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W3F1-2005-0067

Alan J. Harris
Director, Nuclear Safety Assurance
Waterford 3

September 9, 2005

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

SUBJECT: Startup and Power Escalation Report for Cycle 14
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

REFERENCES:
1. NRC letter to Entergy dated May 9, 2005, "Waterford Steam Electric Station, Unit 3 – Issuance of Amendment Re: Modification of Technical Specifications (TS) 5.3.1, Fuel Assemblies, TS 5.6.1, Criticality, TS 6.9.1.11.1, Core Operating Limits Reports, and Deletion of TS Index (TAC No. MC3584)"
2. NRC letter to Entergy dated April 15, 2005, "Waterford Steam Electric Station, Unit 3 – Issuance of Amendment Re: Extended Power Uprate (TAC No. MC1355)"

Dear Sir or Madam:

In accordance with Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specification 6.9.1.1, Entergy Operations, Inc. (Entergy) is submitting the attached summary report for plant startup and power escalation testing for Waterford 3 conducted at the beginning of Cycle 14 operation. Waterford 3 resumed commercial power operation on June 10, 2005 following the completion of refueling outage 13. As part of the refueling outage scope, four Lead Test Assemblies (LTAs) (Reference 1) were installed in the reactor core and an Extended Power Uprate (EPU) from 3441 MWt to 3716 MWt (Reference 2) was implemented.

The core physics testing required for the LTAs and all testing required for the EPU except for the plant maneuvering test and some selected post modification tests have been completed. The remaining EPU plant maneuvering test will be completed following the restart of Waterford 3, which was shutdown in advance of hurricane Katrina. Due to hurricane Katrina and the redirection of Entergy personnel to plant recovery activities following the hurricane, a detailed summary report for the EPU test results is not complete at this time. A brief summary of the EPU test results along with a detailed report on the core physics testing is provided in Attachment 1. A more detailed report of the EPU test results, including a discussion on the plant maneuvering test results, will be provided in a supplemental Startup Report submitted pursuant to Waterford 3 Technical Specification 6.9.1.3.

This letter contains one new commitment as summarized in Attachment 2.

IE26

If you have any questions or require additional information, please contact Greg Scott at 504-739-6703.

Sincerely,

AJH/CED/cbh

Attachments:
1. Startup and Power Escalation Report for Cycle 14
2. List of Regulatory Commitments

cc: Dr. Bruce S. Mallett
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Attachment 1

To

W3F1-2005-0067

Startup and Power Escalation Report for Cycle 14

Startup and Power Escalation Report for Cycle 14

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Startup and Power Escalation Report for Cycle 14

1.0 INTRODUCTION

In accordance with the requirements of Waterford 3 Technical Specification 6.9.1, a summary report of plant startup and power escalation testing is herein submitted. This report contains a general summary of the WSES-3 Cycle 14 startup test program and test results as it pertains to a core thermal power uprate from 3441 to 3716 MWt.

This test program was developed following the guidance prescribed in draft Standard Review Plan 14.2.1, "Generic Guidelines for Extended Power Uprate Testing Programs". This program included pre-critical tests as well as those conducted during low power physics testing (LPPT), power ascension and at full power. Also, the proposed testing detailed in W3F1-2004-004, Supplemental Information, Extended Power Uprate – Startup Testing, was addressed. Special test procedures were developed, in combination with existing plant procedures, to implement the required testing. Plant surveillance test procedures were used, to the extent possible, to satisfy required testing.

The objectives of these tests were to demonstrate that SSCs perform satisfactorily at EPU conditions, that power uprate related modifications have been adequately constructed and implemented, and that the facility can be operated at the proposed EPU conditions in accordance with design requirements and in a manner that will not endanger the health and safety of the public. Specific objectives of the core physics tests were to demonstrate that, during reactor operation, the measured core physics parameters would be within the assumptions of the FSAR accident analyses and within the limitations of the plant technical specifications, as well as to verify the nuclear design calculations. It was also the intent of the core physics tests to demonstrate adequate conservatism in the Cycle 14 core performance with respect to the WSES-3 FSAR, Technical Specifications, Cycle 14 Core Operating Limits Report (COLR), and Cycle 14 Reload Analysis Report.

The details of the test results deemed necessary to demonstrate acceptance of the measured core physics parameters and a brief summary of the EPU Startup Testing are included in this report. A more detailed summary of the EPU Startup Testing will be submitted at a later date.

