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Dale E. James
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2CAN070804

July 3, 2008

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

SUBJECT: ANO-2 Cycle 20 Startup Report
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

The Arkansas Nuclear One, Unit 2 (ANO-2) Technical Requirement Manual (TRM) Section 6.9.1.1 requires a summary report of plant startup and power escalation testing following the installation of fuel that has a different design. Cycle 20 is the first cycle at ANO-2 to be refueled with Westinghouse's Next Generation Fuel (NGF) design fuel assemblies.

The unit achieved criticality on April 10, 2008, following the 2R19 refueling outage.

This letter contains no new commitments.

By means of this submittal, the reporting requirements of ANO-2 TRM 6.9.1.1 are fulfilled.

If you have any questions or require additional information, please contact me.

Sincerely,

DEJ/rwc

Attachment: ANO-2 Cycle 20 Startup Report

cc: Dr. Elmo E. Collins
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Attachment to

2CAN070804

ANO-2 Cycle 20 Startup Report

ANO-2 Cycle 20 Startup Report

ABSTRACT

This report summarizes the results of the startup physics test program. Results of these activities verify the Cycle 20 nuclear design calculations and demonstrate adequate conservatism in core performance with respect to the Arkansas Nuclear One, Unit 2 (ANO-2) Safety Analysis Report (SAR), Technical Specifications (TSs), Technical Requirements Manual (TRM), and the Cycle 20 Reload Safety Evaluation. Cycle 20 achieved initial criticality on April 10, 2008.

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1.0 INTRODUCTION

This report summarizes the results of the ANO-2 Cycle 20 startup physics test program. The startup physics test program consisted of a series of tests performed at various stages, including prior to initial criticality, low power physics testing (LPPT), and during power ascension.

The objective of these tests were (a) to demonstrate that during reactor operation, the measured core physics parameters would be within the assumptions of the SAR accident analyses (Reference 7.1), within the limitations of the plant TSs (Reference 7.2), and within the limitations of the Cycle 20 reload safety evaluation (References 7.3 and 7.4), (b) to verify the nuclear design calculations, and (c) to provide the bases for validation of database and addressable constants in the core protection calculators (CPCs) and the core operating limit supervisory system (COLSS). Specifically, shape annealing matrix (SAM) elements installed in each channel of the CPCs are determined and the all rods out (ARO) planar radial peaking factor (RPF) is verified and conservatively adjusted in the CPCs and COLSS during power ascension.

Section 2 of this report provides a brief description of the reactor core. Section 3 discusses the pre-critical control element assembly (CEA) drop time test. In section 4, initial criticality and the low power physics tests are presented. Section 5 describes the power ascension tests, which include a reactor coolant system (RCS) flow rate determination, core power distribution measurements, the SAM determination, planar RPF verification, azimuthal power tilt verification, and a temperature reactivity coefficient measurement. The conclusions of this report are given in Section 6. Section 7 lists the references cited in this report.

2.0 REACTOR CORE DESCRIPTION

The design of the ANO-2 Cycle 20 core includes the first batch of Next Generation Fuel (NGF) and is the third cycle of zirconium diboride (ZrB_2) as an integral fuel burnable absorber (IFBA). The NGF fuel design incorporates the following changes relative to the previous fuel design:

- A reduced cutback (non-IFBA coated) region at both the tops and bottoms of IFBA fuel rods and a reduced IFBA coating thickness where the coating is applied
- Eliminated use of annular fuel pellets in non-IFBA fuel rods
- Reduced fuel pellet and fuel rod cladding diameters to accommodate increased pressure drop of mixing vane grids
- Slight increase in overall fuel rod length
- Reduction in fuel rod initial fill gas pressures
- A wholly re-designed grid cage including lower end fittings, guide tubes, upper end fitting flow plate and longer hold down springs
- Use of Optimized ZIRLO material for fuel rod cladding and all but the top grid straps
- An Inconel top grid, new mid-grids with I-Springs and intermediate flow mixing grids
- Use of bulge joints to connect grid assemblies and guide tubes (vs. welding)
- Attaching the lower Guardian grid to the lower end fitting with inserts (vs. welding)
- Use of Stress-Relief Annealed (SRA) ZIRLO material for guide tubes
- An anti-rotation joint between guide tubes and the upper nozzle

The 88 new fuel assemblies designated as Batch Z were loaded with fuel rod enrichments as high as 4.16 w/o U-235 and a nominal B-10 loading of 3.14 mg/in in the ZrB_2 IFBA rods. In addition, 1 Batch U and 88 Batch Y assemblies were returned to the Cycle 20 core (Reference 7.3).

The NGF design changes have been explicitly modeled in Cycle 20 neutronics calculations and reload analyses (Reference 7.3).

2.1 Loading Pattern and Assembly Burnup

Attached Figures 1 through 4, taken from the ANO-2 Cycle 20 Reload Analysis Report (RAR), give the loading pattern and beginning of cycle (BOC) assembly average design burnups.

2.2 In-core Instrumentation (ICI) Locations

The ICI design consists of 42 fixed ICI assemblies inserted into the center guide tube of 42 fuel assemblies. ICI locations are identified in Figure 5. Each ICI assembly contains 5 self-powered rhodium detectors and one core exit thermocouple (CET). None of the 42 ICI assemblies were replaced during 2R19 prior to the Cycle 20 startup. During power ascension, at least 199 of 210 possible detectors were operable.

2.3 Verification of Core Loading

After the reactor core was loaded, core mapping was performed using an underwater television camera and monitor. This core mapping operation verified that the core was correctly loaded. Core mapping was performed by the reactor engineering organization. The core mapping operation included a comparison of the identification numbers on the fuel assemblies, CEA configuration, and fuel assembly orientation against the design configuration.

3.0 PRECRITICAL TESTS

3.1 Control Element Assembly (CEA) Drop Time Testing

This testing verifies that the drop time of all CEAs are in accordance with the surveillance requirements of ANO-2 TS 3.1.3.4. The method used by this test involves special control element assembly calculator (CEAC) software (CEA Drop Time Test, or CDTT software), which allows the measurement of all CEAs simultaneously. After the establishment of hot, full flow RCS conditions (i.e., greater than 525 °F with four reactor coolant pumps operating) and with the RCS boron concentration at a sufficient level to keep the reactor adequately shutdown during the test, all CEAs are withdrawn to the full out position. The CDTT software is then loaded into one of the CEAC channels and initiated. The software transmits a large penalty factor to each of the CPC channels, thereby initiating a reactor trip. The CDTT software records CEA positions every 50 milliseconds (msec) during the drop. Data output from the CDTT software is adjusted for holding coil delay time and used to verify that drop time limits are satisfied (Reference 7.14).

From a fully withdrawn position, TS 3.1.3.4 requires that the maximum individual CEA drop time and the average of all CEA drop times from when electrical power to the CEA drive mechanism is interrupted until the CEAs reach 90% inserted be:

Individual Limit	≤ 3.7 seconds
Average Limit	≤ 3.2 seconds

A 50 msec allowance is used for measurement uncertainty.

All CEAs passed the individual drop time limit of 3.65 seconds (TS limit minus 0.05 seconds). The slowest drop time was 3.390 seconds (CEA #80). The average CEA drop time was 2.999 seconds, which passed the average limit of 3.15 seconds (TS average limit minus 0.05 seconds).

In addition, ANO-2 utilizes the CEA drop time testing data as a CEA coupling check. If measured and expected drop times differ by more than 0.1 seconds for a CEA, then an additional review of drop characteristics (i.e., slowdown in the dashpot region, presence or absence of "bounce") is performed to determine the condition of the CEA. Expected drop times are obtained from historical data. If CEAs remain suspect after this further review, additional CEA coupling data may be taken during low power physics testing by exercising the suspect CEAs individually and monitoring the reactivity trace behavior on a reactimeter. This provides a final confirmation that any suspect CEA is coupled. For Cycle 20, all CEAs were determined to be coupled based on meeting expected drop times or review of drop characteristics.

4.0 LOW POWER PHYSICS TESTING

Prior to reactor startup, engineering evaluations and startup test controlling procedure pre-requisites verified the applicability requirements of Westinghouse Topical Report WCAP-16011-P-A, "Startup Test Activity Reduction Program", dated February 2005 (the STAR program) were satisfied. Based on meeting the requirements of this topical report, a reduced scope of startup testing was performed versus the traditional reactimeter based test program. The following presents the STAR test program results.

4.1 <u>Initial Criticality</u>

ANO-2 normally withdraws CEAs to criticality. Shutdown Banks A and B are withdrawn and the RCS is then diluted to an estimated critical boron concentration (CBC) corresponding to the desired critical CEA position. For Cycle 20, the estimated critical position was Group P at 120.0 inches withdrawn based on a measured RCS boron concentration of 1256 parts per million (ppm) prior to starting the approach to criticality. For Cycle 20, actual criticality was achieved with Group P at 96 inches withdrawn.

4.2 <u>STAR Program Hot Zero Power (HZP) CBC</u>

This test procedure specifies that the controlling group (Group P) position be recorded and all other CEAs be at their Upper Electrical Limit. As a pre-requisite, boron equilibrium is checked by obtaining three RCS boron samples and verifying each is within 10 ppm of the average. The residual worth of Group P is determined using the physics test predictions. The average RCS boron sample is corrected for the residual Group P worth to determine the ARO CBC. For

Cycle 20, the ARO CBC was predicted to be 1305 ppm. The actual ARO CBC was 1296 ppm. The acceptance criteria require the actual and predicted ARO CBC values to be within 50 ppm or the boron equivalent of 0.5 % Δk/k. Therefore, the 9 ppm difference for Cycle 20 was well within the acceptance criteria limit.

