ENCLOSURE

SAN ONOFRE NUCLEAR GENERATING STATION (SONGS)

SONGS-2 CYCLE 15 STARTUP TEST ACTIVITY REDUCTION (STAR) PROGRAM IMPLEMENTATION SUMMARY REPORT

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SONGS-2 CYCLE 15 STAR IMPLEMENTATION SUMMARY REPORT

Introduction

Southern California Edison first applied the Startup Test Activity Reduction (STAR) Program methodology to San Onofre Nuclear Generating Station (SONGS) Unit 2 Cycle 15, which allowed the elimination of Control Element Assembly (CEA) group worth measurements from the Low Power Physics Test (LPPT) Program.

SONGS Technical Specification Surveillance Requirement (SR) 3.1.4.1, "Verify MTC [Moderator Temperature Coefficient] within the upper limit [prior to entering Mode 1 after each fuel loading]," was not changed prior to SONGS-2 Cycle 15 initial criticality; therefore, SR 3.1.4.1 was performed consistent with previous cycles, as allowed by Reference 1.

The SONGS-2 Cycle 15 STAR Implementation Summary Report includes information as required from Condition/Limitation #3 of the NRC safety evaluation of Reference 1, which states,

> "The staff requires each licensee using STAR to submit a summary report following the first application, either successful or not, of STAR to its plant. The report should (a) identify the core design method used, (b) compare the measured and calculated values and the differences between these values to the corresponding core design method uncertainties and (c) show compliance with the STAR applicability requirements. If the application of STAR is unsuccessful, identify the reasons why the STAR application failed."

Core Design Method

The Westinghouse ROCS computer program and Studsvik SIMULATE-3 (SIM-3) computer program were used for the core design and startup test predictions of SONGS-2 Cycle 15, consistent with Reference 2.

STAR Test Results and Associated Uncertainties

Attachment 1 Table 1, "STAR Test Results and Uncertainties," provides results from the SONGS-2 Cycle 15 LPPT Program, consistent with the list of STAR program tests provided in Table 3-3 of Reference 1. All of the measured values were within test acceptance criteria. Differences between measured and predicted (calculated) parameters compared favorably with the core design method uncertainties.

STAR Applicability Requirements

Reference 1 Table 3-4, "STAR Program Applicability Requirements," lists the applicability requirements for use of the STAR program. The STAR applicability requirements involve the following 5 areas: 1) Core Design, 2) Fabrication (Fuel Assembly and Control Element Assembly (CEA)), 3) Refueling, 4) CEA Lifetime, and 5) Startup Testing. Prior to eliminating the CEA group worth measurements from the SONGS-2 Cycle 15 Low Power Physics Test program, all STAR applicability requirements were verified to be met.

Conformance with the Core Design applicability requirements is documented in Reference 3.

Conformance with the Fuel Fabrication applicability requirements is documented in Reference 4.

Conformance with the CEA Fabrication applicability requirements is documented in Reference 5.

Conformance with the Refueling applicability requirements (programmatically) is documented in Reference 3. Reference 6, as performed for SONGS-2 Cycle 15, documents verification of proper CEA coupling based on visual criteria consistent with Reference 1 Table 3-4: 1) weight comparison of coupled vs. uncoupled CEA, 2) visual verification of "7-slot" pin position, 3) visual height comparison of CEA extension shafts, and 4) reweighing of coupled CEA extension shafts by an independent team. Reference 7, as performed for SONGS-2 Cycle 15, documents verification that the fuel assemblies, CEAs, and neutron sources are installed in the proper location and with the correct orientation.

Conformance with the CEA Lifetime applicability requirements is documented in References 8 and 9. The eighty-three full length CEAs used in the SONGS-2 Cycle 15 core are comprised of seventy-five new 5-finger CEAs, four re-used 5-finger CEAs that were new for Cycle 14, and four re-used 4-finger CEAs that were new for Cycle 13. At most, Cycle 15 represents a third cycle of operation for its constituent CEAs. Reference 8 concludes that these CEAs will be within the CEA lifetime requirements throughout Cycle 17 operation. Therefore, all of the full length CEAs utilized in SONGS-2 Cycle 15 are within established limits.

Conformance with the Startup Testing requirement of Critical Boron Concentration within 500 pcm of prediction is documented in Reference 10, as performed for SONGS-2 Cycle 15. Test results are provided in Attachment 1.

Summary

The measured test results for all the required STAR tests in Table 3-3 of Reference 1 were within the test acceptance criteria; all test results compared favorably with the associated core design method uncertainties. Compliance with the STAR applicability requirements was demonstrated. Therefore, all of the requirements to implement STAR for SONGS-2 Cycle 15 were met. STAR was implemented successfully for SONGS-2 Cycle 15.

References

1. WCAP-16011-P-A, Revision 0, "Startup Test Activity Reduction Program," February 2005 (referred to in this report as STAR)
2. SCE-9801-P-A, Reload Analysis Methodology for the San Onofre Nuclear Generating Station Units 2 and 3 [Reload Topical Report], June 1999
3. Calculation NFM-2-PH-1519, SONGS-2 Cycle 15 STAR Core Design/Refueling Requirements, 11/9/2007
4. Memorandum For File, Fuel Assembly Fabrication Verification to Support WCAP-16011-P-A Rev. 0, STAR, Implementation at SONGS Unit 2 Cycle 15, 12/26/2007
5. Memorandum For File, STAR – CEA Fabrication Verification to Support WCAP-16011-P-A Rev. 0, Implementation at SONGS Unit 2 Cycle 15, 12/21/2007
6. Procedure SO23-I-3.46, Remote Five Finger CEA Extension Shaft Coupling, Rev. 4 (EC 4-1), 9/24/2004
7. Procedure SO23-X-7, Nuclear Fuel Movement for Refueling Cycles, Rev 14, 3/30/2007
8. Calculation N-1020-175, CEA Life Limit for Units 2 and 3 Cycles 15 through 17, 5/10/2007
9. Calculation NFM-2-PH-1520, SONGS-2 Cycle 15 Physics RAR Input, 8/3/2007
10. Procedure SO23-XXXVII-1, Low Power Physics Testing, Rev. 5, 12/19/2007

ATTACHMENT 1
TEST RESULTS

TABLE 1
STAR TEST RESULTS AND UNCERTAINTIES

TEST	POWER	MEASURED VALUE	CALCULATED VALUE	DIFFERENCE	TEST CRITERIA	UNCERTAINTY
CEA Drop Time	Shutdown	Drop Time to 90% Inserted: 3.01 sec avg, 3.17 sec max	N/A	N/A	Maximum Allowed: 3.4 sec avg, 3.6 sec max	N/A
CEA Drop time Characteristics	Shutdown	21 (of 91) CEAs identified to be couple checked with reactimeter; couple check of 32 CEAs actually performed with reactimeter; all CEAs verified to be coupled		Procedure and program conservatisms dictated couple checks of 32 CEAs	All CEAs verified to be coupled	N/A
Critical Boron Concentration (CBC)	Hot Zero Power (HZP)	2148 ppm	2140 ppm	8 ppm (55 pcm)	50 ppm (procedural review), 500 pcm (STAR)	± 26 ppm
Moderator Temperature Coefficient (MTC) Alternate Surveillance	HZP	+1.1 pcm/°F	+1.0 pcm/°F	+0.1 pcm/°F	MTC < 5 pcm/°F	± 2.4 pcm/°F
MTC, as measured using Reactimeter	HZP	+0.7 pcm/°F	+1.1 pcm/°F	-0.4 pcm/°F	MTC < 5 pcm/°F; Diff < 3 pcm/°F	± 2.4 pcm/°F
Incore Flux Symmetry	Low (20%)	See Table 2	See Table 2	+4.63% max positive; -7.32% most negative	Relative Power Density (RPD) within ± 10% of prediction for fuel assemblies with RPD > 0.9	N/A

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TEST RESULTS

TABLE 1
STAR TEST RESULTS AND UNCERTAINTIES

TEST	POWER	MEASURED VALUE	CALCULATED VALUE	DIFFERENCE	TEST CRITERIA	UNCERTAINTY
Incore Power Distribution	Intermediate	@ 20% power: See Table 2 @ 80% power: See Table 3 See Table 4 Fq = 1.69; Fxy = 1.47; Fr = 1.44; Fz = 1.17	@ 20% power: See Table 2 @ 80% power: See Table 3 See Table 4 Fq = 1.72; Fxy = 1.49; Fr = 1.46; Fz = 1.19	@ 20% power: 2.15% RMS Radial PD; @ 80% power: 1.30% RMS Radial PD; 4.56% RMS Axial PD; -1.7%; -1.0%; -1.4% -1.9%	< 5% RMS < 5% RMS < 5% RMS < ± 10% < ± 10% < ± 10% < ± 10%	N/A N/A N/A ± 5.93%; ± 5.46%; ± 4.24%; N/A
Isothermal Temperature Coefficient (ITC)	Intermediate to Hot Full Power (HFP)	-7.8 pcm°F	-9.7pcm/°F	+1.9 pcm/°F	Diff < 3 pcm/°F	± 2.4 pcm/°F
MTC Surveillance	Intermediate to HFP	-4.7 pcm/°F @ 70% power; -7.4 pcm/°F @ 100% power; -36.3 pcm/°F @ EOC 100% (from HZP test); -34.0 pcm/°F @ EOC 100% (from 33 EFPD HFP test)	-4.3 pcm/°F -7.0 pcm/°F -35.9 pcm/°F -35.9 pcm/°F	-0.4 pcm/°F -0.4 pcm/°F -0.4 pcm/°F +1.9 pcm/°F	< -0.6 pcm/°F < -3.0 pcm/°F > -37 pcm/°F > -37 pcm/°F	± 2.4 pcm/°F