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2.0 PHYSICS TESTING

2.1 REACTOR CORE DESCRIPTION

The Waterford 3 Cycle 14 core contains 117 irradiated assemblies (24 batch U and 92 batch W, 1 batch T in the core center returning to the core after being discharged in refuel 12), 96 new fresh batch X assemblies and 4 Next Generation Fuel Lead Test Assemblies (NGF LTAs). The number of new assemblies has increased from 92 to 100 new assemblies to control power peaking and support energy needs of the Extended Power Uprate (EPU) core. 33 batch T and 68 batch U assemblies present in the Cycle 13 core were discharged from the core. The initial U-235 enrichments of the lead test assemblies range from 4.35 to 4.00 weight percent. The initial U-235 enrichments of the remaining 96 batch X assemblies range from 4.48 to 4.13 weight percent. There was a small difference in enrichments in order to match the reactivity of the NGF LTAs with other batch X assemblies. The batch X enrichments are similar to the 4.55 to 4.20 weight percent used for the Cycle 13 batch W assemblies.

Integral burnable poison rods containing Erbia were first introduced into Waterford 3 cores in Cycle 9 (batch R). Reload batch X consists of seven sub-batches with six different Erbia loadings. The loading of Erbia range from no Erbia rods in sub-batch X0 and the NGF LTAs to 100 Erbia rods in sub-batch X5. The Erbia loading is 2.1 weight percent Erbia. The total number of Erbia rods (7328) in fresh fuel assemblies has increased over the 6176 Erbia rods in Cycle 13 to hold down peaking in the core.

The rated thermal power in Cycle 14 was increased to 3716 MWt. The Cycle 14 core is designed on a nominal best estimate cycle energy of 510.3 EFPD for a Cycle 13 energy of 503 EFPD. Evaluations have been completed to demonstrate the applicability of the reload analysis for Cycle 13 energies between 488 and 518 EFPD, and for the corresponding Cycle 14 bounding cycle end point energies from 544.4 EFPD down to 528.9 EFPD.

The Analyses of Record (AOR) and related assessments for EPU and the lead test assemblies were determined to be applicable to Cycle 14. Based upon the evaluations and analyses, all fuel assembly and fuel rod criteria have been shown to be met. The four CE 16x16 NGF LTAs containing Optimized ZIRLO™ clad fuel rods have been determined to be

acceptable for Waterford Unit 3 Cycle 14, and subsequent operation to a lead rod burnup of 60,000 MWD/MTU and a plant rated power level of3716 MWt.

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The reactor core was loaded with quarter-core rotational symmetry in a low neutron leakage configuration in which "twice-burned" batch U assemblies were loaded on the core periphery, and fresh batch X assemblies were mixed with "once-burned" batch W assemblies in the core interior. This strategy is similar to that used in Cycle 13 when the batch T assemblies were loaded on the edge of the core, and fresh batch W fuel assemblies were mixed with batch U assemblies in the interior. This type of loading tends to maximize fuel efficiency of the core and minimize neutron fluence to the reactor vessel. The peripheral assembly relative integrated powers is somewhat higher than those in Cycle 13, but because of EPU, the excore detector signals in Cycle 14 are significantly larger than in Cycle 13.

Predicted critical boron concentrations, moderator temperature coefficients and minimum scram reactivity worths are similar to those calculated for Cycle 13. The cycle maximum axial power peaking factors are expected to be very similar, but the radial and planar peaking factors will be significantly lower in Cycle 14 due to the greater number of fresh fuel assemblies. The maximum assembly exposure at the end-of-cycle will be higher than that calculated for the previous cycle, but remains within the design and regulatory limits.

In order to mitigate thimble tube growth, the In-Core Instrumentation (ICI) thimble plate was raised 2.9 inches and the Quickloc flanges were lengthened 2.7 inches. The change in the position of the ICI's has been incorporated into the core design neutronics model and was explicitly addressed during the set point analysis.

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Cycle 14 Fuel Mechanical Design Changes

There are no major mechanical design changes for the standard Batch X fuel and grid cages. Except for the NGF LTAs, all of the new batch X assemblies are of the same mechanical design as the batch W assemblies loaded for Cycle 13. The upper end fitting was changed slightly to reduce the overall height of the assembly by 0.20 inches and increase the margin for potential assembly growth before the assembly hold-down springs reached a solid height (i.e., the springs became fully compressed.) The offset bend along the bottom edge of the Guardian grid was modified to improve the welding fit up with the lower end fitting to reduce rework and does not alter its performance. Several documentation only changes were also made to the design.