4.3 STAR Program Moderator Temperature Coefficient (MTC) Alternate Surveillance

When applying the STAR test program, the MTC of reactivity is calculated at HZP by adjusting the predicted MTC to account for the difference between actual boron concentration and the boron concentration associated with the test prediction. The resultant MTC at test conditions was -0.247×10^{-4} Δk/k/°F versus an upper (or positive) Core Operating Limits Report (COLR) limit of $+0.5 \times 10^{-4}$ Δk/k/°F. The MTC was extrapolated to the COLR figure Linear Break Point Power Level (LBPPL) and the 100% power level to insure compliance with the COLR. The resulting MTC (LBPPL) was -0.797×10^{-4} Δk/k/°F versus an upper (or positive) COLR limit of $+0.05 \times 10^{-4}$ Δk/k/°F at the LBPPL. The extrapolated MTC (100) was -1.347×10^{-4} Δk/k/°F versus an upper (or positive) COLR limit of -0.20×10^{-4} Δk/k/°F and a negative COLR limit of -3.8×10^{-4} Δk/k/°F at 100% power. All values were within the limits of the COLR which meets the Alternate MTC Surveillance acceptance criteria.

5.0 POWER ASCENSION TESTING

5.1 Reactor Coolant System (RCS) Flow Rate

At the 66% power test plateau, the RCS flow rate was determined by calorimetric methods at steady state conditions in accordance with ANO-2 TS Table 4.3-1, Item 10, Note 8. The acceptance criterion requires the measured RCS flow rate to be at least 103% of the design flow rate of 120.4×10^6 lbm/hr to account for measurement uncertainties. The RCS flow rate determined calorimetrically was 105.35% of the design flow rate, which satisfies the acceptance criterion. The COLSS and CPC calculated RCS flow rates were verified to be conservative with respect to the calorimetric flow rate and the CPCs were verified conservative with respect to COLSS. No adjustments to COLSS calculated flow were made. However, CPC calculated flow was adjusted to remove excess conservatism.

5.2 Core Power Distribution

5.2.1 29% Power Test Plateau Results

Core power distribution data using fixed in-core neutron detectors is used to verify proper core loading and consistency between as-built and engineering design models. The first power distribution measurement is performed after the turbine is synchronized and prior to exceeding 30% power. The objective of this measurement is primarily to identify any fuel misloading that results in asymmetries or deviations from the reactor physics design. Because of the decreased signal-to-noise ratio at low powers and the absence of xenon stability requirements, radial and azimuthal symmetry criteria are emphasized, whereas pointwise absolute statistical acceptance criteria are relaxed. A core power distribution map at 29% power is given in Figure 6. The acceptance criteria at 29% follow:

a. For a predicted relative power density (RPD) < 0.9, the radial power distribution measured and predicted relative power density values shall agree within ± 0.1 RPD units.

b. For a predicted RPD ≥ 0.9, the radial power distribution measured and predicted RPD values shall agree within ± 10%.

c. The power in each operable detector shall be within ± 10% of the average power in its symmetric detector group.

d. The vector tilt shall be less than 3%.

The acceptance criteria stated in a, b, and c above were met for all 177 fuel locations and all operable detectors (199 operable out of a possible 210). From Figure 6, the maximum percent difference for a predicted RPD ≥ 0.9 was 2.99% (predicted RPD of 0.972 versus measured RPD of 1.001). The largest percent difference for an operable in-core detector relative to the average power in its symmetric group was 4.70%. The vector tilt was measured to be 0.76%; therefore, the acceptance criterion stated in item d above was met.

5.2.2 <u>66% Power Test Plateau Results</u>

At the intermediate power plateau of approximately 66% power, a core power distribution analysis is performed to again verify proper fuel loading and consistency with design predictions. The acceptance criteria at the intermediate power analysis follow:

a. The measured radial power distribution is compared to the predicted power distribution by calculating the root mean square (RMS) deviation from predictions of the RPD for each of the 177 fuel assemblies. This RMS error may not exceed 5%.

b. The measured radial power distribution is additionally compared to the predicted power distribution using a box-by-box comparison of the RPD for each of the 177 fuel assemblies. For a predicted RPD ≥ 0.9, the measured and predicted RPD values shall agree within ± 10%.

c. For a predicted RPD < 0.9, the measured and predicted RPD values shall agree within ± 15%.

d. The measured axial power distribution is also compared to the predicted axial power distribution. The acceptance criterion states the RMS error between the measured axial power distribution and the predicted axial power distribution shall not exceed 5%.

e. The measured values of total planar RPF (F_{xy}), total integrated RPF (F_r), core average axial peak (F_z), and 3-D power peak (F_q) are compared to predicted values. The acceptance criteria state that the measured values:

> *F_{xy}, F_r, and F_z shall be within ± 10% of the predicted values, and that COLSS and CPC constants shall be adjusted to appropriately reflect the measured values.*

All of the acceptance criteria stated in a through e above were met at the 66% power plateau.

TABLE 5.2.2-1

PEAKING PARAMETER COMPARISON			
PARAMETER	MEASURED	PREDICTED	% DIFFERENCE*
F_{xy}	1.4229	1.4390	-1.12
F_r	1.3696	1.3940	-1.75
F_z	1.1417	1.1370	0.41
F_q	1.5966	1.5910	0.35

* % Difference = %(M-P)/P obtained from GETARP output (Figure 7)

Calculated RMS values were:

RADIAL = 1.3784
AXIAL = 4.9895

A RPD map for the 66% power test plateau is given in Figure 7. The maximum percent difference for a predicted RPD ≥ 0.9 was -2.46% (predicted RPD of 1.157 versus measured RPD of 1.128).

5.2.3 <u>100% Power Test Plateau Results</u>

The final core power distribution analysis is performed with equilibrium xenon at approximately 100% power. At this plateau, axial and radial power distributions are compared to design predictions as a final verification that the core is operating in a manner consistent with its design within the associated design uncertainties. The acceptance criteria are the same as those for the intermediate power distribution analysis stated in 5.2.2.a through 5.2.2.e above. The acceptance criteria stated in 5.2.2.a through 5.2.2.e for the 100% power test plateau were met for Cycle 20.

TABLE 5.2.3-1

PEAKING PARAMETER COMPARISON			
PARAMETER	MEASURED	PREDICTED	% DIFFERENCE*
F_{xy}	1.4125	1.4280	-1.08
F_r	1.3681	1.3790	-0.79
F_z	1.1475	1.1150	2.91
F_q	1.6299	1.5840	2.90

* % Difference = %(M-P)/P obtained from GETARP output (Figure 8)

Calculated RMS values were:

RADIAL = 1.2725
AXIAL = 3.6611

A relative power density (RPD) map for the 100% power test plateau is given in Figure 8. The maximum % difference for a predicted RPD ≥ 0.9 was -2.73% (predicted RPD of 1.152 versus measured RPD of 1.121).

5.3 Shape Annealing Matrix (SAM) and Boundary Point Power Correlation Coefficient (BPPCC) Measurement

The CPCs, part of the reactor protection system, use excore neutron flux detector signals to infer the axial distribution of reactor power. The algorithm that infers the core power distribution from the excore signals includes an adjustment for the non-uniform transport of neutrons between the core and the excore detectors. This adjustment is provided by the SAM. The ANO-2 TSs require measurement and installation of appropriate SAM elements and associated BPPCCs after each refueling or verification of cycle independent SAM (CISAM) elements for each channel of the CPCs prior to exceeding 70% power. For Cycle 20, new SAM and BPPCC elements were measured.

Acceptance criteria for the SAM measurement require axial shape RMS errors to be less than or equal to 5.5, the standard deviation of peripheral power integral errors to be less than or equal to 0.5 and a test matrix value between 3.0 and 8.0. The test matrix value acceptance criteria are intended to identify inconsistencies in data used to calculate the SAM and BPPCC elements. The ultimate acceptance criterion for the SAM measurement is the axial shape RMS error.

In order to meet all of the acceptance criteria, measured data below approximately 32% power was excluded. This was required to achieve a test matrix value within the allowable range. With respect to the acceptance criteria, the SAM and BPPCC values that were installed in CPCs gave the following results:

Criteria	Channel A	Channel B	Channel C	Channel D
Axial Shape RMS Error	2.021	2.022	2.026	2.021
Power Error	≤ 0.1544	≤ 0.1712	≤ 0.1352	≤ 0.1382
Test Matrix Value	5.952	5.735	4.592	4.803

The exclusion of measured data below approximately 32% power resulted in slightly higher CPC ASI uncertainty relative to the uncertainty assumed in the overall uncertainty analysis performed for the reload. The exclusion of this data also requires that the CPC uncertainty constants, BERR1 and BERR3, be increased from original values prior to exceeding a core burnup of 210 EFPD.

The higher ASI uncertainty required administrative controls to be implemented that restrict the allowable range of CPC ASI. These restrictions were not needed to maintain operability of CPCs, but were needed to maintain the initial conditions of certain safety analyses initiated at or below 20% power and above 20% power when COLSS is out of service.

5.4 Planar Radial Peaking Factor (RPF) Verification

At the 66% power test plateau, the RPF for the ARO configuration was measured using in-core detector data and the CECOR computer code. The measured ARO Fxy was 1.4223. The planar RPF multiplier corresponding to the ARO condition in CPCs and the similar addressable constant in COLSS were appropriately and conservatively adjusted as a result of this measurement prior to the plant increasing power above 70%. Adjustments for other CEA configurations are no longer performed since conservative bounding values have been determined by reload analyses and are installed prior to startup.

For ANO-2, the CEA shadowing factors are not measured. The CPC database and addressable constants include allowances for using predicted CEA shadowing factors.

5.5 Temperature Reactivity Coefficient

A moderator and isothermal temperature coefficient (ITC) measurement was performed at 100%. During the MTC and ITC measurement, turbine load is used to increase RCS average temperature, which decreases reactor power, and then to decrease RCS average temperature, which increases reactor power. This manipulation yields a ratio of RCS temperature change to reactor power change. Using a predicted power coefficient (PC) with the measured average ratio, an ITC is inferred. Using a predicted fuel temperature coefficient with the inferred ITC yields an MTC.

Acceptance criteria state that the difference between the predicted and inferred ITC shall be less than 0.3×10^{-4} Δk/k/°F. MTC, extrapolated to 100%, 70%, the COLR linear breakpoint power level and 0% power must also be within COLR limits.

For Cycle 20, the ITC and MTC passed the acceptance criteria. The measured ITC was -1.20×10^{-4} Δk/k/°F versus a predicted ITC of -1.30×10^{-4} Δk/k/°F. The difference was 0.10×10^{4} Δk/k/°F which was within the ± 0.3×10^{-4} Δk/k/°F acceptance criteria. Extrapolated MTC values were as follows:

Power Level	Extrapolated MTC Value (Δk/k/°F)
100%	-1.06×10^{-4}
70%	-0.63×10^{-4}
COLR Linear Breakpoint Power Level (50%)	-0.34×10^{-4}
0%	0.07×10^{-4}

All extrapolated MTC values remained within COLR limits.

