Entergy

Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802
Tel 479-858-4619

Dale E. James
Manager, Licensing

2CAN040701

April 18, 2007

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

SUBJECT: Startup Test Activity Reduction (STAR) Summary Report
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

REFERENCE: 1. WCAP-16011-P-A, Revision 0, "Startup Test Activity Reduction Program," February 2005

Dear Sir or Madam:

Arkansas Nuclear One, Unit 2 (ANO-2) resumed operation on October 27, 2006, from the eighteenth (18^{th}) refueling outage (2R18). During the startup from that outage, Entergy Operations applied the methodology presented in the Westinghouse Owner's Group (WOG) Startup Test Activity Reduction (STAR) program (Reference 1). This program changes the reload startup testing to reduce testing operations and testing time while achieving the following objectives: (1) ensure that the core can be operated as designed, and (2) employ normal operating practices in the startup evolution. In this context the use of the reactivity computer is not considered to be a "normal operating practice".

As part of their approval, the NRC added three conditions and limitations to the topical report in their safety evaluation (SE). These conditions and limitations are:

1. The STAR program is applicable only to the participating plants as defined in Table 3-1 of the topical report.

2. Should any of the STAR test results fall outside of the test criteria, either ascertain that the safety analysis and STAR applicability requirements are satisfied, or discontinue use of the STAR program for that fuel cycle.

IE26

3. Each licensee using STAR is required to submit a summary report following the first application, whether 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.

The purpose of this letter is to show ANO-2's compliance to these conditions and limitations.

Table 3-1 of Reference 1 lists ANO-2 as a participating plant. Therefore the STAR Program is applicable to the ANO-2 Cycle 19 reload core.

All of the requirements to implement STAR for 2R18 were met. STAR was implemented successfully during this outage. The measured test results for all the required STAR tests in Table 3-3 of Reference 1 were within the test criteria. It should be noted that ANO-2 procedures do contain the requirement to discontinue the use of the STAR Program if any of the applicability requirements or acceptance criteria is not met.

The summary report required by the third condition of the aforementioned SE is attached. Portions of the report are of a proprietary nature to Westinghouse. The non-proprietary version is included as Attachment 1 to this letter. A proprietary version is enclosed as Attachment 3 to this cover letter. Proprietary information is enclosed in brackets. Superscripts 'a' and 'c' refer to Affidavit paragraphs. The Affidavit for withholding information is included in Attachment 2 to this letter. Based on the Affidavit, Entergy requests that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390.

ANO-2 implemented the STAR program in accordance with Attachment A, "Implementation of the STAR Program", of Attachment A to Appendix G of the referenced topical.

This letter does not contain any NRC commitments. If you have any questions or require additional information, please contact David Bice at 479-858-5338.

Sincerely,

DEJ/dbb

Attachments:

1. Startup Test Activity Reduction (STAR) Summary Report for 2R18 [Non-Proprietary]
2. Affidavit Pursuant to 10 CFR 2.390
3. Startup Test Activity Reduction (STAR) Summary Report for 2R18 [Proprietary]

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One
P. O. Box 310
London, AR 72847

U. S. Nuclear Regulatory Commission
Attn: Ms. Farideh E. Saba
MS O-8 B1
Washington, DC 20555-0001

Mr. Bernard R. Bevill
Director Division of Radiation
Control and Emergency Management
Arkansas Department of Health and Human Services
P. O. Box 1437
Slot H-30
Little Rock, AR 72203-1437

Attachment 1 to

2CAN040701

Startup Test Activity Reduction (STAR)
Summary Report for 2R18
[Non-Proprietary]

SUMMARY REPORT FOR IMPLEMENTATION OF THE STAR PROGRAM AT ANO-2 DURING 2R18

Core Design Method

The Arkansas Nuclear One, Unit 2 (ANO-2) Cycle 19 reload core used Westinghouse's ANC/PARAGON as the design method. This method has been reviewed and approved by the NRC (References 1 through 4).

Comparison of Measured to Calculated Values

Application of the Startup Test Activity Reduction (STAR) program for Cycle 19 allowed the elimination of Control Element Assembly (CEA) worth measurements from the low power physics testing program and allowed for alternate moderator temperature coefficient (MTC) surveillance. The elimination of this measurement and the use of the alternate surveillance are acceptable per the STAR program since the STAR Applicability Requirements have been satisfied and documented.