Cycle 14 Lead Test Assemblies

The Next Generation Fuel lead assemblies are a new design of the CE 16x16 fuel assembly developed to improve fuel reliability to resolve grid to rod fretting for the entire length of the assembly and to increase thermal performance of the bundle. The new design incorporates improved materials for both the fuel rod cladding and the skeleton of the assembly. The NGF LTAs have a higher fuel pellet stack density, a smaller fuel pellet O.D., a smaller fuel rod cladding I.D., a smaller cladding O.D. and a correspondingly higher water-to-fuel ratio. The new design also includes mixing vanes, a pair of additional grids for increased coolant flow mixing, and several other changes related to manufacture of the new assembly design. These differences have been accounted for in the core design analysis.

The Next Generation Fuel assemblies were installed to gather performance data on this enhanced fuel assembly design. An assessment by the fuel vendor has shown that the operation of the LTAs will be within the bounds of the existing safety analysis for all Anticipated Operational Occurrences and Postulated Accidents. All fuel assembly and fuel rod acceptance criteria for the LTAs have been shown to be met. The thermal-hydraulic analysis for Cycle-14 showed that the LTAs will not be the limiting assemblies. Even though the use of the CE 16x16 NGF LTAs do not result in any unreviewed safety questions, a Waterford 3 exemption from 10CFR50.46 App. K for the NGF LTAs cladding material and a Technical Specification change to revise the wording in Technical Specification 5.3.1, Fuel Assemblies, were obtained.

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Core Assessment

A physics assessment was performed to confirm that the physics parameters used in the AORs are applicable to Cycle 14. The primary elements that impact the physics assessment are the Cycle 14 specific core design characteristics. These were explicitly incorporated into the neutronics models and files used to perform the physics assessment. For Cycle 14, this methodology included the application of the No Clad Lift–Off and Erbia burnable absorber methodologies.

All analyses and assessments were performed using NRC approved methodologies (in accordance with Technical Specification 6.9.1.11.1). Neutronics parameters important to safety were generated using NRC approved codes and methods. Physics parameters used in the assessment of safety analyses were generated consistent with the Technical Specification LCO's. There were no reload-driven Technical Specification changes required for Cycle 14, other than to Technical Specification 5.3.1 mentioned above.

There were four parameters that did not meet the Physics Assessment Checklist (PAC) assessment.

1) The single Control Element Assembly (CEA) withdrawal parameters were not met. Sufficient margin to accommodate the single CEA withdrawal within deadband event has been reserved as part of the Cycle 14 set point process.

2) The refueling boron concentration was not met. The required refueling boron concentration has been reduced by crediting insertion of the N-2 CEA configuration. This is listed as an external requirement of Table 6-9 [reference 5.3].

3) The core octant power asymmetry was not met. The impact of the cycle-maximum octant power asymmetry was addressed during the set point process.

4) The maximum pin burnup at MOC was not met. The COLR limit on linear heat rate has been reduced to 12.9 kW/ft for the entire cycle because of the presence of high exposure batch U assemblies that exceed 50,000 MWD/T at BOC. (These assemblies have Inconel top-grids that Waterford 3 wants on the core periphery to resolve top grid fretting fuel failures).

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Entergy assessments for the standard CE 16x16 batch X fuel assemblies and the NGF LTAs confirmed batch X compliance to fuel storage criticality design bases.

COLSS and CPC set points were determined and revised in the set point analysis and have been implemented per station procedures prior to the startup of Cycle 14. Also, the requirements of the PAC Assessment have been adequately addressed for Cycle 14. The types of actions required are limitations on the length of the refueling outage (less than 163 days), implementing the COLR, maintaining the refueling boron concentration for shutdown margin requirements and timing of actions concerning boron dilution.