The measured MTC was extrapolated to 100% and 0% power and predicted peak boron concentration for the cycle to verify the MTC remains within COLR and TS stated design limits. The MTC extrapolated to 100% power and peak boron concentration was -0.78×10^{-4} Δk/k/°F. The MTC extrapolated to 0% power and peak boron concentration was 0.26×10^{-4} Δk/k/°F. Both values were within COLR and TS stated design limits.

Finally, the measured MTC was also extrapolated to 100% power and end of cycle conditions. This extrapolation indicated that the limiting boron concentration for maintaining COLR compliance can not be physically achieved (i.e., negative boron concentration) during the cycle, providing assurance that the COLR negative MTC limit of -3.8×10^{-4} Δk/k/°F will not be exceeded during Cycle 20.

6.0 CONCLUSIONS

Based upon analysis of the startup physics test results, it is concluded that the measured core parameters verify the Cycle 20 nuclear design calculations and the proper loading of the core. All test values were found to be acceptable with respect to limits and requirements contained within the ANO-2 SAR, Technical Specifications and COLR.

The above test results demonstrate adequate conservatism in the Cycle 20 core performance with respect to the Cycle 20 reload safety evaluations and licensing basis.

7.0 REFERENCES

7.1 ANO-2 Safety Analysis Report (SAR), Section 4.5, Startup Program and Section 15, Accident Analysis

7.2 ANO-2 Technical Specifications

7.3 ANO-2 Cycle 20 Reload Analysis Report (RAR), CALC-ANO2-NE-08-00001

7.4 ANO-2 Cycle 20 Core Operating Limits Report (COLR)

7.5 ANO-2 Procedure 2302.009, Change 025, Moderator Temperature Coefficient at Power, 5/28/2008

7.6 ANO-2 Procedure 2302.021, Change 024, Sequence for Low Power Physics Testing Following Refueling, 5/15/2008

7.7 ANO-2 Procedure 2302.022, Change 015, Initial Criticality Following Refueling, 6/16/2008

7.8 ANO-2 Procedure 2302.034, Change 020-00-0, Power Ascension Testing Controlling Procedure, 6/16/2008

7.9 ANO-2 Procedure 2302.039, Change 013-00-0, Core Power Distribution Following Refueling, 4/12/2008, 4/13/2008 & 4/18/2008

7.10 ANO-2 Procedure 2302.046, Change 009-00-0, CEA Drop Time Test, 4/8/2008

7.11 ANO-2 Procedure 2302.057, Change 005, RCS Calorimetric Flowrate Calibration Using RCSFLOW Program, 4/13/2008 & 4/21/2008

FIGURE 1

Cycle 20 Core Loading

Sub-Batch ID	Number of Assemblies	Fuel Rods per Assembly (Excluding ZrB_2 Rods)	Nominal Enrichment (wt. %)	ZrB_2 Rods per Assembly	Shim Loading (ZrB_2)	Number of Fuel Rods (Including ZrB_2 Rods)	Number of ZrB_2 Rods
Z1	16	108	4.16	36	2.00x	2304	576
		32	3.86	8	2.00x	640	128
		48	3.56	4	2.00x	832	64
Z2	20	108	4.16	36	2.00x	2880	720
		36	3.86	4	2.00x	800	80
		24	3.56	28	2.00x	1040	560
Z3	8	88	4.16	56	2.00x	1152	448
		32	3.86	8	2.00x	320	64
		16	3.56	36	2.00x	416	288
Z4	44	80	4.16	64	2.00x	6336	2816
		24	3.86	16	2.00x	1760	704
		8	3.56	44	2.00x	2288	1936
Total	88					20768	8384

Y1	12	64	4.34	40	1.88x	1248	480
		56	4.04	20	1.88x	912	240
		36	3.74	20	1.88x	672	240
Y2	16	64	4.34	40	1.88x	1664	640
		56	4.04	20	1.88x	1216	320
		16	3.74	40	1.88x	896	640
Y3	16	76	4.64	28	1.88x	1664	448
		64	4.34	12	1.88x	1216	192
		36	4.04	20	1.88x	896	320
Y4	8	64	4.64	40	1.88x	832	320
		56	4.34	20	1.88x	608	160
		36	4.04	20	1.88x	448	160
Y5	20	64	4.34	40	1.88x	2080	800
		48	4.04	28	1.88x	1520	560
		12	3.74	44	1.88x	1120	880
Y6	16	56	4.34	48	1.88x	1664	768
		48	4.04	28	1.88x	1216	448
		8	3.74	48	1.88x	896	768
Total	88					20768	8384

FIGURE 1 (continued)

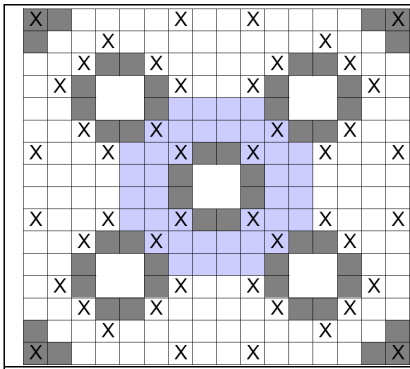
Cycle 20 Core Loading

Sub-Batch ID	Number of Assemblies	Fuel Rods per Assembly (Excluding Erbia Rods)	Nominal Enrichment (wt. %)	Erbia Rods per Assembly	Shim Loading (Erbia)	Number of Fuel Rods (Including Erbia Rods)	Number of Erbia Rods
U4	1	128 8	4.17 3.87	0 100	------ 2.1	128 108	0 100
Total	1					236	100

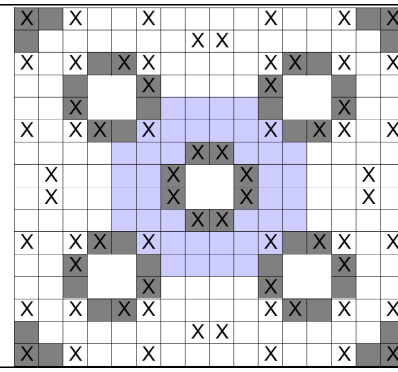
Grand Total	177		41772	**ZrB$_2$** 16768 **Erbia** 100

FIGURE 2

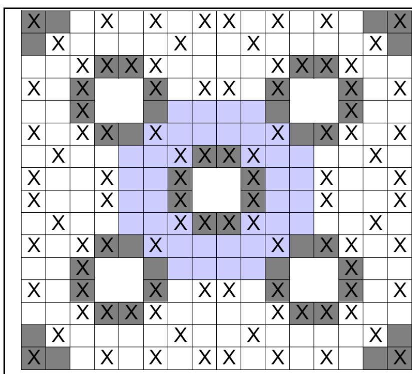
Integral Burnable Poison Shim and Enrichment Zoning Patterns for Batch Z Fuel Assemblies



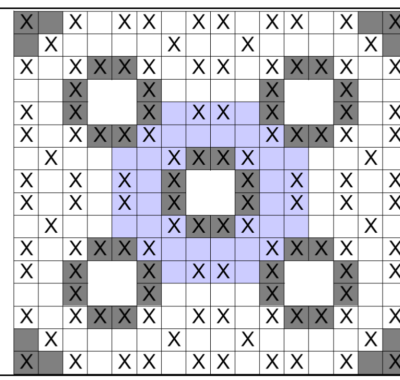
Batch Z1: 48 ZrB_2



Batch Z2: 68 ZrB_2



Batch Z3: 100 ZrB_2



Batch Z4: 124 ZrB_2

	High Enriched Fuel Rod
	Med Enriched Fuel Rod
	Low Enriched Fuel Rod
	High Enriched ZrB_2 Rod
	Med Enriched ZrB_2 Rod
	Low Enriched ZrB_2 Rod

FIGURE 3

Cycle 20 Fuel Management Scheme

A B C D E F G H J K L M N

1						Y505 H-13	Y610 K-7	Y516 H-7	Y607 J-6	Y514 H-5					
2				Y602 E-6	Y203 D-11	Z103 FEED	Z203 FEED	Z208 FEED	Z210 FEED	Z106 FEED	Y209 M-11	Y613 L-6			
3			Y519 G-12	Z108 FEED	Z216 FEED	Z403 FEED	Y308 D-13	Z416 FEED	Y305 M-13	Z419 FEED	Z217 FEED	Z114 FEED	Y520 D-7		
4		Y603 F-5	Z115 FEED	Y407 J-14	Z302 FEED	Y108 E-3	Z431 FEED	Y202 K-13	Z433 FEED	Y104 L-3	Z304 FEED	Y408 B-9	Z102 FEED	Y604 K-5	
5		Y205 L-4	Z202 FEED	Z305 FEED	Y503 G-4	Z402 FEED	Y316 F-2	Z441 FEED	Y306 K-2	Z408 FEED	Y517 M-7	Z306 FEED	Z220 FEED	Y204 E-4	
6	Y507 E-8	Z116 FEED	Z426 FEED	Y101 C-5	Z427 FEED	Y402 P-9	Z423 FEED	Y110 H-14	Z424 FEED	Y404 G-14	Z415 FEED	Y102 N-5	Z418 FEED	Z104 FEED	Y506 C-8
7	Y615 F-7	Z204 FEED	Y304 N-4	Z401 FEED	Y310 B-6	Z430 FEED	Y211 C-6	Z414 FEED	Y206 K-3	Z410 FEED	Y309 P-6	Z438 FEED	Y307 C-4	Z213 FEED	Y614 J-10
8 (270°)	Y511 G-8	Z214 FEED	Z436 FEED	Y201 N-6	Z429 FEED	Y111 P-8	Z444 FEED	U418* H-5	Z428 FEED	Y106 B-8	Z425 FEED	Y214 C-10	Z435 FEED	Z211 FEED	Y512 J-8
9	Y612 G-6	Z212 FEED	Y313 N-12	Z409 FEED	Y315 B-10	Z440 FEED	Y208 F-13	Z407 FEED	Y215 N-10	Z417 FEED	Y302 P-10	Z434 FEED	Y312 C-12	Z207 FEED	Y608 K-9
10	Y513 N-8	Z111 FEED	Z422 FEED	Y112 C-11	Z437 FEED	Y401 J-2	Z439 FEED	Y105 H-2	Z443 FEED	Y405 B-7	Z404 FEED	Y109 N-11	Z442 FEED	Z112 FEED	Y510 L-8
11		Y210 L-12	Z209 FEED	Z307 FEED	Y508 D-9	Z405 FEED	Y314 F-14	Z412 FEED	Y303 K-14	Z406 FEED	Y504 J-12	Z301 FEED	Z201 FEED	Y216 E-12	
12		Y601 F-11	Z109 FEED	Y403 P-7	Z308 FEED	Y103 E-13	Z413 FEED	Y213 F-3	Z421 FEED	Y107 L-13	Z303 FEED	Y406 G-2	Z110 FEED	Y606 K-11	
13			Y509 M-9	Z105 FEED	Z215 FEED	Z420 FEED	Y311 D-3	Z411 FEED	Y301 M-3	Z432 FEED	Z206 FEED	Z107 FEED	Y518 J-4		
14				Y609 E-10	Y212 D-5	Z101 FEED	Z205 FEED	Z219 FEED	Z218 FEED	Z113 FEED	Y207 M-5	Y616 L-10			
15						Y515 H-11	Y605 G-10	Y501 H-9	Y611 F-9	Y502 H-3					