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TEST RESULTS

TABLE 1
STAR TEST RESULTS AND UNCERTAINTIES

TEST	POWER	MEASURED VALUE	CALCULATED VALUE	DIFFERENCE	TEST CRITERIA	UNCERTAINTY
Incore Power Distribution	HFP	See Table 5	See Table 5	1.18% RMS Radial PD;	< 5% RMS	N/A
		See Table 6	See Table 6	2.52% RMS Axial PD;	< 5% RMS	N/A
		Fq = 1.68;	Fq = 1.70;	-1.2%;	< ± 10%	± 5.93%;
		Fxy = 1.47;	Fxy = 1.48;	-0.7%;	< ± 10%	± 5.46%;
		Fr = 1.44;	Fr = 1.46;	-1.4%	< ± 10%	± 4.24%;
		Fz = 1.16	Fz = 1.18	-1.7%	< ± 10%	N/A
Δ CBC HZP – HFP	HFP	525 ppm	505 ppm	+20 ppm	± 75 ppm	± 26 ppm

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TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

PREDICTED RELATIVE POWER DENSITIES

Assy # / RPD														
					1 0.393	2 0.796	3 0.795	4 0.393						
			5 0.222	6 0.535	7 0.886	8 1.083	9 0.953	10 1.082	11 0.886	12 0.535	13 0.222			
		14 0.307	15 0.798	16 0.993	17 1.202	18 1.176	19 1.309	20 1.175	21 1.201	22 0.993	23 0.798	24 0.307		
	25 0.307	26 0.582	27 1.012	28 1.208	29 1.096	30 1.347	31 1.171	32 1.345	33 1.095	34 1.207	35 1.012	36 0.582	37 0.307	
38 0.222	39 0.798	40 1.012	41 0.942	42 1.103	43 1.33	44 1.174	45 1.367	46 1.173	47 1.329	48 1.102	49 0.942	50 1.012	51 0.798	52 0.222
53 0.535	54 0.993	55 1.207	56 1.102	57 1.31	58 1.161	59 1.35	60 1.142	61 1.349	62 1.159	63 1.31	64 1.103	65 1.208	66 0.993	67 0.535
68 0.886	69 1.201	70 1.095	71 1.329	72 1.159	73 1.333	74 1.11	75 1.296	76 1.109	77 1.333	78 1.161	79 1.33	80 1.096	81 1.202	82 0.886
83 0.393	85 1.082	86 1.175	87 1.345	88 1.173	89 1.349	90 1.109	91 1.211	92 0.893	93 1.211	94 1.11	95 1.35	96 1.174	97 1.347	98 1.176	99 1.083	84 0.393
100 0.795	102 0.953	103 1.309	104 1.171	105 1.367	106 1.142	107 1.296	108 0.893	109 0.775	110 0.893	111 1.296	112 1.142	113 1.367	114 1.171	115 1.309	116 0.953	101 0.796
117 0.796	119 1.083	120 1.176	121 1.347	122 1.174	123 1.35	124 1.11	125 1.211	126 0.893	127 1.211	128 1.109	129 1.349	130 1.173	131 1.345	132 1.175	133 1.082	118 0.795
134 0.393	136 0.886	137 1.202	138 1.096	139 1.33	140 1.161	141 1.333	142 1.109	143 1.296	144 1.11	145 1.333	146 1.159	147 1.329	148 1.095	149 1.201	150 0.886	135 0.393
	151 0.535	152 0.993	153 1.208	154 1.103	155 1.31	156 1.159	157 1.349	158 1.142	159 1.35	160 1.161	161 1.31	162 1.102	163 1.207	164 0.993	165 0.535	
	166 0.222	167 0.798	168 1.012	169 0.942	170 1.102	171 1.329	172 1.173	173 1.367	174 1.174	175 1.33	176 1.103	177 0.942	178 1.012	179 0.798	180 0.222	
		181 0.307	182 0.582	183 1.012	184 1.207	185 1.095	186 1.345	187 1.171	188 1.347	189 1.096	190 1.208	191 1.012	192 0.582	193 0.307		
			194 0.307	195 0.798	196 0.993	197 1.201	198 1.175	199 1.309	200 1.176	201 1.202	202 0.993	203 0.798	204 0.307			
				205 0.222	206 0.535	207 0.886	208 1.082	209 0.953	210 1.083	211 0.886	212 0.535	213 0.222				
					214 0.393	215 0.795	216 0.796	217 0.393						

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TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

MEASURED RELATIVE POWER DENSITIES

Assy # / RPD														
						1 0.405	2 0.802	3 0.803	4 0.407					
			5 0.215	6 0.548	7 0.913	8 1.089	9 0.958	10 1.094	11 0.923	12 0.559	13 0.231			
		14 0.325	15 0.823	16 1.024	17 1.2	18 1.182	19 1.296	20 1.189	21 1.215	22 1.039	23 0.837	24 0.329		
	25 0.313	26 0.614	27 1.044	28 1.209	29 1.078	30 1.318	31 1.176	32 1.324	33 1.096	34 1.225	35 1.055	36 0.622	37 0.318	
38 0.222	39 0.804	40 1.022	41 0.972	42 1.119	43 1.303	44 1.158	45 1.271	46 1.161	47 1.31	48 1.13	49 0.985	50 1.035	51 0.815	52 0.224
53 0.532	54 0.994	55 1.196	56 1.102	57 1.294	58 1.16	59 1.319	60 1.133	61 1.318	62 1.152	63 1.303	64 1.121	65 1.212	66 1.007	67 0.537
68 0.875	69 1.19	70 1.1	71 1.307	72 1.162	73 1.315	74 1.116	75 1.275	76 1.116	77 1.315	78 1.168	79 1.319	80 1.112	81 1.202	82 0.879
83 0.398	85 1.082	86 1.192	87 1.322	88 1.165	89 1.323	90 1.118	91 1.199	92 0.886	93 1.198	94 1.121	95 1.326	96 1.168	97 1.334	98 1.205	99 1.087	84 0.393
100 0.799	102 0.97	103 1.295	104 1.159	105 1.269	106 1.134	107 1.283	108 0.898	109 0.781	110 0.892	111 1.278	112 1.133	113 1.274	114 1.165	115 1.302	116 0.974	101 0.801
117 0.795	119 1.074	120 1.181	121 1.322	122 1.168	123 1.328	124 1.127	125 1.204	126 0.889	127 1.197	128 1.113	129 1.325	130 1.175	131 1.324	132 1.183	133 1.076	118 0.798
134 0.386	136 0.868	137 1.187	138 1.104	139 1.315	140 1.168	141 1.32	142 1.121	143 1.28	144 1.118	145 1.315	146 1.163	147 1.312	148 1.099	149 1.184	150 0.868	135 0.39
	151 0.53	152 0.997	153 1.203	154 1.116	155 1.303	156 1.158	157 1.323	158 1.139	159 1.321	160 1.162	161 1.297	162 1.107	163 1.195	164 0.99	165 0.529	
	166 0.221	167 0.804	168 1.028	169 0.983	170 1.131	171 1.317	172 1.16	173 1.267	174 1.156	175 1.304	176 1.119	177 0.972	178 1.019	179 0.801	180 0.22	
		181 0.305	182 0.618	183 1.058	184 1.229	185 1.114	186 1.322	187 1.164	188 1.314	189 1.082	190 1.208	191 1.035	192 0.612	193 0.311		
			194 0.327	195 0.831	196 1.031	197 1.2	198 1.177	199 1.285	200 1.182	201 1.2	202 1.024	203 0.822	204 0.324			
				205 0.221	206 0.542	207 0.875	208 1.068	209 0.946	210 1.081	211 0.908	212 0.549	213 0.224				
						214 0.394	215 0.788	216 0.793	217 0.402							

