991 -3.9	1.165 -2.6	1.169 -1.3	1.330 1.7	1.317 2.1	1.206 2.8	.409 2.5
9	.452 2.5	1.311 2.7	1.264 3.4	1.222 1.3	1.198 .2	1.102 -1.1	1.127 -2.3	.995 -3.5	1.093 -5.3	1.079 -3.1	1.179 -1.3	1.210 .7	1.224 .9	1.303 2.7	.450 2.5
10	.411 1.0	1.251 .7	1.147 2.9	1.199 -2.4	1.127 -2.2	1.195 -1.9	1.114 .1	1.176 -1.7	1.089 -2.2	1.190 -2.3	1.140 -.9	1.212 -1.1	1.097 -1.2	1.258 1.5	.416 2.0
11	.287 -1.0	1.094 -1.6	1.149 -5.4	1.008 -2.9	1.148 -2.9	1.126 -2.1	1.187 -.6	1.199 1.3	1.222 2.2	1.154 .2	1.168 -1.2	1.021 -1.2	1.206 -.4	1.114 .2	.298 .3
12		.636 -1.7	1.245 -1.5	.931 -4.7	.997 -3.5	1.187 -3.1	1.211 .7	1.342 2.6	1.239 2.7	1.232 .2	1.028 -1.0	.963 -1.4	1.270 .6	.649 .5	
13		.302 -1.0	1.004 -1.5	1.238 -1.9	1.181 -2.5	1.102 -.7	1.229 1.3	1.330 3.1	1.263 3.3	1.148 3.0	1.235 1.6	1.278 1.1	1.028 .9	.307 .7	
14			.301 -1.3	.636 -1.5	1.091 -1.9	1.243 .2	1.305 2.8	1.207 2.9	1.316 3.1	1.280 3.1	1.137 2.2	.658 1.7	.309 1.3		
15					.292 -1.7	.419 2.7	.452 3.0	.411 3.0	.455 3.2	.421 3.4	.298 2.8				

Measured Power
% Difference (M-P)/P

Measured Location

FIGURE 4
INCORE Power Distribution - 75%
MILLSTONE UNIT 3 - CYCLE 8

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					.300 3.8	.418 3.7	.443 1.8	.399 1.5	.439 1.4	.417 3.2	.304 3.1				
2			.319 3.2	.676 3.4	1.157 3.4	1.288 3.7	1.291 1.7	1.182 1.5	1.281 1.4	1.268 2.3	1.131 1.1	.643 -1.5	.310 .3		
3		.311 .6	1.049 .6	1.310 1.1	1.205 -1.8	1.128 1.6	1.212 -.1	1.279 .1	1.208 .4	1.124 1.7	1.224 .1	1.271 -1.7	1.045 .2	.316 2.3	
4		.649 -.6	1.283 -.8	1.025 -1.8	1.031 -1.8	1.205 -1.6	1.195 .1	1.305 .7	1.201 1.0	1.227 .6	1.036 -.9	1.017 -2.6	1.287 -.7	.655 .2	
5	.296 .3	1.123 .4	1.226 .2	1.041 -.4	1.165 -1.6	1.125 -1.4	1.165 -1.4	1.165 -.3	1.178 -.2	1.138 -.1	1.157 -2.3	1.026 -2.3	1.213 -1.1	1.107 -1.1	.289 .0
6	.408 1.0	1.257 1.5	1.120 1.4	1.225 .4	1.130 -.8	1.189 -1.5	1.085 -1.5	1.180 -.6	1.104 .3	1.208 .1	1.131 -.9	1.211 -1.1	1.106 -.4	1.237 -.4	.403 .0
7	.442 2.1	1.284 1.7	1.217 1.2	1.200 .9	1.177 -.3	1.091 -.9	1.135 -1.4	1.019 -1.4	1.133 -1.6	1.088 -1.3	1.163 -1.6	1.194 .0	1.211 -.2	1.272 .2	.432 -.7
8	.399 1.5	1.180 1.3	1.286 .6	1.303 .5	1.171 .2	1.178 -.8	1.022 -1.1	.892 -2.1	1.012 -2.0	1.172 -1.3	1.158 -.9	1.299 .2	1.275 -.2	1.176 .9	.397 1.0
9	.441 1.4	1.285 1.2	1.219 .5	1.198 .3	1.182 .0	1.102 .0	1.150 -.1	1.022 -1.1	1.115 -3.1	1.083 -1.6	1.166 -1.2	1.187 -.2	1.192 -.9	1.278 1.2	.439 1.4
10	.403 .0	1.242 .0	1.110 .0	1.204 -1.7	1.124 -1.5	1.196 -.9	1.109 .7	1.182 -.4	1.092 -.9	1.193 -1.2	1.131 -.7	1.210 -.8	1.088 -1.5	1.271 2.6	.415 2.7
11	.289 .0	1.119 .0	1.181 -3.7	1.029 -2.0	1.159 -2.1	1.123 -1.4	1.178 -.2	1.184 1.3	1.202 1.7	1.142 .1	1.180 -.3	1.041 -.4	1.231 .7	1.136 1.5	.300 1.7
12		.654 .0	1.313 1.3	1.006 -3.6	1.013 -3.1	1.186 -2.8	1.186 -.3	1.313 1.3	1.210 1.3	1.227 .2	1.054 .4	1.046 .2	1.337 3.4	.672 2.9	
13		.314 1.6	1.057 1.3	1.283 -.8	1.191 -2.6	1.083 -2.0	1.192 -.9	1.286 .6	1.229 1.3	1.129 1.7	1.253 2.1	1.328 2.5	1.074 3.0	.321 3.9	
14			.313 1.3	.650 -.5	1.089 -2.7	1.218 -1.7	1.273 .8	1.176 .9	1.291 1.7	1.257 1.2	1.139 1.8	.669 2.3	.319 3.2		
15					.288 -2.4	.401 -.7	.438 1.2	.399 1.5	.445 2.3	.408 1.2	.294 1.7				