Thermal Hydraulic Analysis

Steady state DNBR analyses for Cycle 14 at the rated core power of 3716 MWt were performed using the TORC computer code, the CE-1 Critical Heat Flux (CHF) correlation, simplified TORC modeling methods and the CETOP code. The ABB-TV critical heat flux correlation for the NGF LTAs was not credited for performance of the NGF LTAs,

The Modified Statistical Combination of Uncertainties (MSCU) methodology was applied to the Waterford 3 specific Thermal-Hydraulic (TH) parameters and other uncertainty factors at the 95/95 confidence/probability level to verify that the Specified Acceptable Fuel Design Limit (SAFDL) of 1.26 on the CE-1 Critical Heat Flux (CHF) correlation minimum DNBR remains applicable for Cycle 14.

The effects of rod bow on DNBR margin are incorporated into the safety and set point analysis.

NRC approved methods were used for the analysis and it was determined that the TH performance of the Cycle 14 core is bounded by the AORs.

Non-LOCA Safety Analysis

The reload process evaluates the applicability of the AORs for the various Design Bases Events (DBEs) to Cycle 14. The evaluation documents the key analysis inputs from the safety analysis ground rules, the bounding physics analysis, the bounding fuel performance analysis and the bounding thermal hydraulic analysis needed to validate the bounding non-LOCA analyses. The DBEs are categorized into three groups: Moderate Frequency, Infrequent and Limiting Fault events. The DBEs were evaluated with respect to four criteria: offsite dose, reactor coolant system

pressure, fuel performance (DNBR and fuel centerline melt SAFDL's), and loss of shutdown margin. All Chapter 15 FSAR events were reviewed to assure that they meet their respective criteria for Cycle 14.

The use of the lead test assemblies and issues with the AOR (CR-WF3-2005-0495) required that a cycle specific assessment of the CEA ejection analysis be performed. The assessment demonstrated that the results of the AOR bounded the Cycle 14 specific analysis. The results presented in the EPU AOR remained bounding with fuel failure less than 15% as was used for the radiological dose analysis.

Emergency Core Cooling System (ECCS) Performance Analysis

An ECCS performance evaluation was performed for Cycle 14 to demonstrate conformance to the ECCS Acceptance Criteria for Light Water Nuclear Power Reactors. The ECCS performance analysis is comprised of the Large Break Loss of Coolant Accident (LBLOCA), Small Break Loss of Coolant Accident (SBLOCA) and post-LOCA Long Term Cooling (LTC) analyses.

The Cycle 14 ECCS performance evaluation demonstrated that the results of the EPU analyses for LBLOCA, SBLOCA and LTC apply to Cycle 14. The results from the limiting break are bounded by the AOR and conform to the ECCS acceptance criteria (Peak Cladding Temperature ≤ 2200 °F, Maximum Cladding Oxidation ≤ 17%, Maximum Core-Wide Cladding Oxidation ≤ 1% and maintaining a coolable geometry and long term cooling). The results are applicable for the Peak Linear Heat Generation Rate (PLHGR) reported in the COLR and the EPU licensed core power level.

Extended Power Uprate

Waterford implemented a core power uprate from 3441 MWt to 3716 MWt. This uprate has been considered in the reload safety analysis report. Extended Power Uprate required changes to Technical Specifications were addressed by the Extended Power Uprate project.

Core Operating Limits Report (COLR)

As a result of the Extended Power Uprate (EPU) and Cycle 14 analyses, the COLR has been revised for Cycle 14. The Cycle 14 COLR meets the requirements of Waterford 3 Technical Specification 6.9.1.11. The changes to the COLR for Cycle 14 are consistent with the requirements of the Reload Analysis Report (RAR). The changes for Cycle 14 are listed below:

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Cycle 13 COLR Section or Figure	Cycle 14 Change
Section I Introduction	List changes made to COLR for Cycle 14
3.1.1.3 Moderator Temperature Coefficient	Figure 2 was changed to limit the most-negative hot full power MTC to less negative than -3.9×10^{-4} $\Delta\rho$/ °F
Section 3.2.1 Linear Heat Rate	Section 3.2.1 was revised to list the Linear Heat Rate with COLSS in service as 12.9 kw/ft and the Linear Heat Rate with COLSS out of service (COOS) as 13.2 kw/ft
Figure 6 Allowable Peak Linear Heat Rate Versus Tc (COLSS in Service)	Figure 6 was updated since the Linear Heat Rate for Cycle 14 is 12.9 kw/ft and constant with temperature with COLSS in Service
Figure 7 Allowable Peak Linear Heat Rate Versus Tc (COLSS Out of Service)	Figure 7 was updated since the Linear Heat Rate for Cycle 14 is 13.2 kw/ft and constant with temperature with COLSS Out of Service
Section 3.2.4 DNBR Margin	Section 3.2.4.c was revised to allow use of Figure 9A and notes below the text of Section 3.2.4 for use with Figures 8, 8A, 9 & 9A were updated and new notes were added.
Figure 8 Allowable DNBR with Any CEAC Operable (COLSS Out of Service)	Figure 8, was revised to incorporate cycle-specific limits for Cycle 14