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TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
1	0.405	0.393	0.012	0.0305
2	0.802	0.796	0.006	0.0075
3	0.803	0.795	0.008	0.0101
4	0.407	0.393	0.014	0.0356
5	0.215	0.222	-0.007	-0.0315
6	0.548	0.535	0.013	0.0243
7	0.913	0.886	0.027	0.0305
8	1.089	1.083	0.006	0.0055
9	0.958	0.953	0.005	0.0052
10	1.094	1.082	0.012	0.0111
11	0.923	0.886	0.037	0.0418
12	0.559	0.535	0.024	0.0449
13	0.231	0.222	0.009	0.0405
14	0.325	0.307	0.018	0.0586
15	0.823	0.798	0.025	0.0313
16	1.024	0.993	0.031	0.0312
17	1.2	1.202	-0.002	-0.0017
18	1.182	1.176	0.006	0.0051
19	1.296	1.309	-0.013	-0.0099
20	1.189	1.175	0.014	0.0119
21	1.215	1.201	0.014	0.0117
22	1.039	0.993	0.046	**0.0463**
23	0.837	0.798	0.039	0.0489
24	0.329	0.307	0.022	0.0717
25	0.313	0.307	0.006	0.0195
26	0.614	0.582	0.032	0.055
27	1.044	1.012	0.032	0.0316
28	1.209	1.208	0.001	0.0008
29	1.078	1.096	-0.018	-0.0164
30	1.318	1.347	-0.029	-0.0215
31	1.176	1.171	0.005	0.0043
32	1.324	1.345	-0.021	-0.0156
33	1.096	1.095	0.001	0.0009
34	1.225	1.207	0.018	0.0149
35	1.055	1.012	0.043	0.0425
36	0.622	0.582	0.04	0.0687
37	0.318	0.307	0.011	0.0358
38	0.222	0.222	0	0
39	0.804	0.798	0.006	0.0075
40	1.022	1.012	0.01	0.0099

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TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
41	0.972	0.942	0.03	0.0318
42	1.119	1.103	0.016	0.0145
43	1.303	1.33	-0.027	-0.0203
44	1.158	1.174	-0.016	-0.0136
45	1.271	1.367	-0.096	-0.0702
46	1.161	1.173	-0.012	-0.0102
47	1.31	1.329	-0.019	-0.0143
48	1.13	1.102	0.028	0.0254
49	0.985	0.942	0.043	0.0456
50	1.035	1.012	0.023	0.0227
51	0.815	0.798	0.017	0.0213
52	0.224	0.222	0.002	0.009
53	0.532	0.535	-0.003	-0.0056
54	0.994	0.993	0.001	0.001
55	1.196	1.207	-0.011	-0.0091
56	1.102	1.102	0	0
57	1.294	1.31	-0.016	-0.0122
58	1.16	1.161	-0.001	-0.0009
59	1.319	1.35	-0.031	-0.023
60	1.133	1.142	-0.009	-0.0079
61	1.318	1.349	-0.031	-0.023
62	1.152	1.159	-0.007	-0.006
63	1.303	1.31	-0.007	-0.0053
64	1.121	1.103	0.018	0.0163
65	1.212	1.208	0.004	0.0033
66	1.007	0.993	0.014	0.0141
67	0.537	0.535	0.002	0.0037
68	0.875	0.886	-0.011	-0.0124
69	1.19	1.201	-0.011	-0.0092
70	1.1	1.095	0.005	0.0046
71	1.307	1.329	-0.022	-0.0166
72	1.162	1.159	0.003	0.0026
73	1.315	1.333	-0.018	-0.0135
74	1.116	1.11	0.006	0.0054
75	1.275	1.296	-0.021	-0.0162
76	1.116	1.109	0.007	0.0063
77	1.315	1.333	-0.018	-0.0135
78	1.168	1.161	0.007	0.006
79	1.319	1.33	-0.011	-0.0083
80	1.112	1.096	0.016	0.0146

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TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
81	1.202	1.202	0	0
82	0.879	0.886	-0.007	-0.0079
83	0.398	0.393	0.005	0.0127
84	0.393	0.393	0	0
85	1.082	1.082	0	0
86	1.192	1.175	0.017	0.0145
87	1.322	1.345	-0.023	-0.0171
88	1.165	1.173	-0.008	-0.0068
89	1.323	1.349	-0.026	-0.0193
90	1.118	1.109	0.009	0.0081
91	1.199	1.211	-0.012	-0.0099
92	0.886	0.893	-0.007	-0.0078
93	1.198	1.211	-0.013	-0.0107
94	1.121	1.11	0.011	0.0099
95	1.326	1.35	-0.024	-0.0178
96	1.168	1.174	-0.006	-0.0051
97	1.334	1.347	-0.013	-0.0097
98	1.205	1.176	0.029	0.0247
99	1.087	1.083	0.004	0.0037
100	0.799	0.795	0.004	0.005
101	0.801	0.796	0.005	0.0063
102	0.97	0.953	0.017	0.0178
103	1.295	1.309	-0.014	-0.0107
104	1.159	1.171	-0.012	-0.0102
105	1.269	1.367	-0.098	-0.0717
106	1.134	1.142	-0.008	-0.007
107	1.283	1.296	-0.013	-0.01
108	0.898	0.893	0.005	0.0056
109	0.781	0.775	0.006	0.0077
110	0.892	0.893	-0.001	-0.0011
111	1.278	1.296	-0.018	-0.0139
112	1.133	1.142	-0.009	-0.0079
113	1.274	1.367	-0.093	-0.068
114	1.165	1.171	-0.006	-0.0051
115	1.302	1.309	-0.007	-0.0053
116	0.974	0.953	0.021	0.022
117	0.795	0.796	-0.001	-0.0013
118	0.798	0.795	0.003	0.0038
119	1.074	1.083	-0.009	-0.0083
120	1.181	1.176	0.005	0.0043

ATTACHMENT 1
TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
121	1.322	1.347	-0.025	-0.0186
122	1.168	1.174	-0.006	-0.0051
123	1.328	1.35	-0.022	-0.0163
124	1.127	1.11	0.017	0.0153
125	1.204	1.211	-0.007	-0.0058
126	0.889	0.893	-0.004	-0.0045
127	1.197	1.211	-0.014	-0.0116
128	1.113	1.109	0.004	0.0036
129	1.325	1.349	-0.024	-0.0178
130	1.175	1.173	0.002	0.0017
131	1.324	1.345	-0.021	-0.0156
132	1.183	1.175	0.008	0.0068
133	1.076	1.082	-0.006	-0.0055
134	0.386	0.393	-0.007	-0.0178
135	0.39	0.393	-0.003	-0.0076
136	0.868	0.886	-0.018	-0.0203
137	1.187	1.202	-0.015	-0.0125
138	1.104	1.096	0.008	0.0073
139	1.315	1.33	-0.015	-0.0113
140	1.168	1.161	0.007	0.006
141	1.32	1.333	-0.013	-0.0098
142	1.121	1.109	0.012	0.0108
143	1.28	1.296	-0.016	-0.0123
144	1.118	1.11	0.008	0.0072
145	1.315	1.333	-0.018	-0.0135
146	1.163	1.159	0.004	0.0035
147	1.312	1.329	-0.017	-0.0128
148	1.099	1.095	0.004	0.0037
149	1.184	1.201	-0.017	-0.0142
150	0.868	0.886	-0.018	-0.0203
151	0.53	0.535	-0.005	-0.0093
152	0.997	0.993	0.004	0.004
153	1.203	1.208	-0.005	-0.0041
154	1.116	1.103	0.013	0.0118
155	1.303	1.31	-0.007	-0.0053
156	1.158	1.159	-0.001	-0.0009
157	1.323	1.349	-0.026	-0.0193
158	1.139	1.142	-0.003	-0.0026
159	1.321	1.35	-0.029	-0.0215
160	1.162	1.161	0.001	0.0009

ATTACHMENT 1
TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
161	1.297	1.31	-0.013	-0.0099
162	1.107	1.102	0.005	0.0045
163	1.195	1.207	-0.012	-0.0099
164	0.99	0.993	-0.003	-0.003
165	0.529	0.535	-0.006	-0.0112
166	0.221	0.222	-0.001	-0.0045
167	0.804	0.798	0.006	0.0075
168	1.028	1.012	0.016	0.0158
169	0.983	0.942	0.041	0.0435
170	1.131	1.102	0.029	0.0263
171	1.317	1.329	-0.012	-0.009
172	1.16	1.173	-0.013	-0.0111
173	1.267	1.367	-0.1	**-0.0732**
174	1.156	1.174	-0.018	-0.0153
175	1.304	1.33	-0.026	-0.0195
176	1.119	1.103	0.016	0.0145
177	0.972	0.942	0.03	0.0318
178	1.019	1.012	0.007	0.0069
179	0.801	0.798	0.003	0.0038
180	0.22	0.222	-0.002	-0.009
181	0.305	0.307	-0.002	-0.0065
182	0.618	0.582	0.036	0.0619
183	1.058	1.012	0.046	0.0455
184	1.229	1.207	0.022	0.0182
185	1.114	1.095	0.019	0.0174
186	1.322	1.345	-0.023	-0.0171
187	1.164	1.171	-0.007	-0.006
188	1.314	1.347	-0.033	-0.0245
189	1.082	1.096	-0.014	-0.0128
190	1.208	1.208	0	0
191	1.035	1.012	0.023	0.0227
192	0.612	0.582	0.03	0.0515
193	0.311	0.307	0.004	0.013
194	0.327	0.307	0.02	0.0651
195	0.831	0.798	0.033	0.0414
196	1.031	0.993	0.038	0.0383
197	1.2	1.201	-0.001	-0.0008
198	1.177	1.175	0.002	0.0017
199	1.285	1.309	-0.024	-0.0183
200	1.182	1.176	0.006	0.0051