Tables 1, 3, and 4 provide the results from the Cycle 19 STAR program tests. All STAR Program test criteria were met. Therefore, the STAR Program was successfully implemented for the ANO-2 Cycle 19 reload core.

Where applicable, Table 1 also provides a comparison of the difference between the measured and calculated values, and the core design method uncertainties. As illustrated, the differences were all within the core design method uncertainties.

STAR Applicability Requirements

Table 3-4, "STAR Program Applicability Requirements", of Reference 5, lists the applicability requirements for the use of the STAR program. The STAR applicability requirements provide compensatory measures that ensure the core can be operated as designed when used in conjunction with the STAR Program Tests outlined in Table 3-3 of the topical. The STAR applicability requirements involve the following areas:

- Core Design
- Fabrication
- Refueling
- Startup Testing
- CEA Lifetime

Conformance with the STAR applicability requirements is documented in accordance with plant processes and procedures. The information below is formatted to match Table 3-4 of Reference 5.

- Core Design

Requirement 1

ANO-2 Cycle 19 used Westinghouse's ANC/PARAGON as the Design Method. Through benchmarking, the ANC/PARAGON [ ]$^{a, c}$ were confirmed to be applicable to the Zirconium Diboride (ZrB_2) IFBA fuel used for the set of parameters listed under Core Design Requirement 1. The [ ]$^{a, c}$ for ANC/PARAGON was also established. Therefore, STAR Core Design Applicability Requirement 1 is met for Cycle 19.

Requirement 2

This requirement involves the [

.]$^{a, c}$

The ANO-2 Physics Assessment Checklist (PAC) methodology used for Cycle 19 defines the methods used to calculate physics parameters including the application of biases and uncertainties input to downstream analysis. The PAC methodology for select PAC parameters was implemented for Cycle 19 using the Automated Procedure (AP) for confirming the PAC assessment checklist. Included was the application of biases and uncertainties described above. Also included in the PAC assessment was confirmation that the latest biases and uncertainties were applied to all applicable parameters. Therefore, the [
]$^{a, c}$ the ones identified for Requirement 1 since the PAC assessment verified that limits for specific physics parameters are not violated.

Therefore, STAR Core Design Applicability Requirement 2 is met for Cycle 19.

Requirement 3

This requirement is to [

.]$^{a, c}$ Based on review of the benchmarking information that went into the core design uncertainties, acceptance criteria were developed for each of the above parameters based on the STAR topical. Described below are the Cycle 19 values and the corresponding acceptance criteria based on the benchmarking.

[

.][a, c]

Therefore, STAR Core Design Applicability Requirement 3 is met for Cycle 19.

Requirement 4

The confirmation that the Cycle 19 core design is [

.][a, c]

The STAR topical provides [

.][a, c]

The Alternate Core Design Method used is the CASMO/SIMULATE code. Both core design methods were used to calculate the [

.][a, c]

These evaluations were performed for both Cycle 19 where no CEA worth measurements or MTC surveillance would be performed and for Cycle 18 where CEA worth measurements and MTC surveillance were performed. The CASMO/SIMULATE code was benchmarked in accordance with the Core Design Applicability Requirement 3.

Table 2 provides the results from the two codes. The results are consistent between the two codes and are within 5% of the [.][a, c] The differences are, therefore, well within the acceptance criterion of one-half of the [.][a, c]

Therefore, STAR Core Design Applicability Requirement 4 is met for Cycle 19.

Based upon the discussion above, the requirements for the Core Design area listed in Table 3-4 of Reference 5 have been met for Cycle 19.

- Fabrication

  Requirement 1

  A review of the Product Certification certificates shows the fresh Cycle 19 fuel assemblies were built to a particular fuel assembly drawing and Bill of Materials. The Bill of Materials shows that the assemblies were built from an engineering procedure for a particular pattern.

  The fuel assembly drawing describes the orientation of the upper end fittings and serial numbers.

  A review of these documents taken together shows that the fresh Batch Y fuel assemblies for ANO-2 Cycle 19 were manufactured in accordance with the core design assumptions.

  Reload assemblies were previously verified in a similar manner as described above and remain valid for Cycle 19.