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Cycle 13 COLR Section or Figure	Cycle 14 Change
Figure 8A Subset of Allowable DNBR with Any CEAC Operable (COLSS Out of Service)	Figure 8A, was revised to provide better resolution for the four power ranges in the lower portion of Figure 8
Figure 9 Allowable DNBR with No CEAC(s) Operable (COLSS Out of Service)	Figure 9, was revised to incorporate cycle-specific limits for Cycle 14
Figure 9A Subset of Allowable DNBR with No CEAC(s) Operable (COLSS Out of Service)	Figure 9A, was added to provide better resolution for the four power ranges in the lower portion of Figure 9
Section 3.2.7 Axial Shape Index	Section 3.2.7 was revised to incorporate the new Axial Shape Index (ASI) limits required to support extended power uprate and the Cycle 14 COOS analysis
Section III Methodologies	Section III.6 was revised to correct the document number. Sections III.9 and III.10 were added in accordance with License Amendment 199 and sections III.11, III.12 and III.13 were added in accordance with License Amendment Request NPF-38-258 to support eventual adoption of Zirconium Diboride as an integral fuel burnable absorber and ZIRLO™ fuel rod cladding

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COLSS/CPC Set Point Changes

Certain events (such as Anticipated Operational Occurrences (AOOs) like CEA drops, single CEA deviations within the CPC dead band, and Excess Load with Loss of AC power) are analyzed to obtain the required overpower margin that needs to be set aside in COLSS/CPC to prevent fuel failure. Requirements resulting from the transient analyses are input into the COLSS/CPC set points process and cycle-specific addressable constants are derived. The constants are modified prior to cycle startup to ensure that the provisions of the safety analyses are implemented for cycle operation.

2.2 LOW POWER PHYSICS TESTING

2.2.1 Initial Criticality (Ref. 5.7)

Following each refuel, initial criticality is achieved by boron dilution. The initial RCS boron concentration at the start of the dilution is required to be greater than the predicted All Rods Out (ARO) Critical Boron Concentration (CBC) by an amount worth 1.5%$\Delta\rho$. An estimated CBC is calculated for ARO and CEA Group P at 75 inches withdrawn. All Shutdown and Regulating CEA Groups are withdrawn to their upper electrical limits. Group P is withdrawn to 75 inches and dilution is commenced. For Cycle 14, the estimated CBC was calculated to be ***2046*** ppm. Criticality was achieved with a CBC of ***2044*** ppm and Group P at 75 inches withdrawn.

2.2.2 Critical Boron Concentration Measurement (Ref. 5.9)

The purpose of this test is to verify the critical boron concentration for the ARO CEA configuration of the startup test predictions. Initially, CEAs are ARO except for CEA Group P at greater than 130 inches withdrawn. Three stable RCS boron samples are averaged to estimate the rodded CBC. Group P is withdrawn to the upper group stop and the residual worth is measured using a reactivity meter. The rodded CBC is then corrected using the Group P residual worth. The measured ARO CBC for Cycle 14 was ***2072*** ppm. The predicted ARO CBC for Cycle 14 was ***2076*** ppm.

2.2.3 Isothermal Temperature Coefficient Measurement (Ref. 5.10)

The Isothermal Temperature Coefficient (ITC) is estimated by measuring changes in reactivity associated with RCS temperature changes. The RCS average temperature is decreased by approximately 5°F and the reactivity change is measured using a reactivity meter. The temperature is then returned to ***541***°F and the reactivity change is again measured.

The Moderator Temperature Coefficient (MTC) is then calculated by subtracting the predicted Fuel Temperature Coefficient (FTC) from the measured average ITC. Additional calculations include MTC linear extrapolations to both 70% and 100% power.