ATTACHMENT 1
TEST RESULTS

TABLE 2
20% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
201	1.2	1.202	-0.002	-0.0017
202	1.024	0.993	0.031	0.0312
203	0.822	0.798	0.024	0.0301
204	0.324	0.307	0.017	0.0554
205	0.221	0.222	-0.001	-0.0045
206	0.542	0.535	0.007	0.0131
207	0.875	0.886	-0.011	-0.0124
208	1.068	1.082	-0.014	-0.0129
209	0.946	0.953	-0.007	-0.0073
210	1.081	1.083	-0.002	-0.0018
211	0.908	0.886	0.022	0.0248
212	0.549	0.535	0.014	0.0262
213	0.224	0.222	0.002	0.009
214	0.394	0.393	0.001	0.0025
215	0.788	0.795	-0.007	-0.0088
216	0.793	0.796	-0.003	-0.0038
217	0.402	0.393	0.009	0.0229

SUM OF THE SQUARES OF THE DIFFERENCES = .1002
RMS ERROR = .0215

ALL BUNDLE POWERS MEET THE ACCEPTANCE CRITERIA

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

PREDICTED RELATIVE POWER DENSITIES

Assy # / RPD														
					1 0.395	2 0.800	3 0.800	4 0.394						
			5 0.220	6 0.535	7 0.880	8 1.088	9 0.970	10 1.086	11 0.880	12 0.535	13 0.220			
		14 0.317	15 0.817	16 1.020	17 1.205	18 1.192	19 1.307	20 1.190	21 1.204	22 1.020	23 0.817	24 0.317		
	25 0.317	26 0.606	27 1.031	28 1.217	29 1.106	30 1.338	31 1.177	32 1.336	33 1.105	34 1.216	35 1.031	36 0.606	37 0.317	
38 0.220	39 0.817	40 1.031	41 0.966	42 1.116	43 1.317	44 1.170	45 1.346	46 1.169	47 1.316	48 1.116	49 0.966	50 1.031	51 0.817	52 0.220
53 0.535	54 1.020	55 1.216	56 1.116	57 1.299	58 1.153	59 1.322	60 1.131	61 1.321	62 1.152	63 1.299	64 1.116	65 1.217	66 1.020	67 0.535
68 0.880	69 1.204	70 1.105	71 1.316	72 1.152	73 1.303	74 1.095	75 1.261	76 1.094	77 1.303	78 1.153	79 1.317	80 1.106	81 1.205	82 0.880
83 0.394	85 1.086	86 1.190	87 1.336	88 1.169	89 1.321	90 1.094	91 1.175	92 0.868	93 1.175	94 1.095	95 1.322	96 1.170	97 1.338	98 1.192	99 1.088	84 0.395
100 0.800	102 0.970	103 1.307	104 1.177	105 1.346	106 1.131	107 1.261	108 0.868	109 0.753	110 0.868	111 1.261	112 1.131	113 1.346	114 1.177	115 1.307	116 0.970	101 0.800
117 0.800	119 1.088	120 1.192	121 1.338	122 1.170	123 1.322	124 1.095	125 1.175	126 0.868	127 1.175	128 1.094	129 1.321	130 1.169	131 1.336	132 1.190	133 1.086	118 0.800
134 0.395	136 0.880	137 1.205	138 1.106	139 1.317	140 1.153	141 1.303	142 1.094	143 1.261	144 1.095	145 1.303	146 1.152	147 1.316	148 1.105	149 1.204	150 0.880	135 0.394
	151 0.535	152 1.020	153 1.217	154 1.116	155 1.299	156 1.152	157 1.321	158 1.131	159 1.322	160 1.153	161 1.299	162 1.116	163 1.216	164 1.020	165 0.535	
	166 0.220	167 0.817	168 1.031	169 0.966	170 1.116	171 1.316	172 1.169	173 1.346	174 1.170	175 1.317	176 1.116	177 0.966	178 1.031	179 0.817	180 0.220	
		181 0.317	182 0.606	183 1.031	184 1.216	185 1.105	186 1.336	187 1.177	188 1.338	189 1.106	190 1.217	191 1.031	192 0.606	193 0.317		
			194 0.317	195 0.817	196 1.020	197 1.204	198 1.190	199 1.307	200 1.192	201 1.205	202 1.020	203 0.817	204 0.317			
				205 0.220	206 0.535	207 0.880	208 1.086	209 0.970	210 1.088	211 0.880	212 0.535	213 0.220				
					214 0.394	215 0.800	216 0.800	217 0.395						

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

MEASURED RELATIVE POWER DENSITIES

Assy # / RPD														
					1 0.405	2 0.802	3 0.803	4 0.406						
			5 0.229	6 0.553	7 0.926	8 1.096	9 0.963	10 1.098	11 0.931	12 0.558	13 0.234			
		14 0.327	15 0.833	16 1.031	17 1.209	18 1.182	19 1.294	20 1.186	21 1.216	22 1.039	23 0.842	24 0.33		
	25 0.325	26 0.62	27 1.061	28 1.217	29 1.08	30 1.32	31 1.164	32 1.322	33 1.086	34 1.227	35 1.073	36 0.627	37 0.329	
38 0.222	39 0.815	40 1.028	41 0.971	42 1.112	43 1.298	44 1.163	45 1.333	46 1.166	47 1.303	48 1.121	49 0.982	50 1.039	51 0.824	52 0.224
53 0.536	54 1.013	55 1.2	56 1.092	57 1.28	58 1.14	59 1.311	60 1.124	61 1.312	62 1.138	63 1.288	64 1.105	65 1.214	66 1.026	67 0.539
68 0.88	69 1.193	70 1.093	71 1.294	72 1.145	73 1.295	74 1.102	75 1.265	76 1.102	77 1.299	78 1.152	79 1.306	80 1.104	81 1.202	82 0.882
83 0.407	85 1.085	86 1.179	87 1.318	88 1.152	89 1.311	90 1.098	91 1.186	92 0.89	93 1.187	94 1.102	95 1.317	96 1.161	97 1.328	98 1.186	99 1.087	84 0.403
100 0.801	102 0.972	103 1.294	104 1.165	105 1.329	106 1.131	107 1.264	108 0.884	109 0.776	110 0.882	111 1.266	112 1.134	113 1.333	114 1.168	115 1.294	116 0.971	101 0.801
117 0.8	119 1.083	120 1.179	121 1.321	122 1.153	123 1.312	124 1.1	125 1.19	126 0.898	127 1.191	128 1.104	129 1.314	130 1.153	131 1.316	132 1.17	133 1.079	118 0.799
134 0.4	136 0.878	137 1.195	138 1.097	139 1.299	140 1.149	141 1.299	142 1.106	143 1.271	144 1.107	145 1.301	146 1.148	147 1.297	148 1.092	149 1.189	150 0.875	135 0.402
	151 0.536	152 1.019	153 1.207	154 1.1	155 1.287	156 1.143	157 1.316	158 1.128	159 1.316	160 1.145	161 1.285	162 1.099	163 1.202	164 1.014	165 0.535	
	166 0.223	167 0.818	168 1.033	169 0.977	170 1.121	171 1.311	172 1.169	173 1.337	174 1.167	175 1.303	176 1.114	177 0.97	178 1.027	179 0.815	180 0.222	
		181 0.325	182 0.622	183 1.065	184 1.228	185 1.109	186 1.328	187 1.167	188 1.326	189 1.088	190 1.214	191 1.046	192 0.617	193 0.327		
			194 0.327	195 0.834	196 1.029	197 1.201	198 1.178	199 1.293	200 1.188	201 1.21	202 1.028	203 0.827	204 0.325			
				205 0.228	206 0.54	207 0.876	208 1.074	209 0.958	210 1.092	211 0.92	212 0.551	213 0.23				
					214 0.393	215 0.791	216 0.797	217 0.402						