  Therefore, STAR Fabrication Applicability Requirement 1 is met for Cycle 19.

  Requirement 2

  No new CEAs were manufactured for use in Cycle 19. Therefore, STAR Fabrication Applicability Requirement 2 is not applicable to Cycle 19.

Based upon the discussions above, the requirements for the Fabrication area listed in Table 3-4 of Reference 5 have been met for Cycle 19.

- Refueling

  Requirement 1

  ANO-2 procedures require the final core loading to be verified. This verification is performed to provide a final check of fuel assemblies, CEAs and any neutron sources in the reactor. This check verifies fuel assembly serial numbers, [.]$^{a, c}$

  In addition to the above, procedures ensure that core verification has been performed to verify that the [ ]$^{a, c}$ of fuel and control components is in accordance with the core design.

  Through the above procedural requirements, the Cycle 19 core was verified to be loaded as designed. Therefore, STAR Refueling Applicability 1 is met for Cycle 19.

Requirement 2

[ ]a, c are procedurally required to be recorded both before and after it is coupled. The procedure also requires a second person verification of these steps. In addition the procedures ensure that supervision has confirmed that CEA coupling was verified using specific criteria such as [ ]a, c Therefore, STAR Refueling Applicability Requirement 2 is met for Cycle 19.

Procedures for [ ]a, c were successfully completed during 2R18 and verified as such; therefore the requirements of Table 3-4 of Reference 5 for the Refueling area have been met.

- Startup Testing

  The low power physics testing procedure states that if the measured [ ]a, c does not meet the acceptance criteria, then proceed with low power physics testing using traditional techniques. This includes the Isothermal Temperature Coefficient (ITC) test, CEA worth measurement and the MTC surveillance test being performed. As illustrated in Table 1, [ ]a, c; therefore, these tests were not performed.

Based on the above the requirements for Startup Testing listed in Table 3-4 of Reference 5 have been met.

- CEA Lifetime

  Table 3-4 of Reference 5 requires [

  ]a, c

  None of the ANO-2 CEAs exceeded any established limits, as described below.

  A full batch of CEAs operated in the ANO-2 core from Cycle 1 through Cycle 11 were replaced during 2R11, accumulating a total residence time of 11.48 EFPY. No lifetime issues were detected with any of the CEAs, and all of these CEAs fully performed their design function during this timeframe. The current batch of CEAs in the core has operated successfully from Cycle 12 through Cycle 18. Assuming a limiting cycle length of 525 EFPD for Cycle 18 and a limiting cycle length of 520 EFPD for Cycle 19, the total EFPY for CEAs at the end of Cycle 19 is 11.47 EFPY. A 1.075 multiplier was added to Cycles 16 and greater to account for power uprate (ensuring that the fluxes are being compared appropriately to pre-power uprate powers/fluxes). Thus, the CEAs in the reactor core will all be within the established ANO-2 operating experience of 11.48 EFPY, for which there is confidence in the assumed behavior of the CEA materials, at the end of Cycle 19.

Based on CEALL code results, WCAP-16018 inspection thresholds are not exceeded and no CEALL code limits are exceeded.

ANO-2 repositions the All Out position of all CEAs in the core approximately every 90 days to minimize CEA wear with the CEA guide tube.

Uncertainties are conservatively applied in the CEA lifetime determination based upon operating experience. That is, [

]$^{a, c}$

Based on both operational experience and calculated fluences of the ANO-2 CEAs, there is confidence in the assumed behavior of the CEA materials throughout Cycle 19 operations.

Based on the above discussions, [

.]$^{a, c}$ The lifetime of the CEAs used in the ANO-2 Cycle 19 core fully meets the applicability requirements listed in Table 3-4 of Reference 5.

Conclusions

The above discussions demonstrate that the NRC's conditions and limitations listed in Reference 5 have been successfully met for the startup of ANO-2 following 2R18.