Table 2.2.3-1

Waterford 3 ITC/MTC Measurement Results*			
	Measured*	***Predicted***	***Acceptance Criteria***
ITC	***-0.034***	***0.012***	***±0.3***
MTC (0%)	***0.13***	***0.175***	***-3.9<MTC<+0.5***
MTC (70%)	***-0.528***	***-0.464***	***-3.9<MTC<0.0***
MTC(100%)	***-0.856***	***-0.811***	***-3.9<MTC<-0.2***

* All values are $x10^{-4}$ $\Delta\rho$/deg F.

** MTC values at 70% and 100% are extrapolated.

The acceptance criteria demands, per Waterford 3 Technical Specification 3.1.1.3, that the MTC be less positive than $+0.5 \times 10^{-4}$ $\Delta\rho$/deg F at zero power and within the limits of the COLR. This requires that the MTC be less positive than 0.0×10^{-4} $\Delta\rho$/deg F at 70% power, more negative than -0.2×10^{-4} $\Delta\rho$/deg F at 100% power, and less negative than $–3.9 \times 10^{-4}$ $\Delta\rho$/deg F at any power. Also, the measured average ITC must agree with predictions to within $\pm0.3 \times 10^{-4}$ $\Delta\rho$/deg F. All acceptance criteria were met and are summarized in Table 2.2.3-1.

2.2.4 CEA Group Worth Measurement (Ref. 5.8)

The purpose of this test is to determine the worth of selected CEA groups. Initially, CEAs are ARO except for Group P at greater than

130 inches withdrawn. Shutdown Bank B was designated as the reference group. First, the reactivity of the reference group was measured using a reactivity meter and dilution to compensate for the reactivity addition. Then all other CEA groups were measured using CEA exchanges and the reactivity meter.

The acceptance criteria demands that the measured worth of the Reference Group is within ±10% of the predicted worth, the measured worth of each CEA measurement group is within ±0.10%Δρ or ±15% of the predicted CEA group worth (whichever is larger), and the measured total CEA group worth is within ±10% of the predicted total CEA group worth. All acceptance criteria were met and are summarized in Table 2.2.4-1.

Table 2.2.4-1

WSES-3 CEA Group Worth Measurement Results				
Group(s) Inserted	Measured Worth* (%Δρ)	Predicted Worth (%Δρ)	Measured Error (%)	Acceptance Criteria Satisfied?
B	1.9166	1.9481	-1.62	YES
2 & 3	0.8092	0.9099	-11.07	YES
5 & 6 & P	0.8525	0.9657	-11.72	YES
1 & 4	1.0856	1.1676	-7.02	YES
A	1.4540	1.5168	-4.14	YES
Total	6.1179	6.5081	-5.99	YES

* After correction to adjust for test conditions.

2.3 POWER ASCENSION AND EPU TESTING

2.3.1 Fuel Symmetry Verification (Ref. 5.11)

Prior to exceeding 30% full power, fuel symmetry verification must be performed to ensure that no detectable fuel misloadings are present. Assembly power data is obtained by executing CECOR, a computer code used to construct three dimensional assembly and peak pin power distributions from incore detector signals. Each instrumented assembly power is compared with the average of its symmetric group and a percent difference is calculated. The acceptance criterion states that this difference must be less than or equal to 10%. The largest percent difference from average

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observed was approximately 7.9%. See Figure 1 for CECOR output.

2.3.2 Core Power Distribution Measurement (Ref. 5.12)

The purpose of this test is to verify that selected measured core power distribution parameters agree with the predicted core power distribution parameters at both the 68% and 100% power levels. These parameters include the measured radial power distribution, axial power distribution, planar radial peaking factor (F_{xy}), integrated radial peaking factor (F_r), core average axial peaking factor (F_z), and three-dimensional (3-D) power peaking factor (F_q).

A snapshot is taken and CECOR executed to obtain assembly power data. The comparisons were made using the GETARP program and the results are shown in Figures 2 and 3, and summarized in Tables 2.3.2-1 and 2.3.2-2.

The acceptance criteria states that for the measured radial power distribution, the total RMS error between measured and predicted relative power densities for all assemblies must be less than 5%. Also, for each assembly with a predicted relative power density less than 0.9, the percent difference between measured and predicted must be less than 15%. For those assemblies with predicted relative power densities greater than or equal to 0.9, the percent difference between measured and predicted must be less than 10%. For the axial power distribution, the RMS error between measured and predicted relative power densities must be less than 5%. Additionally, for all four peaking factors, measured and predicted values must agree to within ±10%. All acceptance criteria were met at both the 68% and 100% power levels and are summarized in Tables 2.3.2-1 and 2.3.2-2.