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
1	0.405	0.3946	0.0104	0.0264
2	0.802	0.8004	0.0016	0.002
3	0.803	0.7996	0.0034	0.0043
4	0.406	0.3942	0.0118	0.0299
5	0.229	0.2199	0.0091	0.0414
6	0.553	0.5349	0.0181	0.0338
7	0.926	0.8804	0.0456	0.0518
8	1.096	1.0877	0.0083	0.0076
9	0.963	0.9705	-0.0075	-0.0077
10	1.098	1.0863	0.0117	0.0108
11	0.931	0.8799	0.0511	0.0581
12	0.558	0.5355	0.0225	0.042
13	0.234	0.2201	0.0139	0.0632
14	0.327	0.3173	0.0097	0.0306
15	0.833	0.817	0.016	0.0196
16	1.031	1.02	0.011	0.0108
17	1.209	1.2053	0.0037	0.0031
18	1.182	1.1919	-0.0099	-0.0083
19	1.294	1.3067	-0.0127	-0.0097
20	1.186	1.1902	-0.0042	-0.0035
21	1.216	1.2042	0.0118	0.0098
22	1.039	1.02	0.019	0.0186
23	0.842	0.8168	0.0252	0.0309
24	0.33	0.3171	0.0129	0.0407
25	0.325	0.3171	0.0079	0.0249
26	0.62	0.6056	0.0144	0.0238
27	1.061	1.0309	0.0301	0.0292
28	1.217	1.2168	0.0002	0.0002
29	1.08	1.1062	-0.0262	-0.0237
30	1.32	1.3384	-0.0184	-0.0137
31	1.164	1.1769	-0.0129	-0.011
32	1.322	1.3356	-0.0136	-0.0102
33	1.086	1.1048	-0.0188	-0.017
34	1.227	1.2163	0.0107	0.0088
35	1.073	1.0305	0.0425	0.0412
36	0.627	0.6056	0.0214	0.0353
37	0.329	0.3173	0.0117	0.0369
38	0.222	0.2201	0.0019	0.0086
39	0.815	0.8168	-0.0018	-0.0022
40	1.028	1.0305	-0.0025	-0.0024

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
41	0.971	0.9657	0.0053	0.0055
42	1.112	1.1161	-0.0041	-0.0037
43	1.298	1.3171	-0.0191	-0.0145
44	1.163	1.1702	-0.0072	-0.0062
45	1.333	1.3461	-0.0131	-0.0097
46	1.166	1.1688	-0.0028	-0.0024
47	1.303	1.3159	-0.0129	-0.0098
48	1.121	1.1161	0.0049	0.0044
49	0.982	0.9657	0.0163	0.0169
50	1.039	1.0309	0.0081	0.0079
51	0.824	0.817	0.007	0.0086
52	0.224	0.2199	0.0041	0.0186
53	0.536	0.5355	0.0005	0.0009
54	1.013	1.02	-0.007	-0.0069
55	1.2	1.2163	-0.0163	-0.0134
56	1.092	1.1161	-0.0241	-0.0216
57	1.28	1.2991	-0.0191	-0.0147
58	1.14	1.1531	-0.0131	-0.0114
59	1.311	1.3221	-0.0111	-0.0084
60	1.124	1.131	-0.007	-0.0062
61	1.312	1.3213	-0.0093	-0.007
62	1.138	1.1516	-0.0136	-0.0118
63	1.288	1.2991	-0.0111	-0.0085
64	1.105	1.1161	-0.0111	-0.0099
65	1.214	1.2168	-0.0028	-0.0023
66	1.026	1.02	0.006	0.0059
67	0.539	0.5349	0.0041	0.0077
68	0.88	0.8799	0.0001	0.0001
69	1.193	1.2042	-0.0112	-0.0093
70	1.093	1.1048	-0.0118	-0.0107
71	1.294	1.3159	-0.0219	-0.0166
72	1.145	1.1516	-0.0066	-0.0057
73	1.295	1.3033	-0.0083	-0.0064
74	1.102	1.0947	0.0073	0.0067
75	1.265	1.2609	0.0041	0.0033
76	1.102	1.0937	0.0083	0.0076
77	1.299	1.3033	-0.0043	-0.0033
78	1.152	1.1531	-0.0011	-0.001
79	1.306	1.3171	-0.0111	-0.0084
80	1.104	1.1062	-0.0022	-0.002

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
81	1.202	1.2053	-0.0033	-0.0027
82	0.882	0.8804	0.0016	0.0018
83	0.407	0.3942	0.0128	0.0325
84	0.403	0.3946	0.0084	0.0213
85	1.085	1.0863	-0.0013	-0.0012
86	1.179	1.1902	-0.0112	-0.0094
87	1.318	1.3356	-0.0176	-0.0132
88	1.152	1.1688	-0.0168	-0.0144
89	1.311	1.3213	-0.0103	-0.0078
90	1.098	1.0937	0.0043	0.0039
91	1.186	1.1749	0.0111	0.0094
92	0.89	0.8675	0.0225	0.0259
93	1.187	1.1749	0.0121	0.0103
94	1.102	1.0947	0.0073	0.0067
95	1.317	1.3221	-0.0051	-0.0039
96	1.161	1.1702	-0.0092	-0.0079
97	1.328	1.3384	-0.0104	-0.0078
98	1.186	1.1919	-0.0059	-0.005
99	1.087	1.0877	-0.0007	-0.0006
100	0.801	0.7996	0.0014	0.0018
101	0.801	0.8004	0.0006	0.0007
102	0.972	0.9705	0.0015	0.0015
103	1.294	1.3067	-0.0127	-0.0097
104	1.165	1.1769	-0.0119	-0.0101
105	1.329	1.3461	-0.0171	-0.0127
106	1.131	1.131	0	0
107	1.264	1.2609	0.0031	0.0025
108	0.884	0.8675	0.0165	0.019
109	0.776	0.7528	0.0232	0.0308
110	0.882	0.8675	0.0145	0.0167
111	1.266	1.2609	0.0051	0.004
112	1.134	1.131	0.003	0.0027
113	1.333	1.3461	-0.0131	-0.0097
114	1.168	1.1769	-0.0089	-0.0076
115	1.294	1.3067	-0.0127	-0.0097
116	0.971	0.9705	0.0005	0.0005
117	0.8	0.8004	-0.0004	-0.0005
118	0.799	0.7996	-0.0006	-0.0008
119	1.083	1.0877	-0.0047	-0.0043
120	1.179	1.1919	-0.0129	-0.0108

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
121	1.321	1.3384	-0.0174	-0.013
122	1.153	1.1702	-0.0172	-0.0147
123	1.312	1.3221	-0.0101	-0.0076
124	1.1	1.0947	0.0053	0.0048
125	1.19	1.1749	0.0151	0.0129
126	0.898	0.8675	0.0305	0.0352
127	1.191	1.1749	0.0161	0.0137
128	1.104	1.0937	0.0103	0.0094
129	1.314	1.3213	-0.0073	-0.0055
130	1.153	1.1688	-0.0158	-0.0135
131	1.316	1.3356	-0.0196	-0.0147
132	1.17	1.1902	-0.0202	-0.017
133	1.079	1.0863	-0.0073	-0.0067
134	0.4	0.3946	0.0054	0.0137
135	0.402	0.3942	0.0078	0.0198
136	0.878	0.8804	-0.0024	-0.0027
137	1.195	1.2053	-0.0103	-0.0085
138	1.097	1.1062	-0.0092	-0.0083
139	1.299	1.3171	-0.0181	-0.0137
140	1.149	1.1531	-0.0041	-0.0036
141	1.299	1.3033	-0.0043	-0.0033
142	1.106	1.0937	0.0123	0.0112
143	1.271	1.2609	0.0101	0.008
144	1.107	1.0947	0.0123	0.0112
145	1.301	1.3033	-0.0023	-0.0018
146	1.148	1.1516	-0.0036	-0.0031
147	1.297	1.3159	-0.0189	-0.0144
148	1.092	1.1048	-0.0128	-0.0116
149	1.189	1.2042	-0.0152	-0.0126
150	0.875	0.8799	-0.0049	-0.0056
151	0.536	0.5349	0.0011	0.0021
152	1.019	1.02	-0.001	-0.001
153	1.207	1.2168	-0.0098	-0.0081
154	1.1	1.1161	-0.0161	-0.0144
155	1.287	1.2991	-0.0121	-0.0093
156	1.143	1.1516	-0.0086	-0.0075
157	1.316	1.3213	-0.0053	-0.004
158	1.128	1.131	-0.003	-0.0027
159	1.316	1.3221	-0.0061	-0.0046
160	1.145	1.1531	-0.0081	-0.007