180°

* from Cycle 16

Y YY Assembly Identifier
Z-ZZ Previous Cycle Location

U REGION U4 (4.036 $^{w}/_{o}$)	Y REGION Y5 (4.101 $^{w}/_{o}$)	Z REGION Z4 (3.977 $^{w}/_{o}$)
Y REGION Y1 (4.101 $^{w}/_{o}$)	Y REGION Y6 (4.101 $^{w}/_{o}$)	
Y REGION Y2 (4.101 $^{w}/_{o}$)	Z REGION Z1 (3.977 $^{w}/_{o}$)	
Y REGION Y3 (4.401 $^{w}/_{o}$)	Z REGION Z2 (3.977 $^{w}/_{o}$)	
Y REGION Y4 (4.401 $^{w}/_{o}$)	Z REGION Z3 (3.977 $^{w}/_{o}$)	

Note: U4 assembly in center reinserted from the spent fuel pool, discharged at the end of Cycle 16.

FIGURE 4

BOC Assembly Average Burnup and Initial Enrichment Distribution

nn BB
xxxx

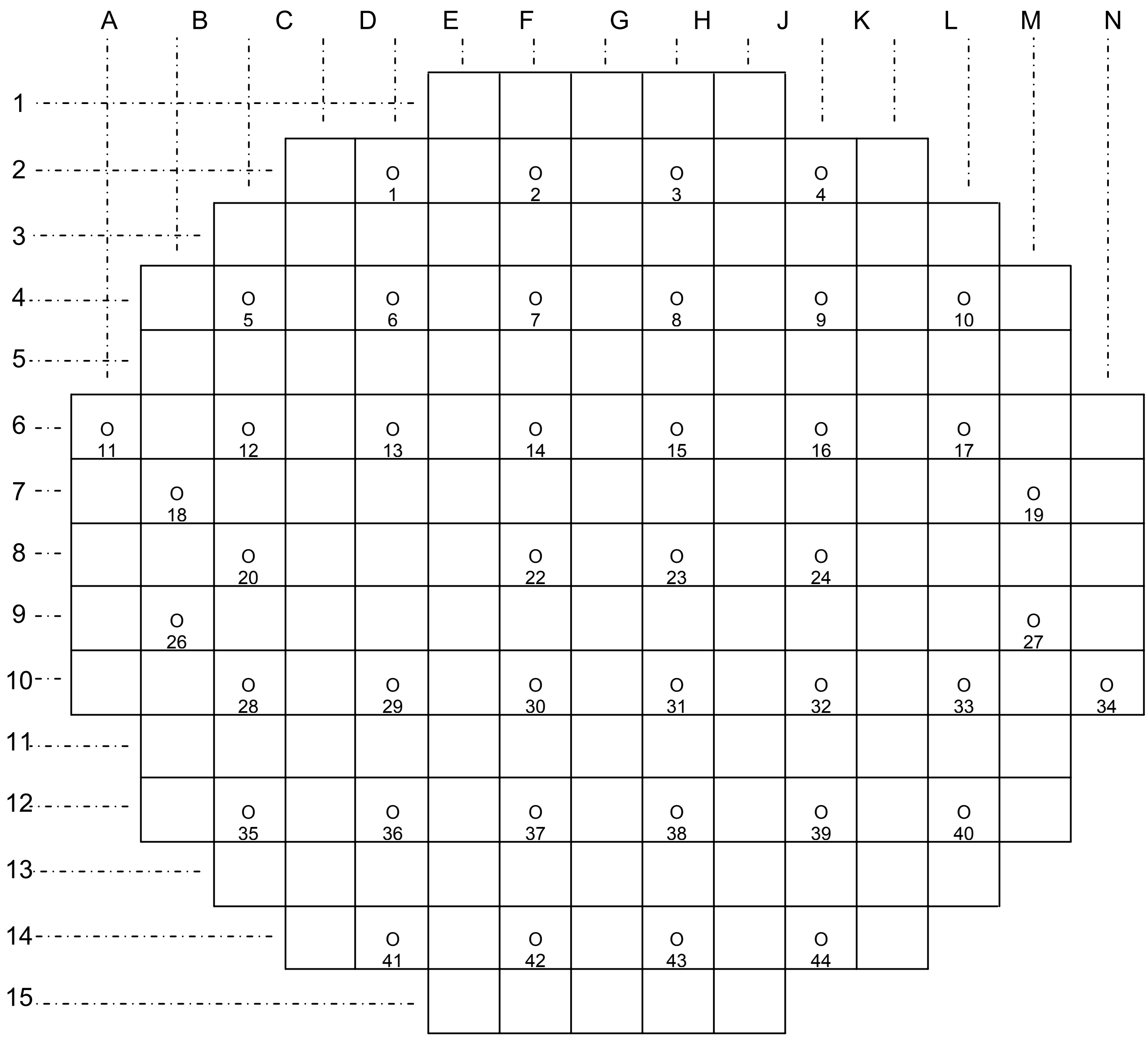
BB = Batch Identifier for Assembly nn
Assembly Average Burnup (MWD/T)

1 U4 25816	2 Z4 0	3 Y1 21738	4 Z4 0	5 Y2 23892	6 Z4 0	7 Z2 0	8 Y5 24370
9 Z4 0	10 Y2 23888	11 Z4 0	12 Y3 19413	13 Z4 0	14 Y3 17863	15 Z2 0	16 Y6 24567
17 Y1 21738	18 Z4 0	19 Y4 21654	20 Z4 0	21 Y1 21951	22 Z4 0	23 Z1 0	24 Y5 24680
25 Z4 0	26 Y3 19425	27 Z4 0	28 Y5 24762	29 Z3 0	30 Z2 0	31 Y2 24261	
32 Y2 23892	33 Z4 0	34 Y1 21966	35 Z3 0	36 Y4 21669	37 Z1 0	38 Y6 24670	
39 Z4 0	40 Y3 17843	41 Z4 0	42 Z2 0	43 Z1 0	44 Y6 24763		
45 Z2 0	46 Z2 0	47 Z1 0	48 Y2 24263	49 Y6 24662			
50 Y5 24370	51 Y6 24554	52 Y5 24502					

Region Z ZrB2 rods have annular pellets in top & bottom 6" of rod at the rod's nominal enrichment