Measured Power
% Difference (M-P)/P

Measured Location

FIGURE 5

INCORE Power Distribution - 100%

MILLSTONE UNIT 3 - CYCLE 8

	R	P	N	M	L	K	J	H	G	F	E	D	C	B	A
1					.306 4.4	.423 4.4	.443 1.8	.399 1.3	.435 .2	.414 2.0	.305 2.0				
2			.326 2.5	.679 2.6	1.139 2.5	1.273 4.3	1.259 1.3	1.154 1.1	1.246 .8	1.241 1.8	1.111 .0	.639 -3.3	.315 -.9		
3		.317 -.3	1.049 -.4	1.305 .1	1.211 -1.4	1.119 1.4	1.189 -.5	1.250 -.3	1.187 .2	1.120 1.8	1.215 -.8	1.257 -3.5	1.042 -1.0	.322 1.3	
4		.650 -1.7	1.278 -1.8	1.068 -1.8	1.052 -1.4	1.206 -1.4	1.185 .1	1.290 .9	1.194 1.2	1.226 .6	1.046 -1.5	1.054 -3.1	1.281 -1.8	.657 -.8	
5	.299 .0	1.104 -.6	1.213 -1.0	1.051 -1.0	1.181 -1.2	1.133 -1.0	1.170 -.8	1.170 .4	1.184 .5	1.143 .0	1.162 -2.8	1.035 -3.0	1.206 -1.8	1.092 -1.7	.292 -.3
6	.409 .7	1.226 .6	1.110 .9	1.222 .2	1.140 -.3	1.199 -.9	1.102 -.6	1.199 .5	1.119 1.0	1.213 .2	1.134 -1.0	1.203 -1.6	1.095 -.8	1.211 -.8	.405 .0
7	.445 2.5	1.257 1.7	1.198 1.1	1.192 1.0	1.184 .5	1.108 .0	1.163 -.3	1.057 -.2	1.162 -.4	1.105 -.4	1.170 -.8	1.185 .1	1.193 -.2	1.244 .1	.433 -.5
8	.404 2.5	1.162 1.8	1.265 .9	1.293 1.1	1.178 1.1	1.197 .3	1.060 .1	.963 -.5	1.049 -.9	1.191 -.2	1.165 .0	1.286 .5	1.252 -.2	1.155 1.1	.401 1.8
9	.445 2.3	1.263 1.6	1.201 .5	1.195 .9	1.189 .8	1.119 .9	1.178 .9	1.059 .0	1.146 -1.8	1.103 -.5	1.174 -.3	1.182 .2	1.178 -.6	1.255 1.5	.443 2.1
10	.403 -.5	1.215 -.5	1.103 -.1	1.207 -1.3	1.132 -1.1	1.205 -.4	1.125 1.5	1.199 .5	1.109 .0	1.206 -.3	1.143 .0	1.217 -.2	1.089 -1.0	1.259 3.3	.420 3.4
11	.291 -.7	1.100 -1.0	1.184 -3.6	1.051 -1.5	1.171 -2.0	1.130 -1.1	1.179 .1	1.185 1.7	1.200 1.8	1.146 .1	1.188 -.6	1.057 -.5	1.225 .0	1.134 2.1	.306 2.3
12		.656 -.9	1.318 1.1	1.054 -3.1	1.029 -3.1	1.181 -3.1	1.178 -.2	1.297 1.4	1.201 1.4	1.225 .2	1.064 -.3	1.087 -.1	1.329 2.1	.678 2.6	
13		.321 .9	1.064 1.0	1.290 -.9	1.189 -2.9	1.076 -2.2	1.174 -.9	1.262 .6	1.204 .8	1.113 .8	1.237 .7	1.320 1.2	1.072 1.8	.327 2.8	
14			.321 .9	.656 -.8	1.081 -2.7	1.199 -1.6	1.247 .9	1.153 1.0	1.257 1.1	1.220 -.1	1.117 .5	.671 1.4	.325 2.2		
15					.292 -2.3	.405 -.2	.439 1.2	.400 1.5	.442 1.6	.405 .0	.295 .7				

Measured Power
% Difference (M-P)/P

Measured Location