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Table 2.3.2-1

WSES-3 Cycle 14 68% Core Power Distribution Results				
	Westinghouse Predicted	Measured*	% Difference	Acceptance Criteria
Radial RMS	NA	1.2527	NA	<5%
Axial RMS	NA	3.2363	NA	<5%
F_{xy}	1.4700	1.4579	-0.8222	±5%
F_r	1.4500	1.4260	-1.6583	±5%
F_z	1.1700	1.1481	-1.8718	±5%
F_q	1.6900	1.6683	-1.2844	±5%

* RMS values in %, other values are absolute.

Table 2.3.2-2

WSES-3 Cycle 14 100% Core Power Distribution Results				
	Westinghouse Predicted	Measured*	% Difference	Acceptance Criteria
Radial RMS	NA	0.8994	NA	<5%
Axial RMS	NA	3.5244	NA	<5%
F_{xy}	1.4700	1.4569	-0.8924	±5%
F_r	1.4500	1.4254	-1.6964	±5%
F_z	1.1600	1.1443	-1.3558	±5%
F_q	1.6700	1.6531	-1.0137	±5%

* RMS values in %, other values are absolute.

2.3.3 Radial Peaking Measurement (Ref. 5.13 and Ref. 5.14)

For Cycle 14 EPU purposes, the All Rods Out (ARO) Radial Peaking Factor was verified conservative to the installed ARO Radial Peaking Factor in the COLSS and CPC systems. This verification was performed at 92.5%, 95.0%, 97.5% and 100.0%. The results are summarized in Table 2.3.3-1.

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Table 2.3.3-1

Waterford 3 Cycle 14 EPU ARO Radial Peaking Factor Results Acceptance Criteria: Measured ≤ COLSS & CPC			
	Measured	***COLSS***	***CPC***
F_{xy} (92.5%)	***1.4561***	***1.4802***	***1.4803***
F_{xy} (95.0%)	***1.4559***	***1.4802***	***1.4803***
F_{xy} (97.5%)	***1.4560***	***1.4802***	***1.4803***
F_{xy} (100.0%)	***1.4565***	***1.4802***	***1.4803***

2.3.4 Reactor Coolant System Flow Measurement (Ref. 5.15)

For Cycle 14 EPU purposes, the COLSS Reactor Coolant System (RCS) flow rate was verified conservative to the measured RCS flow rate. In addition, each CPC RCS flow rate was verified to be conservative to the COLSS RCS flow rate. This verification was performed at 92.5%, 95.0%, 97.5% and 100.0%. The results are summarized in Table 2.3.4-1 and
2.3.4-2.

Table 2.3.4-1

Waterford 3 Cycle 14 EPU RCS Flow Results Acceptance Criteria: Measured ≥ COLSS		
	Measured (gpm)	***COLSS (gpm)***
Flow (92.5%)	***428,206***	***425,278***
Flow (95.0%)	***428,333***	***427,435***
Flow (97.5%)	***428,424***	***426,813***
Flow (100.0%)	***427,940***	***426,753***

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Table 2.3.4-2

Waterford 3 Cycle 14 EPU RCS Flow Results Acceptance Criteria: COLSS ≥ CPC					
	*COLSS**	*CPC*			
	(normalized)	*A*	*B*	*C*	*D*
Flow (92.5%)	*1.0869*	*1.0855*	*1.0857*	*1.0852*	*1.0848*
Flow (95.0%)	*1.0960*	*1.0818*	*1.0819*	*1.0817*	*1.0820*
Flow (97.5%)	*1.0937*	*1.0801*	*1.0804*	*1.0802*	*1.0804*
Flow (100.0%)	*1.0900*	*1.0803*	*1.0805*	*1.0805*	*1.0807*

* Normalized to design mass flow rate.

2.3.5 Manual Secondary Calorimetric (Ref. 5.16)

For Cycle 14 EPU purposes, a hand heat balance calculation was conducted. This verifies the feedwater based secondary calorimetric heat balance calculations performed by COLSS. This verification was performed at approximately 92.5%, 95.0%, 97.5% and 100.0%. The results are summarized in Table 2.3.5-1.