References

1. WCAP-11596-P-A, "Qualification of the PHOENIX-P / ANC Nuclear Design System for Pressurized Water Reactor Cores", June 1988

2. WCAP-10965-P-A, "ANC: A Westinghouse Advanced Nodal Computer Code", September 1986

3. WCAP-10965-P-A, Addendum 1, "ANC: A Westinghouse Advanced Nodal Computer Code: Enhancements to ANC Rod Power Recovery", April 1989

4. WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON", August 2004

5. WCAP-16011-P-A, "Startup Test Activity Reduction Program", Revision 0, February 2005

Table 1
ANO-2 Cycle 19 STAR Program Test Results

TEST[1]	POWER	MEASURED VALUE	CALCULATED VALUE	DIFFERENCE	TEST CRITERIA	UNCERTAINTY
CEA Drop Time	Shutdown	Individual 2.70 to 3.39 seconds Average 2.96 seconds	NA	NA	Individual ≤ 3.5 seconds Average ≤ 3.2 seconds	NA
CEA Drop Characteristics	Shutdown	Reed switch position vs. time was measured. Measured 90% insertion times were compared to historical average times for each CEA location.		Max difference = 0.24 seconds	Difference ≤ 0.1 seconds or trace shows dashpot slowdown and no rebound	NA
CBC	HZP	1376.9 ppm	1343 ppm	34 ppm	[ ]$^{a, c}$	[ ]$^{a, c}$
MTC Alternate Surveillance	HZP	-0.15 E-4Δk/k/°F	NA	NA	< 0.5 E-4Δk/k/°F [2] and within COLR limits	NA
Incore Flux Symmetry	~29%	Power in each operable detector location	NA	Max difference from symmetric group average = 3.17%	Power of each operable detector within ± 10% of the average power in its symmetric group	NA

[1] Table 3-3 of the STAR topical report (Reference 1) provides descriptions of the tests.
[2] Technical Specification limit

Table 1
ANO-2 Cycle 19 STAR Program Test Results
(Continued)

TEST[1]	POWER	MEASURED VALUE	CALCULATED VALUE	DIFFERENCE	TEST CRITERIA	UNCERTAINTY
Incore Power Distribution	67%	See Table 3			RMS Errors ≤ 5%, ΔRPD within ± 15% (RPD < 0.9), ΔRPD within ± 10% (RPD ≥ 0.9), Fxy, Fr, Fz within ±10%	F_{xy} = 4.94 % difference F_r = 3.44 % difference
ITC	~100%	-1.22 E-4Δk/k/°F	-1.30 E-4Δk/k/°F	0.08 E-4Δk/k/°F	± 0.3 E-4Δk/k/°F	[ ][a, c]
MTC Surveillance	HFP	-1.08 E-4Δk/k/°F	NA	NA	< 0.0 E-4Δk/k/°F [2] and within COLR limits	NA
Incore Power Distribution	HFP	See Table 4			RMS Errors ≤ 5%, ΔRPD within ± 15% (RPD < 0.9), ΔRPD within ± 10% (RPD ≥ 0.9), Fxy, Fr, Fz within ±10%	F_{xy} = 4.94 % difference F_r = 3.44 % difference
ΔCBC HZP-HFP	HFP	543.5 ppm	573 ppm	29.5 ppm	± 50 ppm	NA

[1] Table 3-3 of the STAR topical report (Reference 1) provides descriptions of the tests.
[2] Technical Specification limit

Table 2

[

]a, c

Table 3 – 67% Power Distribution

```
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: a2721uj.s01
PREDICTED DATA EXTRACTED FROM: a2pred.068
```