FIGURE 5

ICI Locations



DETECTOR AXIAL LEVEL

J = 1 BOTTOM OF CORE
J = 2 MIDDLE OF CORE
J = 3 TOP OF CORE

FIGURE 6

GETARP Output for the 29% Power Plateau

```
                               GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTTT     AAAA     RRRRRRRRR   PPPPPPPPP
                               GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTTT    AAAAAA    RRRRRRRRRR  PPPPPPPPPP
                               GGG         EEE             TTT       AAA  AAA   RRR     RRR PPP     PPP
                               GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA  RRRRRRRRRR  PPPPPPPPPP
                               GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA  RRRRRRRRR   PPPPPPPPP
                               GGG    GGG  EEE             TTT      AAA    AAA  RRR RRR     PPP
                               GGGGGGGGGG  EEEEEEEEEE      TTT      AAA    AAA  RRR  RRR    PPP
                               GGGGGGGGGG  EEEEEEEEEE      TTT      AAA    AAA  RRR    RRR  PPP     (FPA)
                               A PROGRAM TO EXTRACT DATA FROM CECOR SUMMARY FILES FOR COMPARISON OF
                               AXIAL AND RADIAL POWER DISTRIBUTIONS.
                               GETRNP01 - GETARP FOR NT REVISION 1
                               MEASURED DATA EXTRACTED FROM: a32510n.s01
                               PREDICTED DATA EXTRACTED FROM: a2pred.029

                                        RELATIVE RADIAL POWER DISTRIBUTION COMPARISON
+-----------+                           +-------+-------+-------+-------+-------+
; PREDICTED ;                           ;  .411 ;  .537 ;  .563 ;  .537 ;  .410 ;                        (MEAS.-PREDICTED)
; MEASURED  ;                           ;  .435 ;  .570 ;  .595 ;  .566 ;  .434 ;     % DIFFERENCE = ----------------- X 100.0
; % DIFFER  ;                           ;  5.88 ;  6.08 ;  5.70 ;  5.31 ;  5.77 ;                           PREDICTED
+-----------+           +-------+-------+-------+-------+-------+-------+-------+-------+-------+
                        ;  .418 ;  .662 ; 1.056 ; 1.162 ; 1.170 ; 1.162 ; 1.056 ;  .663 ;  .420 ;
                        ;  .431 ;  .635 ; 1.035 ; 1.150 ; 1.151 ; 1.136 ; 1.036 ;  .652 ;  .437 ;
                        ;  3.02 ; -4.05 ; -1.99 ; -1.05 ; -1.66 ; -2.21 ; -1.90 ; -1.61 ;  4.09 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .526 ; 1.071 ; 1.203 ; 1.141 ; 1.276 ; 1.178 ; 1.276 ; 1.143 ; 1.207 ; 1.075 ;  .526 ;
                ;  .555 ; 1.064 ; 1.169 ; 1.113 ; 1.252 ; 1.154 ; 1.250 ; 1.115 ; 1.177 ; 1.073 ;  .559 ;
                ;  5.49 ;  -.67 ; -2.85 ; -2.47 ; -1.86 ; -2.06 ; -2.00 ; -2.43 ; -2.51 ;  -.19 ;  6.25 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .420 ; 1.075 ; 1.229 ; 1.257 ; 1.170 ; 1.165 ; 1.125 ; 1.166 ; 1.171 ; 1.260 ; 1.229 ; 1.071 ;  .418 ;
        ;  .450 ; 1.081 ; 1.223 ; 1.249 ; 1.175 ; 1.158 ; 1.138 ; 1.163 ; 1.176 ; 1.247 ; 1.227 ; 1.088 ;  .455 ;
        ;  7.19 ;   .58 ;  -.53 ;  -.61 ;   .41 ;  -.60 ;  1.12 ;  -.24 ;   .46 ; -1.06 ;  -.13 ;  1.59 ;  8.78 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .663 ; 1.207 ; 1.260 ; 1.140 ; 1.142 ; 1.195 ; 1.111 ; 1.194 ; 1.140 ; 1.140 ; 1.257 ; 1.203 ;  .662 ;
        ;  .695 ; 1.194 ; 1.236 ; 1.150 ; 1.135 ; 1.199 ; 1.112 ; 1.202 ; 1.138 ; 1.154 ; 1.244 ; 1.205 ;  .706 ;
        ;  4.79 ; -1.06 ; -1.87 ;   .84 ;  -.64 ;   .34 ;   .11 ;   .63 ;  -.19 ;  1.27 ; -1.06 ;   .17 ;  6.59 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .410 ; 1.056 ; 1.143 ; 1.171 ; 1.140 ; 1.145 ; 1.066 ; 1.042 ; 1.064 ; 1.145 ; 1.142 ; 1.170 ; 1.141 ; 1.056 ;  .411 ;
;  .395 ; 1.050 ; 1.136 ; 1.172 ; 1.123 ; 1.151 ; 1.069 ; 1.070 ; 1.071 ; 1.158 ; 1.138 ; 1.184 ; 1.151 ; 1.076 ;  .449 ;
; -3.56 ;  -.56 ;  -.63 ;   .13 ; -1.51 ;   .48 ;   .28 ;  2.65 ;   .66 ;  1.13 ;  -.33 ;  1.20 ;   .86 ;  1.89 ;  9.15 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .537 ; 1.162 ; 1.276 ; 1.166 ; 1.194 ; 1.064 ;  .972 ;  .956 ;  .972 ; 1.066 ; 1.195 ; 1.165 ; 1.276 ; 1.162 ;  .537 ;
;  .561 ; 1.159 ; 1.260 ; 1.149 ; 1.189 ; 1.061 ;  .994 ;  .974 ; 1.001 ; 1.071 ; 1.199 ; 1.158 ; 1.269 ; 1.160 ;  .578 ;
;  4.50 ;  -.29 ; -1.26 ; -1.44 ;  -.42 ;  -.26 ;  2.24 ;  1.85 ;  2.99 ;   .47 ;   .33 ;  -.59 ;  -.52 ;  -.16 ;  7.57 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .563 ; 1.170 ; 1.178 ; 1.125 ; 1.111 ; 1.042 ;  .956 ;  .858 ;  .956 ; 1.042 ; 1.111 ; 1.125 ; 1.178 ; 1.170 ;  .563 ;
;  .595 ; 1.156 ; 1.157 ; 1.130 ; 1.101 ; 1.053 ;  .939 ;  .883 ;  .958 ; 1.063 ; 1.105 ; 1.137 ; 1.165 ; 1.167 ;  .601 ;
;  5.77 ; -1.18 ; -1.77 ;   .49 ;  -.93 ;  1.08 ; -1.77 ;  2.91 ;   .20 ;  1.97 ;  -.52 ;  1.11 ; -1.10 ;  -.24 ;  6.80 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .537 ; 1.162 ; 1.276 ; 1.165 ; 1.195 ; 1.066 ;  .972 ;  .956 ;  .972 ; 1.064 ; 1.194 ; 1.166 ; 1.276 ; 1.162 ;  .537 ;
;  .570 ; 1.142 ; 1.256 ; 1.148 ; 1.190 ; 1.059 ;  .986 ;  .966 ;  .993 ; 1.064 ; 1.195 ; 1.156 ; 1.268 ; 1.166 ;  .564 ;
;  6.10 ; -1.71 ; -1.55 ; -1.47 ;  -.41 ;  -.67 ;  1.42 ;  1.03 ;  2.15 ;   .04 ;   .08 ;  -.88 ;  -.59 ;   .38 ;  5.05 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .411 ; 1.056 ; 1.141 ; 1.170 ; 1.142 ; 1.145 ; 1.064 ; 1.042 ; 1.066 ; 1.145 ; 1.140 ; 1.171 ; 1.143 ; 1.056 ;  .410 ;
;  .442 ; 1.061 ; 1.137 ; 1.173 ; 1.130 ; 1.143 ; 1.046 ; 1.055 ; 1.052 ; 1.148 ; 1.132 ; 1.179 ; 1.144 ; 1.054 ;  .391 ;
;  7.63 ;   .47 ;  -.34 ;   .23 ; -1.06 ;  -.15 ; -1.69 ;  1.20 ; -1.33 ;   .28 ;  -.69 ;   .65 ;   .06 ;  -.15 ; -4.61 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .662 ; 1.203 ; 1.257 ; 1.140 ; 1.140 ; 1.194 ; 1.111 ; 1.195 ; 1.142 ; 1.140 ; 1.260 ; 1.207 ;  .663 ;
        ;  .695 ; 1.187 ; 1.229 ; 1.144 ; 1.126 ; 1.187 ; 1.102 ; 1.191 ; 1.131 ; 1.148 ; 1.236 ; 1.194 ;  .695 ;
        ;  4.93 ; -1.35 ; -2.21 ;   .39 ; -1.25 ;  -.58 ;  -.85 ;  -.30 ;  -.96 ;   .73 ; -1.88 ; -1.05 ;  4.89 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .418 ; 1.071 ; 1.229 ; 1.260 ; 1.171 ; 1.166 ; 1.125 ; 1.165 ; 1.170 ; 1.257 ; 1.229 ; 1.075 ;  .420 ;
        ;  .445 ; 1.063 ; 1.213 ; 1.238 ; 1.169 ; 1.155 ; 1.132 ; 1.160 ; 1.171 ; 1.240 ; 1.217 ; 1.072 ;  .448 ;
        ;  6.56 ;  -.75 ; -1.33 ; -1.72 ;  -.21 ;  -.98 ;   .63 ;  -.42 ;   .10 ; -1.39 ;  -.95 ;  -.27 ;  6.68 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .526 ; 1.075 ; 1.207 ; 1.143 ; 1.276 ; 1.178 ; 1.276 ; 1.141 ; 1.203 ; 1.071 ;  .526 ;
                ;  .550 ; 1.063 ; 1.171 ; 1.110 ; 1.246 ; 1.147 ; 1.245 ; 1.110 ; 1.170 ; 1.063 ;  .552 ;
                ;  4.53 ; -1.08 ; -2.96 ; -2.87 ; -2.36 ; -2.62 ; -2.40 ; -2.75 ; -2.78 ;  -.74 ;  4.98 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                        ;  .420 ;  .663 ; 1.056 ; 1.162 ; 1.170 ; 1.162 ; 1.056 ;  .662 ;  .418 ;
                        ;  .436 ;  .655 ; 1.036 ; 1.137 ; 1.143 ; 1.131 ; 1.033 ;  .652 ;  .435 ;
                        ;  3.72 ; -1.13 ; -1.90 ; -2.14 ; -2.34 ; -2.64 ; -2.20 ; -1.53 ;  3.99 ;
                        +-------+-------+-------+-------+-------+-------+-------+-------+-------+
                                        ;  .410 ;  .537 ;  .563 ;  .537 ;  .411 ;
                                        ;  .434 ;  .565 ;  .591 ;  .563 ;  .433 ;
                                        ;  5.73 ;  5.18 ;  5.01 ;  4.89 ;  5.32 ;
                                        +-------+-------+-------+-------+-------+
```

FIGURE 6 (continued)

GETARP Output for the 29% Power Plateau

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.4230	.4809	13.6889
2	.4890	.5399	10.4109
3	.5540	.5986	8.0506
4	.6520	.6988	7.1761
5	.7100	.7539	6.1878
6	.7510	.7929	5.5766
7	.7890	.8285	5.0115
8	.8210	.8592	4.6487
9	.8490	.8858	4.3314
10	.8730	.9091	4.1392
11	.8950	.9301	3.9190
12	.9140	.9491	3.8409
13	.9330	.9670	3.6458
14	.9500	.9839	3.5700
15	.9660	1.0000	3.5161
16	.9820	1.0153	3.3943
17	.9970	1.0300	3.3055
18	1.0120	1.0439	3.1493
19	1.0260	1.0571	3.0286
20	1.0400	1.0696	2.8445
21	1.0530	1.0814	2.6999
22	1.0660	1.0927	2.5081
23	1.0800	1.1034	2.1666
24	1.0930	1.1140	1.9239
25	1.1080	1.1259	1.6195
26	1.1250	1.1399	1.3261
27	1.1400	1.1530	1.1420
28	1.1530	1.1622	.7988
29	1.1640	1.1681	.3558
30	1.1730	1.1721	-.0776
31	1.1810	1.1747	-.5361
32	1.1870	1.1757	-.9491
33	1.1920	1.1754	-1.3891
34	1.1950	1.1738	-1.7778
35	1.1980	1.1707	-2.2816
36	1.1990	1.1661	-2.7403
37	1.1990	1.1599	-3.2576
38	1.1980	1.1520	-3.8370
39	1.1950	1.1421	-4.4280
40	1.1890	1.1298	-4.9796
41	1.1810	1.1150	-5.5884
42	1.1680	1.0968	-6.0995
43	1.1500	1.0745	-6.5633
44	1.1260	1.0474	-6.9832
45	1.0930	1.0144	-7.1900
46	1.0500	.9747	-7.1752
47	.9990	.9310	-6.8038
48	.9220	.8687	-5.7854
49	.7910	.7548	-4.5729
50	.7080	.7063	-.2388
51	.6220	.6604	6.1749