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
161	1.285	1.2991	-0.0141	-0.0109
162	1.099	1.1161	-0.0171	-0.0153
163	1.202	1.2163	-0.0143	-0.0118
164	1.014	1.02	-0.006	-0.0059
165	0.535	0.5355	-0.0005	-0.0009
166	0.223	0.2199	0.0031	0.0141
167	0.818	0.817	0.001	0.0012
168	1.033	1.0309	0.0021	0.002
169	0.977	0.9657	0.0113	0.0117
170	1.121	1.1161	0.0049	0.0044
171	1.311	1.3159	-0.0049	-0.0037
172	1.169	1.1688	0.0002	0.0002
173	1.337	1.3461	-0.0091	-0.0068
174	1.167	1.1702	-0.0032	-0.0027
175	1.303	1.3171	-0.0141	-0.0107
176	1.114	1.1161	-0.0021	-0.0019
177	0.97	0.9657	0.0043	0.0045
178	1.027	1.0305	-0.0035	-0.0034
179	0.815	0.8168	-0.0018	-0.0022
180	0.222	0.2201	0.0019	0.0086
181	0.325	0.3173	0.0077	0.0243
182	0.622	0.6056	0.0164	0.0271
183	1.065	1.0305	0.0345	0.0335
184	1.228	1.2163	0.0117	0.0096
185	1.109	1.1048	0.0042	0.0038
186	1.328	1.3356	-0.0076	-0.0057
187	1.167	1.1769	-0.0099	-0.0084
188	1.326	1.3384	-0.0124	-0.0093
189	1.088	1.1062	-0.0182	-0.0165
190	1.214	1.2168	-0.0028	-0.0023
191	1.046	1.0309	0.0151	0.0146
192	0.617	0.6056	0.0114	0.0188
193	0.327	0.3171	0.0099	0.0312
194	0.327	0.3171	0.0099	0.0312
195	0.834	0.8168	0.0172	0.0211
196	1.029	1.02	0.009	0.0088
197	1.201	1.2042	-0.0032	-0.0027
198	1.178	1.1902	-0.0122	-0.0103
199	1.293	1.3067	-0.0137	-0.0105
200	1.188	1.1919	-0.0039	-0.0033

ATTACHMENT 1
TEST RESULTS

TABLE 3
80% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
201	1.21	1.2053	0.0047	0.0039
202	1.028	1.02	0.008	0.0078
203	0.827	0.817	0.01	0.0122
204	0.325	0.3173	0.0077	0.0243
205	0.228	0.2201	0.0079	0.0359
206	0.54	0.5355	0.0045	0.0084
207	0.876	0.8799	-0.0039	-0.0044
208	1.074	1.0863	-0.0123	-0.0113
209	0.958	0.9705	-0.0125	-0.0129
210	1.092	1.0877	0.0043	0.004
211	0.92	0.8804	0.0396	0.045
212	0.551	0.5349	0.0161	0.0301
213	0.23	0.2199	0.0101	0.0459
214	0.393	0.3942	-0.0012	-0.003
215	0.791	0.7996	-0.0086	-0.0108
216	0.797	0.8004	-0.0034	-0.0042
217	0.402	0.3946	0.0074	0.0188

SUM OF THE SQUARES OF THE DIFFERENCES = .0364
RMS ERROR = .0130

ALL BUNDLE POWERS MEET THE ACCEPTANCE CRITERIA

ATTACHMENT 1
TEST RESULTS

TABLE 4
80% CORE AVERAGE AXIAL POWER DISTRIBUTION

PCT. HT.	MEASURED VALUE	PREDICTED VALUE	DIFFERENCE
100 (TOP)	0.4087	0.397	0.0117
98	0.5185	0.55	-0.0315
96	0.6196	0.689	-0.0694
94	0.7109	0.781	-0.0701
92	0.7915	0.859	-0.0675
90	0.8612	0.923	-0.0618
88	0.9201	0.974	-0.0539
86	0.9686	1.016	-0.0474
84	1.0077	1.051	-0.0433
82	1.0384	1.079	-0.0406
80	1.0621	1.102	-0.0399
78	1.08	1.12	-0.04
76	1.0936	1.136	-0.0424
74	1.1041	1.148	-0.0439
72	1.1125	1.158	-0.0455
70	1.1197	1.166	-0.0463
68	1.1264	1.172	-0.0456
66	1.133	1.176	-0.043
64	1.1396	1.18	-0.0404
62	1.146	1.182	-0.036
60	1.1522	1.182	-0.0298
58	1.1578	1.182	-0.0242
56	1.1624	1.18	-0.0176
54	1.1656	1.176	-0.0104
52	1.1671	1.172	-0.0049
50	1.1668	1.167	-0.0002
48	1.1647	1.161	0.0037
46	1.1607	1.154	0.0067
44	1.1552	1.146	0.0092
42	1.1485	1.138	0.0105
40	1.141	1.128	0.013
38	1.1331	1.117	0.0161
36	1.1251	1.106	0.0191
34	1.1174	1.093	0.0244
32	1.1099	1.079	0.0309
30	1.1026	1.064	0.0386
28	1.0951	1.048	0.0471
26	1.0866	1.03	0.0566
24	1.0764	1.011	0.0654
22	1.0633	0.99	0.0733
20	1.046	0.967	0.079
18	1.0232	0.941	0.0822
16	0.9935	0.913	0.0805
14	0.9555	0.88	0.0755
12	0.9082	0.842	0.0662
10	0.8506	0.797	0.0536
8	0.7822	0.743	0.0392
6	0.7029	0.678	0.0249
4	0.613	0.601	0.012
2	0.5131	0.48	0.0331
0 (BOT)	0.4046	0.347	0.0576

SUM OF THE SQUARES OF THE DIFFERENCES = .1061
RMS ERROR = .0456

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

PREDICTED RELATIVE POWER DENSITIES

Assy # / RPD														
						1 0.397	2 0.801	3 0.800	4 0.397					
			5 0.223	6 0.538	7 0.88	8 1.085	9 0.97	10 1.084	11 0.88	12 0.539	13 0.223			
		14 0.321	15 0.82	16 1.02	17 1.201	18 1.188	19 1.3	20 1.186	21 1.2	22 1.02	23 0.82	24 0.321		
	25 0.321	26 0.611	27 1.032	28 1.214	29 1.105	30 1.333	31 1.174	32 1.33	33 1.104	34 1.214	35 1.032	36 0.611	37 0.321	
38 0.223	39 0.82	40 1.032	41 0.969	42 1.117	43 1.313	44 1.169	45 1.342	46 1.168	47 1.312	48 1.117	49 0.969	50 1.032	51 0.82	52 0.223
53 0.539	54 1.02	55 1.214	56 1.117	57 1.297	58 1.153	59 1.32	60 1.132	61 1.319	62 1.152	63 1.297	64 1.117	65 1.214	66 1.02	67 0.538
68 0.88	69 1.2	70 1.104	71 1.312	72 1.152	73 1.302	74 1.098	75 1.263	76 1.097	77 1.302	78 1.153	79 1.313	80 1.105	81 1.201	82 0.88
83 0.397	85 1.084	86 1.186	87 1.33	88 1.168	89 1.319	90 1.097	91 1.18	92 0.876	93 1.18	94 1.098	95 1.32	96 1.169	97 1.333	98 1.188	99 1.085	84 0.397
100 0.8	102 0.97	103 1.3	104 1.174	105 1.342	106 1.132	107 1.263	108 0.876	109 0.763	110 0.876	111 1.263	112 1.132	113 1.342	114 1.174	115 1.3	116 0.97	101 0.801
117 0.801	119 1.085	120 1.188	121 1.333	122 1.169	123 1.32	124 1.098	125 1.18	126 0.876	127 1.18	128 1.097	129 1.319	130 1.168	131 1.33	132 1.186	133 1.084	118 0.8
134 0.397	136 0.88	137 1.201	138 1.105	139 1.313	140 1.153	141 1.302	142 1.097	143 1.263	144 1.098	145 1.302	146 1.152	147 1.312	148 1.104	149 1.2	150 0.88	135 0.397
	151 0.538	152 1.02	153 1.214	154 1.117	155 1.297	156 1.152	157 1.319	158 1.132	159 1.32	160 1.153	161 1.297	162 1.117	163 1.214	164 1.02	165 0.539	
	166 0.223	167 0.82	168 1.032	169 0.969	170 1.117	171 1.312	172 1.168	173 1.342	174 1.169	175 1.313	176 1.117	177 0.969	178 1.032	179 0.82	180 0.223	
		181 0.321	182 0.611	183 1.032	184 1.214	185 1.104	186 1.33	187 1.174	188 1.333	189 1.105	190 1.214	191 1.032	192 0.611	193 0.321		
			194 0.321	195 0.82	196 1.02	197 1.2	198 1.186	199 1.3	200 1.188	201 1.201	202 1.02	203 0.82	204 0.321			
				205 0.223	206 0.539	207 0.88	208 1.084	209 0.97	210 1.085	211 0.88	212 0.538	213 0.223				
						214 0.397	215 0.8	216 0.801	217 0.397							