RELATIVE RADIAL POWER DISTRIBUTION COMPARISON

				.397	.519	.540	.515	.395				
				.377	.497	.517	.487	.371				
				-4.93	-4.21	-4.30	-5.51	-6.13				
			.379	.597	1.029	1.133	1.105	1.132	1.028	.596	.378	
			.382	.576	1.015	1.140	1.099	1.118	.999	.580	.374	
			.72	-3.53	-1.34	.65	-.54	-1.27	-2.80	-2.76	-.99	
		.473	.970	1.124	1.202	1.186	1.210	1.186	1.201	1.123	.968	.473
		.471	.973	1.130	1.212	1.180	1.222	1.154	1.188	1.111	.960	.478
		-.49	.35	.51	.85	-.47	1.02	-2.73	-1.12	-1.11	-.84	1.00
	.378	.968	1.075	1.231	1.244	1.233	1.192	1.233	1.244	1.231	1.075	.970	.379
	.385	.996	1.068	1.270	1.248	1.270	1.185	1.248	1.217	1.239	1.051	.992	.387
	1.83	2.90	-.63	3.18	.32	2.97	-.60	1.25	-2.20	.62	-2.26	2.29	2.17
	.596	1.123	1.231	1.174	1.185	1.142	1.202	1.142	1.184	1.174	1.231	1.124	.597
	.604	1.146	1.258	1.178	1.217	1.132	1.222	1.116	1.196	1.149	1.237	1.135	.597
	1.38	2.04	2.20	.31	2.69	-.90	1.64	-2.24	.98	-2.17	.46	1.00	-.03
.395	1.028	1.201	1.244	1.184	1.176	1.149	1.173	1.150	1.176	1.185	1.244	1.202	1.029	.397
.374	1.030	1.233	1.244	1.206	1.173	1.150	1.165	1.157	1.167	1.209	1.222	1.225	1.027	.389
-5.38	.24	2.65	-.02	1.84	-.28	.11	-.70	.59	-.77	2.05	-1.77	1.91	-.17	-2.12
.515	1.132	1.186	1.233	1.142	1.150	1.096	1.149	1.096	1.149	1.142	1.233	1.186	1.133	.519
.502	1.145	1.191	1.266	1.125	1.169	1.066	1.163	1.075	1.164	1.120	1.246	1.171	1.135	.508
-2.43	1.19	.45	2.68	-1.48	1.62	-2.72	1.22	-1.96	1.32	-1.91	1.08	-1.27	.14	-2.04
.540	1.105	1.210	1.192	1.202	1.173	1.149	1.042	1.149	1.173	1.202	1.192	1.210	1.105	.540
.524	1.117	1.252	1.201	1.229	1.167	1.160	1.035	1.154	1.156	1.222	1.174	1.223	1.108	.529
-2.92	1.08	3.47	.72	2.27	-.50	.92	-.63	.42	-1.47	1.65	-1.50	1.10	.29	-1.95
.519	1.133	1.186	1.233	1.142	1.149	1.096	1.149	1.096	1.150	1.142	1.233	1.186	1.132	.515
.501	1.141	1.183	1.265	1.133	1.171	1.070	1.160	1.070	1.161	1.119	1.249	1.168	1.144	.493
-3.54	.67	-.28	2.63	-.80	1.89	-2.39	.92	-2.35	.98	-2.04	1.28	-1.49	1.03	-4.20
.397	1.029	1.202	1.244	1.185	1.176	1.150	1.173	1.149	1.176	1.184	1.244	1.201	1.028	.395
.384	1.034	1.238	1.242	1.220	1.172	1.167	1.153	1.136	1.158	1.203	1.235	1.236	1.031	.366
-3.20	.46	3.02	-.20	2.93	-.32	1.44	-1.75	-1.10	-1.55	1.62	-.73	2.89	.27	-7.27
	.597	1.124	1.231	1.174	1.184	1.142	1.202	1.142	1.185	1.174	1.231	1.123	.596
	.603	1.148	1.252	1.163	1.204	1.119	1.211	1.112	1.199	1.161	1.249	1.147	.612
	1.03	2.11	1.72	-.93	1.73	-2.01	.76	-2.61	1.16	-1.14	1.47	2.16	2.68
	.379	.970	1.075	1.231	1.244	1.233	1.192	1.233	1.244	1.231	1.075	.968	.378
	.391	1.001	1.060	1.249	1.229	1.259	1.174	1.259	1.229	1.253	1.060	.999	.387
	3.04	3.24	-1.40	1.48	-1.22	2.14	-1.50	2.07	-1.20	1.82	-1.44	3.24	2.49
		.473	.968	1.123	1.201	1.186	1.210	1.186	1.202	1.124	.970	.473	
		.469	.967	1.121	1.201	1.170	1.219	1.162	1.199	1.122	.966	.468	
		-.85	-.13	-.18	.04	-1.35	.78	-2.02	-.29	-.20	-.46	-1.16	
			.378	.596	1.028	1.132	1.105	1.133	1.029	.597	.379		
			.383	.585	1.012	1.130	1.101	1.127	1.009	.586	.377		
			1.33	-1.82	-1.51	-.16	-.41	-.49	-1.92	-1.91	-.53		
				.395	.515	.540	.519	.397				
				.381	.494	.526	.499	.375				
				-3.56	-4.16	-2.65	-3.88	-5.57				