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4600	1.4530	.4829 %
FR	1.3782	1.4120	-2.3966 %
FZ	1.1757	1.1990	-1.9405 %
FQ	1.6494	1.6960	-2.7456 %

```
CALCULATED RMS VALUES
    RADIAL =    1.9193
    AXIAL  =    4.1978
MEASURED ASI  =    -.0704
PREDICTED ASI =    -.1058
          ACCEPTANCE CRITERIA REPORT
          --------------------------
MEASURED FXY    WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
MEASURED FR     WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
MEASURED FZ     WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
MEASURED FQ     WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
RMS ERROR ON AXIAL DISTRIBUTION     WAS   LESS THAN OR EQUAL TO     5.000 %.
RMS ERROR ON RADIAL DISTRIBUTION     WAS   LESS THAN OR EQUAL TO     5.000 %.
ALL PREDICTED RADIAL POWERS LESS THAN 0.9
WERE     WITHIN PLUS OR MINUS    15.000 % OF MEASURED.
ALL PREDICTED RADIAL POWERS GREATER THAN OR EQUAL TO 0.9
WERE     WITHIN PLUS OR MINUS    10.000 % OF MEASURED.

***  ALL ACCEPTANCE CRITERIA WERE MET ***
```

FIGURE 7
GETARP Output for the 66% Power Plateau

```
GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTTT     AAAA     RRRRRRRRR   PPPPPPPPP
GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTTT    AAAAAA    RRRRRRRRRR  PPPPPPPPPP
GGG         EEE             TTT       AAA  AAA   RRR     RRR PPP     PPP
GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA  RRRRRRRRRR  PPPPPPPPPP
GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA  RRRRRRRRR   PPPPPPPPP
GGG    GGG  EEE             TTT      AAA    AAA  RRR RRR     PPP
GGGGGGGGGG  EEEEEEEEEE      TTT      AAA    AAA  RRR  RRR    PPP
GGGGGGGGGG  EEEEEEEEEE      TTT      AAA    AAA  RRR    RRR  PPP     (FPA)
A PROGRAM TO EXTRACT DATA FROM CECOR SUMMARY FILES FOR COMPARISON OF
AXIAL AND RADIAL POWER DISTRIBUTIONS.
GETRNP01 - GETARP FOR NT REVISION 1
MEASURED DATA EXTRACTED FROM: a3251tk.s01
PREDICTED DATA EXTRACTED FROM: a2pred.068

                          RELATIVE RADIAL POWER DISTRIBUTION COMPARISON
+-----------+                                   +-------+-------+-------+-------+-------+
; PREDICTED ;                                   ;  .423 ;  .550 ;  .576 ;  .549 ;  .422 ;                (MEAS.-PREDICTED)
; MEASURED  ;                                   ;  .433 ;  .567 ;  .592 ;  .562 ;  .432 ;     % DIFFERENCE = ----------------- X 100.0
; % DIFFER  ;                                   ;  2.46 ;  3.04 ;  2.76 ;  2.36 ;  2.32 ;                    PREDICTED
+-----------+                   +-------+-------+-------+-------+-------+-------+-------+-------+-------+
                                ;  .429 ;  .671 ; 1.058 ; 1.157 ; 1.165 ; 1.157 ; 1.058 ;  .672 ;  .430 ;
                                ;  .430 ;  .640 ; 1.036 ; 1.146 ; 1.148 ; 1.131 ; 1.036 ;  .659 ;  .437 ;
                                ;   .27 ; -4.55 ; -2.12 ;  -.91 ; -1.50 ; -2.26 ; -2.07 ; -1.96 ;  1.69 ;
                        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                        ;  .534 ; 1.068 ; 1.195 ; 1.135 ; 1.260 ; 1.169 ; 1.260 ; 1.136 ; 1.198 ; 1.072 ;  .534 ;
                        ;  .550 ; 1.061 ; 1.168 ; 1.113 ; 1.251 ; 1.153 ; 1.248 ; 1.115 ; 1.176 ; 1.071 ;  .555 ;
                        ;  3.04 ;  -.70 ; -2.30 ; -1.96 ;  -.69 ; -1.34 ;  -.91 ; -1.84 ; -1.80 ;  -.13 ;  3.94 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .430 ; 1.072 ; 1.212 ; 1.244 ; 1.161 ; 1.159 ; 1.120 ; 1.160 ; 1.162 ; 1.246 ; 1.212 ; 1.068 ;  .429 ;
                ;  .446 ; 1.072 ; 1.216 ; 1.241 ; 1.172 ; 1.160 ; 1.138 ; 1.164 ; 1.174 ; 1.239 ; 1.222 ; 1.081 ;  .451 ;
                ;  3.69 ;   .02 ;   .32 ;  -.23 ;   .97 ;   .08 ;  1.59 ;   .32 ;  1.02 ;  -.57 ;   .79 ;  1.22 ;  5.05 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .672 ; 1.198 ; 1.246 ; 1.133 ; 1.139 ; 1.191 ; 1.114 ; 1.190 ; 1.138 ; 1.133 ; 1.244 ; 1.195 ;  .671 ;
                ;  .691 ; 1.191 ; 1.234 ; 1.146 ; 1.136 ; 1.202 ; 1.117 ; 1.206 ; 1.140 ; 1.152 ; 1.241 ; 1.200 ;  .701 ;
                ;  2.77 ;  -.61 ;  -.99 ;  1.18 ;  -.27 ;   .95 ;   .25 ;  1.33 ;   .16 ;  1.65 ;  -.25 ;   .45 ;  4.42 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .422 ; 1.058 ; 1.136 ; 1.162 ; 1.138 ; 1.145 ; 1.075 ; 1.053 ; 1.074 ; 1.145 ; 1.139 ; 1.161 ; 1.135 ; 1.058 ;  .423 ;
;  .403 ; 1.047 ; 1.136 ; 1.171 ; 1.125 ; 1.154 ; 1.076 ; 1.077 ; 1.083 ; 1.164 ; 1.141 ; 1.182 ; 1.147 ; 1.070 ;  .445 ;
; -4.45 ; -1.08 ;  -.02 ;   .79 ; -1.13 ;   .81 ;   .09 ;  2.31 ;   .80 ;  1.62 ;   .20 ;  1.80 ;  1.06 ;  1.18 ;  5.13 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .549 ; 1.157 ; 1.260 ; 1.160 ; 1.190 ; 1.074 ;  .989 ;  .978 ;  .989 ; 1.075 ; 1.191 ; 1.159 ; 1.260 ; 1.157 ;  .550 ;
;  .557 ; 1.140 ; 1.253 ; 1.148 ; 1.192 ; 1.069 ; 1.005 ;  .986 ; 1.013 ; 1.079 ; 1.203 ; 1.159 ; 1.265 ; 1.153 ;  .573 ;
;  1.38 ; -1.45 ;  -.52 ; -1.01 ;   .16 ;  -.49 ;  1.58 ;   .78 ;  2.39 ;   .40 ;   .99 ;  -.04 ;   .42 ;  -.31 ;  4.18 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .576 ; 1.165 ; 1.169 ; 1.120 ; 1.114 ; 1.053 ;  .978 ;  .883 ;  .978 ; 1.053 ; 1.114 ; 1.120 ; 1.169 ; 1.165 ;  .576 ;
;  .590 ; 1.147 ; 1.152 ; 1.129 ; 1.105 ; 1.063 ;  .963 ;  .898 ;  .979 ; 1.072 ; 1.111 ; 1.137 ; 1.162 ; 1.161 ;  .597 ;
;  2.46 ; -1.52 ; -1.42 ;   .79 ;  -.79 ;   .99 ; -1.56 ;  1.67 ;   .12 ;  1.84 ;  -.26 ;  1.49 ;  -.57 ;  -.30 ;  3.71 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .550 ; 1.157 ; 1.260 ; 1.159 ; 1.191 ; 1.075 ;  .989 ;  .978 ;  .989 ; 1.074 ; 1.190 ; 1.160 ; 1.260 ; 1.157 ;  .549 ;
;  .566 ; 1.138 ; 1.252 ; 1.148 ; 1.194 ; 1.068 ;  .999 ;  .979 ; 1.005 ; 1.073 ; 1.198 ; 1.155 ; 1.263 ; 1.158 ;  .562 ;
;  2.83 ; -1.66 ;  -.63 ;  -.94 ;   .26 ;  -.64 ;  1.02 ;   .11 ;  1.58 ;  -.13 ;   .70 ;  -.39 ;   .26 ;   .11 ;  2.40 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .423 ; 1.058 ; 1.135 ; 1.161 ; 1.139 ; 1.145 ; 1.074 ; 1.053 ; 1.075 ; 1.145 ; 1.138 ; 1.162 ; 1.136 ; 1.058 ;  .422 ;
;  .439 ; 1.056 ; 1.133 ; 1.171 ; 1.134 ; 1.151 ; 1.060 ; 1.065 ; 1.063 ; 1.153 ; 1.134 ; 1.175 ; 1.138 ; 1.052 ;  .399 ;
;  3.75 ;  -.15 ;  -.19 ;   .86 ;  -.45 ;   .49 ; -1.27 ;  1.11 ; -1.13 ;   .72 ;  -.31 ;  1.14 ;   .16 ;  -.61 ; -5.52 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .671 ; 1.195 ; 1.244 ; 1.133 ; 1.138 ; 1.190 ; 1.114 ; 1.191 ; 1.139 ; 1.133 ; 1.246 ; 1.198 ;  .672 ;
                ;  .690 ; 1.183 ; 1.228 ; 1.143 ; 1.130 ; 1.194 ; 1.108 ; 1.196 ; 1.133 ; 1.145 ; 1.232 ; 1.188 ;  .691 ;
                ;  2.90 ;  -.97 ; -1.31 ;   .88 ;  -.74 ;   .31 ;  -.55 ;   .40 ;  -.55 ;  1.04 ; -1.10 ;  -.80 ;  2.80 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .429 ; 1.068 ; 1.212 ; 1.246 ; 1.162 ; 1.160 ; 1.120 ; 1.159 ; 1.161 ; 1.244 ; 1.212 ; 1.072 ;  .430 ;
                ;  .442 ; 1.059 ; 1.209 ; 1.232 ; 1.168 ; 1.158 ; 1.133 ; 1.161 ; 1.168 ; 1.231 ; 1.210 ; 1.064 ;  .444 ;
                ;  3.10 ;  -.87 ;  -.28 ; -1.12 ;   .50 ;  -.18 ;  1.20 ;   .15 ;   .62 ; -1.07 ;  -.15 ;  -.75 ;  3.22 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                        ;  .534 ; 1.072 ; 1.198 ; 1.136 ; 1.260 ; 1.169 ; 1.260 ; 1.135 ; 1.195 ; 1.068 ;  .534 ;
                        ;  .547 ; 1.062 ; 1.172 ; 1.112 ; 1.246 ; 1.148 ; 1.244 ; 1.109 ; 1.168 ; 1.059 ;  .548 ;
                        ;  2.44 ;  -.89 ; -2.14 ; -2.14 ; -1.10 ; -1.80 ; -1.24 ; -2.26 ; -2.27 ;  -.80 ;  2.58 ;
                        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                                ;  .430 ;  .672 ; 1.058 ; 1.157 ; 1.165 ; 1.157 ; 1.058 ;  .671 ;  .429 ;
                                ;  .436 ;  .662 ; 1.038 ; 1.134 ; 1.141 ; 1.128 ; 1.033 ;  .657 ;  .434 ;
                                ;  1.43 ; -1.46 ; -1.92 ; -1.97 ; -2.06 ; -2.46 ; -2.34 ; -2.16 ;  1.17 ;
                                +-------+-------+-------+-------+-------+-------+-------+-------+-------+
                                                ;  .422 ;  .549 ;  .576 ;  .550 ;  .423 ;
                                                ;  .432 ;  .562 ;  .589 ;  .561 ;  .431 ;
                                                ;  2.46 ;  2.42 ;  2.21 ;  1.93 ;  1.93 ;
                                                +-------+-------+-------+-------+-------+
```