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

MEASURED RELATIVE POWER DENSITIES

Assy # / RPD														
					1 0.402	2 0.797	3 0.798	4 0.404						
			5 0.234	6 0.552	7 0.921	8 1.091	9 0.958	10 1.094	11 0.926	12 0.558	13 0.238			
		14 0.327	15 0.834	16 1.028	17 1.206	18 1.178	19 1.291	20 1.182	21 1.213	22 1.037	23 0.843	24 0.331		
	25 0.331	26 0.621	27 1.059	28 1.216	29 1.078	30 1.318	31 1.159	32 1.32	33 1.083	34 1.226	35 1.072	36 0.629	37 0.334	
38 0.223	39 0.817	40 1.03	41 0.97	42 1.111	43 1.298	44 1.162	45 1.333	46 1.164	47 1.303	48 1.12	49 0.981	50 1.041	51 0.827	52 0.225
53 0.536	54 1.013	55 1.202	56 1.093	57 1.282	58 1.139	59 1.313	60 1.124	61 1.314	62 1.138	63 1.289	64 1.104	65 1.215	66 1.025	67 0.539
68 0.881	69 1.193	70 1.092	71 1.295	72 1.145	73 1.298	74 1.104	75 1.271	76 1.105	77 1.301	78 1.152	79 1.306	80 1.102	81 1.201	82 0.882
83 0.41	85 1.085	86 1.174	87 1.317	88 1.151	89 1.313	90 1.101	91 1.193	92 0.9	93 1.193	94 1.104	95 1.319	96 1.16	97 1.326	98 1.179	99 1.085	84 0.405
100 0.8	102 0.97	103 1.291	104 1.162	105 1.329	106 1.132	107 1.268	108 0.888	109 0.782	110 0.886	111 1.27	112 1.134	113 1.332	114 1.164	115 1.29	116 0.968	101 0.799
117 0.799	119 1.083	120 1.174	121 1.32	122 1.152	123 1.314	124 1.102	125 1.197	126 0.907	127 1.198	128 1.107	129 1.316	130 1.151	131 1.314	132 1.163	133 1.078	118 0.797
134 0.403	136 0.878	137 1.194	138 1.096	139 1.3	140 1.148	141 1.302	142 1.109	143 1.277	144 1.109	145 1.304	146 1.148	147 1.298	148 1.09	149 1.188	150 0.875	135 0.404
	151 0.535	152 1.016	153 1.207	154 1.099	155 1.288	156 1.142	157 1.318	158 1.128	159 1.319	160 1.146	161 1.287	162 1.099	163 1.203	164 1.013	165 0.535	
	166 0.223	167 0.82	168 1.034	169 0.976	170 1.119	171 1.312	172 1.168	173 1.338	174 1.166	175 1.304	176 1.113	177 0.969	178 1.029	179 0.818	180 0.222	
		181 0.33	182 0.623	183 1.063	184 1.228	185 1.108	186 1.328	187 1.165	188 1.325	189 1.086	190 1.214	191 1.044	192 0.618	193 0.333		
			194 0.328	195 0.835	196 1.028	197 1.201	198 1.176	199 1.292	200 1.185	201 1.208	202 1.026	203 0.827	204 0.325			
				205 0.232	206 0.541	207 0.876	208 1.073	209 0.954	210 1.089	211 0.916	212 0.55	213 0.232				
					214 0.392	215 0.787	216 0.793	217 0.401						

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
1	0.402	0.3971	0.0049	0.0123
2	0.797	0.8011	-0.0041	-0.0051
3	0.798	0.8003	-0.0023	-0.0029
4	0.404	0.3967	0.0073	0.0184
5	0.234	0.2227	0.0113	0.0507
6	0.552	0.5383	0.0137	0.0255
7	0.921	0.8804	0.0406	0.0461
8	1.091	1.0848	0.0062	0.0057
9	0.958	0.9697	-0.0117	-0.0121
10	1.094	1.0835	0.0105	0.0097
11	0.926	0.8799	0.0461	0.0524
12	0.558	0.539	0.019	0.0353
13	0.238	0.223	0.015	0.0673
14	0.327	0.3213	0.0057	0.0177
15	0.834	0.8202	0.0138	0.0168
16	1.028	1.0204	0.0076	0.0074
17	1.206	1.2013	0.0047	0.0039
18	1.178	1.1879	-0.0099	-0.0083
19	1.291	1.3003	-0.0093	-0.0072
20	1.182	1.1862	-0.0042	-0.0035
21	1.213	1.2003	0.0127	0.0106
22	1.037	1.0204	0.0166	0.0163
23	0.843	0.82	0.023	0.028
24	0.331	0.3211	0.0099	0.0308
25	0.331	0.3211	0.0099	0.0308
26	0.621	0.6107	0.0103	0.0169
27	1.059	1.0322	0.0268	0.026
28	1.216	1.2144	0.0016	0.0013
29	1.078	1.1052	-0.0272	-0.0246
30	1.318	1.3327	-0.0147	-0.011
31	1.159	1.1743	-0.0153	-0.013
32	1.32	1.33	-0.01	-0.0075
33	1.083	1.1038	-0.0208	-0.0188
34	1.226	1.2139	0.0121	0.01
35	1.072	1.0318	0.0402	0.039
36	0.629	0.6107	0.0183	0.03
37	0.334	0.3213	0.0127	0.0395
38	0.223	0.223	0	0
39	0.817	0.82	-0.003	-0.0037
40	1.03	1.0318	-0.0018	-0.0017

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
41	0.97	0.9688	0.0012	0.0012
42	1.111	1.1167	-0.0057	-0.0051
43	1.298	1.3134	-0.0154	-0.0117
44	1.162	1.1691	-0.0071	-0.0061
45	1.333	1.3418	-0.0088	-0.0066
46	1.164	1.1677	-0.0037	-0.0032
47	1.303	1.3124	-0.0094	-0.0072
48	1.12	1.1167	0.0033	0.003
49	0.981	0.9688	0.0122	0.0126
50	1.041	1.0322	0.0088	0.0085
51	0.827	0.8202	0.0068	0.0083
52	0.225	0.2227	0.0023	0.0103
53	0.536	0.539	-0.003	-0.0056
54	1.013	1.0204	-0.0074	-0.0073
55	1.202	1.2139	-0.0119	-0.0098
56	1.093	1.1167	-0.0237	-0.0212
57	1.282	1.2967	-0.0147	-0.0113
58	1.139	1.1533	-0.0143	-0.0124
59	1.313	1.3198	-0.0068	-0.0052
60	1.124	1.1321	-0.0081	-0.0072
61	1.314	1.3191	-0.0051	-0.0039
62	1.138	1.1518	-0.0138	-0.012
63	1.289	1.2967	-0.0077	-0.0059
64	1.104	1.1167	-0.0127	-0.0114
65	1.215	1.2144	0.0006	0.0005
66	1.025	1.0204	0.0046	0.0045
67	0.539	0.5383	0.0007	0.0013
68	0.881	0.8799	0.0011	0.0013
69	1.193	1.2003	-0.0073	-0.0061
70	1.092	1.1038	-0.0118	-0.0107
71	1.295	1.3124	-0.0174	-0.0133
72	1.145	1.1518	-0.0068	-0.0059
73	1.298	1.3022	-0.0042	-0.0032
74	1.104	1.0979	0.0061	0.0056
75	1.271	1.2626	0.0084	0.0067
76	1.105	1.0969	0.0081	0.0074
77	1.301	1.3022	-0.0012	-0.0009
78	1.152	1.1533	-0.0013	-0.0011
79	1.306	1.3134	-0.0074	-0.0056
80	1.102	1.1052	-0.0032	-0.0029

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
81	1.201	1.2013	-0.0003	-0.0002
82	0.882	0.8804	0.0016	0.0018
83	0.41	0.3967	0.0133	0.0335
84	0.405	0.3971	0.0079	0.0199
85	1.085	1.0835	0.0015	0.0014
86	1.174	1.1862	-0.0122	-0.0103
87	1.317	1.33	-0.013	-0.0098
88	1.151	1.1677	-0.0167	-0.0143
89	1.313	1.3191	-0.0061	-0.0046
90	1.101	1.0969	0.0041	0.0037
91	1.193	1.1796	0.0134	0.0114
92	0.9	0.8758	0.0242	0.0276
93	1.193	1.1796	0.0134	0.0114
94	1.104	1.0979	0.0061	0.0056
95	1.319	1.3198	-0.0008	-0.0006
96	1.16	1.1691	-0.0091	-0.0078
97	1.326	1.3327	-0.0067	-0.005
98	1.179	1.1879	-0.0089	-0.0075
99	1.085	1.0848	0.0002	0.0002
100	0.8	0.8003	-0.0003	-0.0004
101	0.799	0.8011	-0.0021	-0.0026
102	0.97	0.9697	0.0003	0.0003
103	1.291	1.3003	-0.0093	-0.0072
104	1.162	1.1743	-0.0123	-0.0105
105	1.329	1.3418	-0.0128	-0.0095
106	1.132	1.1321	-0.0001	-0.0001
107	1.268	1.2626	0.0054	0.0043
108	0.888	0.8758	0.0122	0.0139
109	0.782	0.7634	0.0186	0.0244
110	0.886	0.8758	0.0102	0.0116
111	1.27	1.2626	0.0074	0.0059
112	1.134	1.1321	0.0019	0.0017
113	1.332	1.3418	-0.0098	-0.0073
114	1.164	1.1743	-0.0103	-0.0088
115	1.29	1.3003	-0.0103	-0.0079
116	0.968	0.9697	-0.0017	-0.0018
117	0.799	0.8011	-0.0021	-0.0026
118	0.797	0.8003	-0.0033	-0.0041
119	1.083	1.0848	-0.0018	-0.0017
120	1.174	1.1879	-0.0139	-0.0117