PREDICTED / MEASURED / % DIFFER

$$\%\ \text{DIFFERENCE} = \frac{(\text{MEAS.} - \text{PREDICTED})}{\text{PREDICTED}} \times 100.0$$

Table 3 – 67% Power Distribution (continued)

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.5060	.5645	11.5626
2	.6210	.6493	4.5563
3	.7300	.7250	-.6834
4	.8080	.7912	-2.0752
5	.8510	.8479	-.3675
6	.8840	.8952	1.2636
7	.9120	.9337	2.3741
8	.9350	.9641	3.1113
9	.9520	.9874	3.7236
10	.9660	1.0048	4.0175
11	.9790	1.0173	3.9140
12	.9890	1.0261	3.7528
13	.9980	1.0323	3.4344
14	1.0070	1.0368	2.9557
15	1.0140	1.0404	2.6022
16	1.0220	1.0438	2.1307
17	1.0290	1.0474	1.7856
18	1.0360	1.0514	1.4895
19	1.0420	1.0560	1.3466
20	1.0480	1.0611	1.2510
21	1.0550	1.0665	1.0894
22	1.0610	1.0719	1.0307
23	1.0670	1.0772	.9524
24	1.0730	1.0819	.8306
25	1.0810	1.0860	.4594
26	1.0900	1.0892	-.0752
27	1.0990	1.0915	-.6827
28	1.1060	1.0930	-1.1794
29	1.1100	1.0937	-1.4701
30	1.1140	1.0939	-1.8071
31	1.1160	1.0938	-1.9935
32	1.1170	1.0936	-2.0972
33	1.1170	1.0935	-2.1002
34	1.1170	1.0938	-2.0789
35	1.1160	1.0943	-1.9443
36	1.1140	1.0950	-1.7082
37	1.1110	1.0955	-1.3978
38	1.1070	1.0953	-1.0577
39	1.1020	1.0937	-.7497
40	1.0960	1.0899	-.5534
41	1.0880	1.0829	-.4731
42	1.0770	1.0714	-.5238
43	1.0630	1.0543	-.8221
44	1.0440	1.0304	-1.3052
45	1.0190	.9986	-2.0037
46	.9880	.9579	-3.0455
47	.9510	.9076	-4.5651
48	.9010	.8471	-5.9825
49	.8150	.7762	-4.7557
50	.7080	.6952	-1.8148
51	.5970	.6043	1.2261

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4370	1.3810	4.0565 %
FR	1.3945	1.3500	3.2995 %
FZ	1.0955	1.1160	-1.8396 %
FQ	1.5558	1.5050	3.3763 %

CALCULATED RMS VALUES
RADIAL = 1.7781
AXIAL = 2.3732
MEASURED ASI = -.0231
PREDICTED ASI = -.0421

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 ***

Table 4 – 100% Power Distribution

```
GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTT     AAAA     RRRRRRRR   PPPPPPPP
GGGGGGGGGG  EEEEEEEEEE  TTTTTTTTTT    AAAAAA    RRRRRRRRR  PPPPPPPPP
GGG         EEE             TTT      AAA  AAA   RRR     RRR PPP     PPP
GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA  RRRRRRRRR  PPPPPPPPP
GGG  GGGGG  EEEEEE          TTT      AAAAAAAAAA  RRRRRRRR   PPPPPPPP
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: A272934.s02
PREDICTED DATA EXTRACTED FROM: a2pred.100
```