FIGURE 7 (continued)
GETARP Output for the 66% Power Plateau

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.5120	.5587	9.1137
2	.5850	.6256	6.9375
3	.6550	.6915	5.5683
4	.7620	.8041	5.5289
5	.8210	.8641	5.2519
6	.8600	.9047	5.1931
7	.8940	.9406	5.2077
8	.9210	.9698	5.3022
9	.9440	.9937	5.2640
10	.9620	1.0131	5.3080
11	.9780	1.0290	5.2099
12	.9910	1.0420	5.1493
13	1.0030	1.0533	5.0130
14	1.0130	1.0630	4.9314
15	1.0230	1.0714	4.7291
16	1.0320	1.0789	4.5423
17	1.0410	1.0855	4.2780
18	1.0490	1.0915	4.0534
19	1.0560	1.0969	3.8770
20	1.0630	1.1019	3.6590
21	1.0710	1.1065	3.3109
22	1.0780	1.1108	3.0399
23	1.0850	1.1147	2.7376
24	1.0920	1.1188	2.4566
25	1.1000	1.1244	2.2176
26	1.1100	1.1321	1.9885
27	1.1200	1.1389	1.6834
28	1.1260	1.1417	1.3942
29	1.1310	1.1412	.9054
30	1.1340	1.1387	.4174
31	1.1360	1.1348	-.1068
32	1.1370	1.1293	-.6782
33	1.1370	1.1224	-1.2799
34	1.1360	1.1143	-1.9100
35	1.1350	1.1049	-2.6485
36	1.1320	1.0944	-3.3186
37	1.1280	1.0827	-4.0197
38	1.1230	1.0697	-4.7475
39	1.1160	1.0553	-5.4394
40	1.1080	1.0393	-6.2027
41	1.0970	1.0215	-6.8800
42	1.0830	1.0012	-7.5526
43	1.0650	.9778	-8.1852
44	1.0420	.9505	-8.7768
45	1.0110	.9185	-9.1461
46	.9710	.8809	-9.2831
47	.9250	.8401	-9.1748
48	.8580	.7829	-8.7557
49	.7390	.6795	-8.0483
50	.6710	.6354	-5.3062
51	.5990	.5938	-.8667

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4229	1.4390	-1.1189 %
FR	1.3696	1.3940	-1.7502 %
FZ	1.1417	1.1370	.4132 %
FQ	1.5966	1.5910	.3517 %

CALCULATED RMS VALUES
RADIAL = 1.3784
AXIAL = 4.9895
MEASURED ASI = -.0024
PREDICTED ASI = -.0449

ACCEPTANCE CRITERIA REPORT

MEASURED FXY WAS WITHIN PLUS OR MINUS 10.000 % OF THE PREDICTED VALUE.
MEASURED FR WAS WITHIN PLUS OR MINUS 10.000 % OF THE PREDICTED VALUE.
MEASURED FZ WAS WITHIN PLUS OR MINUS 10.000 % OF THE PREDICTED VALUE.
MEASURED FQ WAS WITHIN PLUS OR MINUS 10.000 % OF THE PREDICTED VALUE.
RMS ERROR ON AXIAL DISTRIBUTION WAS LESS THAN OR EQUAL TO 5.000 %.
RMS ERROR ON RADIAL DISTRIBUTION WAS LESS THAN OR EQUAL TO 5.000 %.
ALL PREDICTED RADIAL POWERS LESS THAN 0.9
WERE WITHIN PLUS OR MINUS 15.000 % OF MEASURED.
ALL PREDICTED RADIAL POWERS GREATER THAN OR EQUAL TO 0.9
WERE WITHIN PLUS OR MINUS 10.000 % OF MEASURED.