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
121	1.32	1.3327	-0.0127	-0.0095
122	1.152	1.1691	-0.0171	-0.0146
123	1.314	1.3198	-0.0058	-0.0044
124	1.102	1.0979	0.0041	0.0037
125	1.197	1.1796	0.0174	0.0148
126	0.907	0.8758	0.0312	0.0356
127	1.198	1.1796	0.0184	0.0156
128	1.107	1.0969	0.0101	0.0092
129	1.316	1.3191	-0.0031	-0.0024
130	1.151	1.1677	-0.0167	-0.0143
131	1.314	1.33	-0.016	-0.012
132	1.163	1.1862	-0.0232	-0.0196
133	1.078	1.0835	-0.0055	-0.0051
134	0.403	0.3971	0.0059	0.0149
135	0.404	0.3967	0.0073	0.0184
136	0.878	0.8804	-0.0024	-0.0027
137	1.194	1.2013	-0.0073	-0.0061
138	1.096	1.1052	-0.0092	-0.0083
139	1.3	1.3134	-0.0134	-0.0102
140	1.148	1.1533	-0.0053	-0.0046
141	1.302	1.3022	-0.0002	-0.0002
142	1.109	1.0969	0.0121	0.011
143	1.277	1.2626	0.0144	0.0114
144	1.109	1.0979	0.0111	0.0101
145	1.304	1.3022	0.0018	0.0014
146	1.148	1.1518	-0.0038	-0.0033
147	1.298	1.3124	-0.0144	-0.011
148	1.09	1.1038	-0.0138	-0.0125
149	1.188	1.2003	-0.0123	-0.0102
150	0.875	0.8799	-0.0049	-0.0056
151	0.535	0.5383	-0.0033	-0.0061
152	1.016	1.0204	-0.0044	-0.0043
153	1.207	1.2144	-0.0074	-0.0061
154	1.099	1.1167	-0.0177	-0.0159
155	1.288	1.2967	-0.0087	-0.0067
156	1.142	1.1518	-0.0098	-0.0085
157	1.318	1.3191	-0.0011	-0.0008
158	1.128	1.1321	-0.0041	-0.0036
159	1.319	1.3198	-0.0008	-0.0006
160	1.146	1.1533	-0.0073	-0.0063

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
161	1.287	1.2967	-0.0097	-0.0075
162	1.099	1.1167	-0.0177	-0.0159
163	1.203	1.2139	-0.0109	-0.009
164	1.013	1.0204	-0.0074	-0.0073
165	0.535	0.539	-0.004	-0.0074
166	0.223	0.2227	0.0003	0.0013
167	0.82	0.8202	-0.0002	-0.0002
168	1.034	1.0322	0.0018	0.0017
169	0.976	0.9688	0.0072	0.0074
170	1.119	1.1167	0.0023	0.0021
171	1.312	1.3124	-0.0004	-0.0003
172	1.168	1.1677	0.0003	0.0003
173	1.338	1.3418	-0.0038	-0.0028
174	1.166	1.1691	-0.0031	-0.0027
175	1.304	1.3134	-0.0094	-0.0072
176	1.113	1.1167	-0.0037	-0.0033
177	0.969	0.9688	0.0002	0.0002
178	1.029	1.0318	-0.0028	-0.0027
179	0.818	0.82	-0.002	-0.0024
180	0.222	0.223	-0.001	-0.0045
181	0.33	0.3213	0.0087	0.0271
182	0.623	0.6107	0.0123	0.0201
183	1.063	1.0318	0.0312	0.0302
184	1.228	1.2139	0.0141	0.0116
185	1.108	1.1038	0.0042	0.0038
186	1.328	1.33	-0.002	-0.0015
187	1.165	1.1743	-0.0093	-0.0079
188	1.325	1.3327	-0.0077	-0.0058
189	1.086	1.1052	-0.0192	-0.0174
190	1.214	1.2144	-0.0004	-0.0003
191	1.044	1.0322	0.0118	0.0114
192	0.618	0.6107	0.0073	0.012
193	0.333	0.3211	0.0119	0.0371
194	0.328	0.3211	0.0069	0.0215
195	0.835	0.82	0.015	0.0183
196	1.028	1.0204	0.0076	0.0074
197	1.201	1.2003	0.0007	0.0006
198	1.176	1.1862	-0.0102	-0.0086
199	1.292	1.3003	-0.0083	-0.0064
200	1.185	1.1879	-0.0029	-0.0024

ATTACHMENT 1
TEST RESULTS

TABLE 5
100% RADIAL POWER DISTRIBUTION

ASSEMBLY	MEASURED	PREDICTED	DIFFERENCE	DIFF / PRED
201	1.208	1.2013	0.0067	0.0056
202	1.026	1.0204	0.0056	0.0055
203	0.827	0.8202	0.0068	0.0083
204	0.325	0.3213	0.0037	0.0115
205	0.232	0.223	0.009	0.0404
206	0.541	0.539	0.002	0.0037
207	0.876	0.8799	-0.0039	-0.0044
208	1.073	1.0835	-0.0105	-0.0097
209	0.954	0.9697	-0.0157	-0.0162
210	1.089	1.0848	0.0042	0.0039
211	0.916	0.8804	0.0356	0.0404
212	0.55	0.5383	0.0117	0.0217
213	0.232	0.2227	0.0093	0.0418
214	0.392	0.3967	-0.0047	-0.0118
215	0.787	0.8003	-0.0133	-0.0166
216	0.793	0.8011	-0.0081	-0.0101
217	0.401	0.3971	0.0039	0.0098

SUM OF THE SQUARES OF THE DIFFERENCES = .0300
RMS ERROR = .0118

ALL BUNDLE POWERS MEET THE ACCEPTANCE CRITERIA

ATTACHMENT 1
TEST RESULTS

TABLE 6
100% CORE AVERAGE AXIAL POWER DISTRIBUTION

PCT. HT.	MEASURED VALUE	PREDICTED VALUE	DIFFERENCE
100 (TOP)	0.4062	0.377	0.0292
98	0.515	0.52	-0.005
96	0.6152	0.651	-0.0358
94	0.7055	0.738	-0.0325
92	0.7853	0.814	-0.0287
90	0.8542	0.876	-0.0218
88	0.9125	0.927	-0.0145
86	0.9605	0.97	-0.0095
84	0.9992	1.005	-0.0058
82	1.0297	1.034	-0.0043
80	1.0532	1.059	-0.0058
78	1.0711	1.08	-0.0089
76	1.0848	1.098	-0.0132
74	1.0954	1.113	-0.0176
72	1.1041	1.126	-0.0219
70	1.1117	1.137	-0.0253
68	1.1188	1.146	-0.0272
66	1.1257	1.154	-0.0283
64	1.1327	1.16	-0.0273
62	1.1396	1.165	-0.0254
60	1.1462	1.169	-0.0228
58	1.1522	1.172	-0.0198
56	1.1572	1.173	-0.0158
54	1.1607	1.174	-0.0133
52	1.1627	1.173	-0.0103
50	1.1628	1.171	-0.0082
48	1.161	1.168	-0.007
46	1.1576	1.164	-0.0064
44	1.1526	1.159	-0.0064
42	1.1466	1.153	-0.0064
40	1.1399	1.147	-0.0071
38	1.1329	1.139	-0.0061
36	1.1259	1.13	-0.0041
34	1.1194	1.119	0.0004
32	1.1132	1.108	0.0052
30	1.1073	1.095	0.0123
28	1.1012	1.081	0.0202
26	1.0943	1.065	0.0293
24	1.0856	1.048	0.0376
22	1.0739	1.028	0.0459
20	1.058	1.007	0.051
18	1.0363	0.982	0.0543
16	1.0075	0.954	0.0535
14	0.9701	0.921	0.0491
12	0.9231	0.882	0.0411
10	0.8654	0.837	0.0284
8	0.7966	0.781	0.0156
6	0.7165	0.714	0.0025
4	0.6253	0.634	-0.0087
2	0.5239	0.507	0.0169
0 (BOT)	0.4135	0.367	0.0465

SUM OF THE SQUARES OF THE DIFFERENCES = 0.0324
RMS ERROR = 0.0252