RELATIVE RADIAL POWER DISTRIBUTION COMPARISON

PREDICTED / MEASURED / % DIFFER													
				.403 .372 -7.78	.526 .488 -7.31	.547 .508 -7.18	.522 .477 -8.53	.402 .365 -9.12	% DIFFERENCE = (MEAS.-PREDICTED) / PREDICTED X 100.0				
		.386 .379 -1.82	.603 .581 -3.65	1.026 1.010 -1.52	1.126 1.126 .01	1.100 1.091 -.82	1.125 1.104 -1.84	1.024 .995 -2.81	.602 .585 -2.84	.386 .372 -3.63			
	.479 .464 -3.15	.970 .966 -.37	1.120 1.130 .91	1.194 1.214 1.69	1.178 1.171 -.56	1.204 1.225 1.72	1.178 1.146 -2.70	1.194 1.191 -.28	1.119 1.112 -.65	.968 .953 -1.51	.479 .470 -1.83		
.386 .380 -1.66	.968 .989 2.19	1.072 1.057 -1.42	1.225 1.265 3.30	1.237 1.243 .51	1.229 1.278 3.96	1.189 1.184 -.38	1.229 1.259 2.44	1.237 1.214 -1.89	1.225 1.235 .81	1.072 1.040 -2.98	.970 .986 1.65	.386 .381 -1.25	
.602 .596 -.96	1.119 1.142 2.10	1.225 1.259 2.79	1.171 1.174 .23	1.185 1.229 3.74	1.143 1.137 -.53	1.204 1.237 2.75	1.143 1.121 -1.91	1.184 1.208 2.01	1.171 1.145 -2.22	1.225 1.237 .97	1.120 1.129 .81	.603 .586 -2.76	
.402 .383 -4.81	1.024 1.024 -.04	1.194 1.228 2.84	1.237 1.238 .07	1.184 1.220 3.05	1.179 1.182 .22	1.156 1.175 1.67	1.178 1.177 -.08	1.156 1.176 1.76	1.179 1.175 -.33	1.185 1.224 3.31	1.237 1.215 -1.75	1.194 1.213 1.61	1.026 1.012 -1.39	.403 .379 -5.95
.522 .496 -5.04	1.125 1.130 .44	1.178 1.176 -.15	1.229 1.269 3.29	1.143 1.128 -1.30	1.156 1.189 2.88	1.105 1.082 -2.06	1.158 1.189 2.66	1.105 1.090 -1.31	1.156 1.186 2.56	1.143 1.125 -1.61	1.229 1.251 1.77	1.178 1.157 -1.80	1.126 1.119 -.63	.526 .497 -5.61
.547 .515 -5.88	1.100 1.106 .50	1.204 1.242 3.15	1.189 1.194 .40	1.204 1.242 3.17	1.178 1.180 .15	1.158 1.191 2.85	1.054 1.055 .05	1.158 1.189 2.66	1.178 1.171 -.63	1.204 1.240 2.96	1.189 1.171 -1.54	1.204 1.220 1.36	1.100 1.097 -.30	.547 .519 -5.16
.526 .491 -6.61	1.126 1.129 .26	1.178 1.170 -.68	1.229 1.270 3.35	1.143 1.137 -.55	1.156 1.193 3.17	1.105 1.088 -1.55	1.158 1.187 2.54	1.105 1.088 -1.53	1.156 1.183 2.37	1.143 1.123 -1.73	1.229 1.252 1.90	1.178 1.153 -2.14	1.125 1.126 .07	.522 .486 -6.95
.403 .377 -6.41	1.026 1.024 -.21	1.194 1.236 3.51	1.237 1.238 .05	1.185 1.234 4.15	1.179 1.183 .37	1.156 1.196 3.45	1.178 1.169 -.77	1.156 1.163 .64	1.179 1.167 -.98	1.184 1.216 2.72	1.237 1.226 -.88	1.194 1.222 2.35	1.024 1.019 -.54	.402 .373 -7.23
	.603 .595 -1.32	1.120 1.145 2.27	1.225 1.255 2.47	1.171 1.161 -.81	1.184 1.219 2.99	1.143 1.127 -1.39	1.204 1.229 2.10	1.143 1.119 -2.07	1.185 1.211 2.22	1.171 1.155 -1.35	1.225 1.246 1.70	1.119 1.136 1.55	.602 .600 -.38	
	.386 .385 -.33	.970 .994 2.52	1.072 1.051 -1.98	1.225 1.249 1.92	1.237 1.227 -.80	1.229 1.269 3.26	1.189 1.175 -1.16	1.229 1.269 3.24	1.237 1.225 -.97	1.225 1.247 1.81	1.072 1.044 -2.59	.968 .984 1.60	.386 .379 -1.83	
		.479 .463 -3.40	.968 .962 -.67	1.119 1.124 .44	1.194 1.206 .97	1.178 1.163 -1.31	1.204 1.223 1.58	1.178 1.155 -1.92	1.194 1.201 .58	1.120 1.120 .03	.970 .956 -1.48	.479 .458 -4.37	
			.386 .381 -1.36	.602 .591 -1.80	1.024 1.009 -1.49	1.125 1.116 -.79	1.100 1.094 -.58	1.126 1.117 -.77	1.026 1.005 -2.02	.603 .588 -2.46	.386 .373 -3.33		
				.402 .375 -6.65	.522 .484 -7.24	.547 .516 -5.63	.526 .490 -6.83	.403 .370 -8.30					