*** ALL ACCEPTANCE CRITERIA WERE MET ***

FIGURE 8

GETARP Output for the 100% Power Plateau

```
GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTTT     AAAA      RRRRRRRRR   PPPPPPPPP
GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTTT    AAAAAA     RRRRRRRRRR  PPPPPPPPPP
GGG         EEE             TTT       AAA  AAA    RRR     RRR PPP      PPP
GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA   RRRRRRRRRR  PPPPPPPPPP
GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA   RRRRRRRRR   PPPPPPPPP
GGG    GGG  EEE             TTT      AAA    AAA   RRR RRR     PPP
GGGGGGGGGG  EEEEEEEEEE      TTT      AAA    AAA   RRR  RRR    PPP
GGGGGGGGGG  EEEEEEEEEE      TTT      AAA    AAA   RRR    RRR  PPP      (FPA)
A PROGRAM TO EXTRACT DATA FROM CECOR SUMMARY FILES FOR COMPARISON OF
AXIAL AND RADIAL POWER DISTRIBUTIONS.
GETRNP01 - GETARP FOR NT REVISION 1
MEASURED DATA EXTRACTED FROM: A3255JB.S02
PREDICTED DATA EXTRACTED FROM: a2pred.eq.100

                                         RELATIVE RADIAL POWER DISTRIBUTION COMPARISON
+-----------+                           +-------+-------+-------+-------+-------+
; PREDICTED ;                           ;  .430 ;  .557 ;  .583 ;  .557 ;  .430 ;                    (MEAS.-PREDICTED)
; MEASURED  ;                           ;  .427 ;  .557 ;  .582 ;  .552 ;  .425 ;    % DIFFERENCE = ----------------- X 100.0
; % DIFFER  ;                           ;  -.76 ;  -.03 ;  -.21 ;  -.92 ; -1.17 ;                        PREDICTED
+-----------+           +-------+-------+-------+-------+-------+-------+-------+-------+-------+
                        ;  .435 ;  .676 ; 1.056 ; 1.152 ; 1.160 ; 1.152 ; 1.057 ;  .678 ;  .436 ;
                        ;  .426 ;  .643 ; 1.032 ; 1.138 ; 1.142 ; 1.122 ; 1.032 ;  .661 ;  .432 ;
                        ; -2.17 ; -4.83 ; -2.25 ; -1.19 ; -1.51 ; -2.61 ; -2.37 ; -2.55 ;  -.85 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .539 ; 1.064 ; 1.188 ; 1.130 ; 1.249 ; 1.164 ; 1.249 ; 1.131 ; 1.191 ; 1.067 ;  .539 ;
                ;  .539 ; 1.050 ; 1.168 ; 1.119 ; 1.247 ; 1.159 ; 1.243 ; 1.120 ; 1.176 ; 1.060 ;  .544 ;
                ;  -.08 ; -1.32 ; -1.71 ;  -.99 ;  -.14 ;  -.40 ;  -.44 ;  -.96 ; -1.29 ;  -.68 ;   .90 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .436 ; 1.067 ; 1.200 ; 1.235 ; 1.157 ; 1.157 ; 1.119 ; 1.158 ; 1.158 ; 1.238 ; 1.200 ; 1.064 ;  .435 ;
        ;  .436 ; 1.056 ; 1.201 ; 1.239 ; 1.170 ; 1.172 ; 1.138 ; 1.174 ; 1.170 ; 1.235 ; 1.206 ; 1.067 ;  .441 ;
        ;   .06 ; -1.02 ;   .05 ;   .29 ;  1.10 ;  1.26 ;  1.72 ;  1.34 ;  1.03 ;  -.24 ;   .54 ;   .29 ;  1.45 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .678 ; 1.191 ; 1.238 ; 1.130 ; 1.140 ; 1.190 ; 1.118 ; 1.189 ; 1.139 ; 1.130 ; 1.235 ; 1.188 ;  .676 ;
        ;  .680 ; 1.185 ; 1.234 ; 1.142 ; 1.146 ; 1.207 ; 1.129 ; 1.209 ; 1.149 ; 1.147 ; 1.241 ; 1.195 ;  .689 ;
        ;   .27 ;  -.54 ;  -.29 ;  1.09 ;   .55 ;  1.40 ;  1.01 ;  1.65 ;   .88 ;  1.50 ;   .52 ;   .56 ;  1.89 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .430 ; 1.057 ; 1.131 ; 1.158 ; 1.139 ; 1.146 ; 1.083 ; 1.062 ; 1.082 ; 1.146 ; 1.140 ; 1.157 ; 1.130 ; 1.056 ;  .430 ;
;  .406 ; 1.040 ; 1.136 ; 1.168 ; 1.139 ; 1.160 ; 1.092 ; 1.084 ; 1.096 ; 1.168 ; 1.154 ; 1.178 ; 1.147 ; 1.059 ;  .435 ;
; -5.52 ; -1.65 ;   .41 ;   .85 ;  -.04 ;  1.24 ;   .80 ;  2.07 ;  1.28 ;  1.93 ;  1.26 ;  1.85 ;  1.51 ;   .31 ;  1.25 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .557 ; 1.152 ; 1.249 ; 1.158 ; 1.189 ; 1.082 ; 1.001 ;  .993 ; 1.001 ; 1.083 ; 1.190 ; 1.157 ; 1.249 ; 1.152 ;  .557 ;
;  .549 ; 1.130 ; 1.245 ; 1.156 ; 1.197 ; 1.086 ; 1.017 ; 1.005 ; 1.024 ; 1.096 ; 1.208 ; 1.167 ; 1.257 ; 1.143 ;  .562 ;
; -1.48 ; -1.93 ;  -.31 ;  -.15 ;   .70 ;   .37 ;  1.64 ;  1.23 ;  2.34 ;  1.23 ;  1.54 ;   .85 ;   .66 ;  -.77 ;   .85 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .583 ; 1.160 ; 1.164 ; 1.119 ; 1.118 ; 1.062 ;  .993 ;  .900 ;  .993 ; 1.062 ; 1.118 ; 1.119 ; 1.164 ; 1.160 ;  .583 ;
;  .580 ; 1.141 ; 1.155 ; 1.128 ; 1.120 ; 1.076 ;  .996 ;  .917 ; 1.012 ; 1.085 ; 1.128 ; 1.136 ; 1.166 ; 1.154 ;  .587 ;
;  -.46 ; -1.65 ;  -.77 ;   .80 ;   .16 ;  1.35 ;   .32 ;  1.85 ;  1.92 ;  2.18 ;   .86 ;  1.53 ;   .13 ;  -.50 ;   .66 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .557 ; 1.152 ; 1.249 ; 1.157 ; 1.190 ; 1.083 ; 1.001 ;  .993 ; 1.001 ; 1.082 ; 1.189 ; 1.158 ; 1.249 ; 1.152 ;  .557 ;
;  .555 ; 1.130 ; 1.244 ; 1.157 ; 1.200 ; 1.088 ; 1.016 ; 1.002 ; 1.020 ; 1.091 ; 1.204 ; 1.163 ; 1.254 ; 1.147 ;  .554 ;
;  -.30 ; -1.90 ;  -.36 ;  -.03 ;   .87 ;   .43 ;  1.49 ;   .92 ;  1.92 ;   .82 ;  1.23 ;   .42 ;   .38 ;  -.45 ;  -.49 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
;  .430 ; 1.056 ; 1.130 ; 1.157 ; 1.140 ; 1.146 ; 1.082 ; 1.062 ; 1.083 ; 1.146 ; 1.139 ; 1.158 ; 1.131 ; 1.057 ;  .430 ;
;  .430 ; 1.046 ; 1.132 ; 1.168 ; 1.148 ; 1.161 ; 1.086 ; 1.079 ; 1.086 ; 1.161 ; 1.146 ; 1.170 ; 1.135 ; 1.043 ;  .403 ;
;   .04 ;  -.92 ;   .18 ;   .96 ;   .69 ;  1.28 ;   .39 ;  1.55 ;   .24 ;  1.30 ;   .57 ;  1.03 ;   .32 ; -1.29 ; -6.27 ;
+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .676 ; 1.188 ; 1.235 ; 1.130 ; 1.139 ; 1.189 ; 1.118 ; 1.190 ; 1.140 ; 1.130 ; 1.238 ; 1.191 ;  .678 ;
        ;  .680 ; 1.179 ; 1.230 ; 1.141 ; 1.143 ; 1.203 ; 1.124 ; 1.203 ; 1.143 ; 1.139 ; 1.231 ; 1.181 ;  .679 ;
        ;   .52 ;  -.77 ;  -.41 ;   .94 ;   .32 ;  1.16 ;   .58 ;  1.08 ;   .30 ;   .84 ;  -.53 ;  -.84 ;   .20 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
        ;  .435 ; 1.064 ; 1.200 ; 1.238 ; 1.158 ; 1.158 ; 1.119 ; 1.157 ; 1.157 ; 1.235 ; 1.200 ; 1.067 ;  .436 ;
        ;  .434 ; 1.048 ; 1.196 ; 1.231 ; 1.167 ; 1.170 ; 1.135 ; 1.170 ; 1.164 ; 1.226 ; 1.194 ; 1.049 ;  .434 ;
        ;  -.24 ; -1.55 ;  -.34 ;  -.57 ;   .76 ;  1.02 ;  1.45 ;  1.15 ;   .64 ;  -.75 ;  -.51 ; -1.73 ;  -.40 ;
        +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                ;  .539 ; 1.067 ; 1.191 ; 1.131 ; 1.249 ; 1.164 ; 1.249 ; 1.130 ; 1.188 ; 1.064 ;  .539 ;
                ;  .537 ; 1.054 ; 1.173 ; 1.119 ; 1.243 ; 1.155 ; 1.240 ; 1.114 ; 1.166 ; 1.048 ;  .536 ;
                ;  -.34 ; -1.26 ; -1.48 ; -1.09 ;  -.47 ;  -.79 ;  -.73 ; -1.39 ; -1.83 ; -1.54 ;  -.55 ;
                +-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+
                        ;  .436 ;  .678 ; 1.057 ; 1.152 ; 1.160 ; 1.152 ; 1.056 ;  .676 ;  .435 ;
                        ;  .432 ;  .664 ; 1.035 ; 1.128 ; 1.137 ; 1.121 ; 1.029 ;  .658 ;  .429 ;
                        ; -1.01 ; -2.09 ; -2.09 ; -2.12 ; -1.98 ; -2.73 ; -2.54 ; -2.69 ; -1.46 ;
                        +-------+-------+-------+-------+-------+-------+-------+-------+-------+
                                        ;  .430 ;  .557 ;  .583 ;  .557 ;  .430 ;
                                        ;  .426 ;  .553 ;  .579 ;  .551 ;  .424 ;
                                        ;  -.89 ;  -.70 ;  -.64 ; -1.08 ; -1.30 ;
                                        +-------+-------+-------+-------+-------+
```

FIGURE 8 (continued)

GETARP Output for the 100% Power Plateau

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.6090	.6249	2.6181
2	.6900	.7017	1.6925
3	.7680	.7765	1.1049
4	.8850	.9024	1.9665
5	.9470	.9688	2.3013
6	.9860	1.0125	2.6901
7	1.0190	1.0501	3.0493
8	1.0450	1.0793	3.2805
9	1.0640	1.1015	3.5279
10	1.0780	1.1179	3.7047
11	1.0890	1.1297	3.7355
12	1.0970	1.1376	3.7012
13	1.1030	1.1429	3.6176
14	1.1080	1.1460	3.4282
15	1.1110	1.1473	3.2709
16	1.1130	1.1475	3.0967
17	1.1150	1.1466	2.8336
18	1.1150	1.1450	2.6932
19	1.1150	1.1430	2.5100
20	1.1150	1.1406	2.2994
21	1.1130	1.1381	2.2557
22	1.1110	1.1355	2.2080
23	1.1090	1.1328	2.1431
24	1.1080	1.1303	2.0161
25	1.1070	1.1294	2.0259
26	1.1080	1.1306	2.0396
27	1.1080	1.1308	2.0541
28	1.1060	1.1268	1.8851
29	1.1020	1.1195	1.5885
30	1.0960	1.1100	1.2746
31	1.0890	1.0989	.9054
32	1.0810	1.0861	.4730
33	1.0740	1.0720	-.1859
34	1.0650	1.0567	-.7828
35	1.0560	1.0403	-1.4881
36	1.0460	1.0231	-2.1932
37	1.0350	1.0050	-2.9000
38	1.0240	.9862	-3.6873
39	1.0110	.9667	-4.3802
40	.9960	.9463	-4.9918
41	.9810	.9249	-5.7193
42	.9630	.9018	-6.3548
43	.9420	.8766	-6.9456
44	.9160	.8484	-7.3780
45	.8860	.8166	-7.8369
46	.8480	.7801	-8.0020
47	.8050	.7414	-7.9015
48	.7460	.6884	-7.7206
49	.6440	.5953	-7.5588
50	.5910	.5543	-6.2054
51	.5340	.5154	-3.4791

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4125	1.4280	-1.0843 %
FR	1.3681	1.3790	-.7922 %
FZ	1.1475	1.1150	2.9118 %
FQ	1.6299	1.5840	2.8976 %

```
CALCULATED RMS VALUES
    RADIAL =    1.2725
    AXIAL  =    3.6611
MEASURED ASI  =     .0672
PREDICTED ASI =     .0391
          ACCEPTANCE CRITERIA REPORT
          --------------------------
MEASURED FXY    WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
MEASURED FR     WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
MEASURED FZ     WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
MEASURED FQ     WAS  WITHIN PLUS OR MINUS     10.000 % OF THE PREDICTED VALUE.
RMS ERROR ON AXIAL DISTRIBUTION     WAS   LESS THAN OR EQUAL TO     5.000 %.
RMS ERROR ON RADIAL DISTRIBUTION     WAS   LESS THAN OR EQUAL TO     5.000 %.
ALL PREDICTED RADIAL POWERS LESS THAN 0.9
WERE     WITHIN PLUS OR MINUS    15.000 % OF MEASURED.
ALL PREDICTED RADIAL POWERS GREATER THAN OR EQUAL TO 0.9
WERE     WITHIN PLUS OR MINUS    10.000 % OF MEASURED.

***  ALL ACCEPTANCE CRITERIA WERE MET ***
```