Table 4 – 100% Power Distribution (continued)

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.6020	.6010	-.1717
2	.7350	.6946	-5.4937
3	.8580	.7781	-9.3145
4	.9400	.8508	-9.4900
5	.9840	.9126	-7.2571
6	1.0150	.9637	-5.0565
7	1.0400	1.0046	-3.4047
8	1.0590	1.0362	-2.1561
9	1.0730	1.0595	-1.2620
10	1.0830	1.0757	-.6758
11	1.0900	1.0861	-.3551
12	1.0940	1.0921	-.1730
13	1.0980	1.0949	-.2856
14	1.1000	1.0955	-.4068
15	1.1010	1.0951	-.5400
16	1.1020	1.0942	-.7063
17	1.1020	1.0936	-.7656
18	1.1010	1.0934	-.6879
19	1.1000	1.0939	-.5511
20	1.0990	1.0951	-.3587
21	1.0970	1.0966	-.0362
22	1.0940	1.0983	.3926
23	1.0920	1.0998	.7152
24	1.0890	1.1008	1.0855
25	1.0880	1.1010	1.1981
26	1.0890	1.1002	1.0319
27	1.0890	1.0983	.8542
28	1.0870	1.0952	.7555
29	1.0820	1.0911	.8367
30	1.0760	1.0860	.9293
31	1.0700	1.0803	.9614
32	1.0630	1.0742	1.0522
33	1.0560	1.0679	1.1312
34	1.0470	1.0618	1.4109
35	1.0380	1.0558	1.7115
36	1.0290	1.0499	2.0306
37	1.0190	1.0440	2.4499
38	1.0080	1.0376	2.9362
39	.9970	1.0302	3.3329
40	.9850	1.0211	3.6665
41	.9710	1.0094	3.9506
42	.9560	.9940	3.9699
43	.9380	.9738	3.8176
44	.9170	.9478	3.3635
45	.8910	.9150	2.6958
46	.8590	.8744	1.7957
47	.8240	.8253	.1615
48	.7800	.7672	-1.6351
49	.7060	.7000	-.8545
50	.6210	.6236	.4198
51	.5350	.5386	.6750

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4158	1.3690	3.4186 %
FR	1.3856	1.3410	3.3276 %
FZ	1.1010	1.1010	.0032 %
FQ	1.5512	1.5040	3.1403 %

CALCULATED RMS VALUES
RADIAL = 2.2826
AXIAL = 2.7415
MEASURED ASI = .0263
PREDICTED ASI = .0433

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 ***

Attachment 2 to

2CAN040701

Affidavit Pursuant to 10 CFR 2.390

Westinghouse

Westinghouse Electric Company
Nuclear Services
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 2055-0001

Direct tel: (412) 374-4643
Direct fax: (412) 374-4011
e-mail: greshaja@westinghouse.com

Our ref: CAW-07-2260

April 5, 2007

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: 2CAN040701 Attachment 3, "Summary Report for Implementation of the STAR Program at ANO-2 during 2R-18" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-07-2260 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Entergy Operations, Inc.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-07-2260 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

BA Maurer /for

J. A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: Jon Thompson/NRR

CAW-07-2260

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

B.F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before me
this 5th day of April, 2007

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Sharon L. Markle, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Jan. 29, 2011
Member, Pennsylvania Association of Notaries

(1) I am Acting Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in 2CAN040701 Attachment 3, "Summary Report for Implementation of the STAR Program at ANO-2 during 2R 18" (Proprietary) being transmitted by Entergy Operations Inc. letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse for use by ANO Unit 2 is in response to conditions and limitations of an NRC safety evaluation.

This information is part of that which will enable Westinghouse to:

(a) Support Entergy's use of the STAR Program at ANO Unit 2.

Further this information has substantial commercial value as follows:

(a) Westinghouse can use this information to further enhance their licensing position with their competitors.

(b) Assist customers to obtain license changes.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar analyses and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.