Table 2.3.5-1

Waterford 3 Cycle 14 EPU Hand Heat Balance Results Acceptance Criteria: Ultrasonic FW ±0.5% Venturi FW ±1.0%		
Reactor Power Level	*Ultrasonic FW Based*	*Venturi FW Based*
92.66%	*92.40%*	*92.51%*
94.96%	*95.43%*	*95.34%*
97.83%	*97.72%*	*97.66%*
99.75%	*99.74%*	*99.72%*

2.4 OPERATIONAL TESTING

2.4.1 Isothermal Temperature Coefficient Measurement (Ref. 5.5)

Prior to reaching 40 EFPD core burnup, an additional ITC/MTC test was conducted to verify compliance with Technical Specification and COLR requirements. In a process similar to the Low Power

Startup and Power Escalation Report for Cycle 14

Physics Testing ITC Measurement, RCS temperature is increased and decreased by approximately 4°F and the power change is measured. This process was repeated 3 additional times to obtain sufficient data to determine an average rate of change of power with temperature. This value is multiplied by a predicted Power Coefficient to arrive at an average ITC.

The MTC is then calculated by subtracting the predicted Fuel Temperature Coefficient (FTC) from the measured average ITC. Additional calculations include MTC linear extrapolations to 70% and 100% at the current burnup and an extrapolation to 100% power at the end of cycle (EOC).

The acceptance criteria demands that, for any core burnup, the MTC be less positive than 0.0 x 10^{-4} $\Delta\rho$/deg F above 70% power, more negative than -0.2 x 10^{-4} $\Delta\rho$/deg F at 100% power, and less negative than –3.9 x 10^{-4} $\Delta\rho$/deg F at any power. Also, the measured average ITC must agree with predictions to within ±0.5 x 10^{-4} $\Delta\rho$/deg F. All acceptance criteria were met and are summarized in Table 2.4.1-1.

Table 2.4.1-1

Waterford 3* ITC/MTC Measurement Results			
	Measured**	Predicted	Acceptance Criteria
ITC	-1.149	-0.9361	±0.5
MTC (70%)	-0.6946	-0.4640	-3.9<MTC<0.0
MTC(100%)	-1.0400	-0.8110	-3.9<MTC<-0.2
EOC MTC (100%)	-2.8500	-2.6980	-3.9<MTC<-0.2

* All values are x10^{-4} $\Delta\rho$/deg F.

** MTC values at 70%, 100% and EOC 100% are extrapolated.

3.0 STARTUP TESTING

3.1 DESCRIPTION

3.1.1 The objectives of these tests were to demonstrate that SSCs perform satisfactorily at EPU conditions, that power uprate related modifications have been adequately constructed and implemented,

Startup and Power Escalation Report for Cycle 14

and that the facility can be operated at the proposed EPU conditions in accordance with design requirements and in a manner that will not endanger the health and safety of the public.

3.2 SUMMARY

For each test performed in the power ascension test program, test conditions and associated acceptance criteria were defined within the test. For tests utilizing existing plant procedures and surveillances, acceptance criteria were updated for uprated conditions. For special tests developed for power uprate start-up testing, two levels of acceptance criteria were developed. Level 1 criteria were associated with safe unit operation, and required a halt to power ascension. Level 2 criteria were associated with system/component performance expectations, and were evaluated prior to continuing to the next power plateau.

Plant testing performed during and following power ascension included the following:

- NSSS Plant Data Record
- Transient Data Record
- Radiation Surveys (including Biological Shield Effectiveness Survey)
- Initial Turbine Startup
- BOP Data Record
- Non-intrusive Monitoring (including Level 2 Piping Vibration Monitoring)
- Post Modification Testing
- Moisture Carryover Test
- Thermal Performance Test
- Process Variable Intercomparison
- CPC Process Noise Verification
- COLSS Secondary Pressure Loss Terms Verification

3.3 RESULTS

All required tests have been completed with the exception of a Plant Maneuvering Test, which will be performed during the next performance of the quarterly valve test. Also, several post modification tests (e.g. generator capacity check, turbine valve testing) are not yet complete. The

results of these tests, when performed, will be included in a supplemental Startup Report.

All parameters exceeding Category 2 limits have been evaluated to be acceptable for continued operation at 3716 MWt. Where the condition indicated less than optimal system performance, this was entered into the plant corrective action program. One Category 1 limit, MSR Shell Drain Tank 2B level (high), was exceeded after 100% power was achieved. This has been evaluated to be acceptable in the interim for continued plant operation at 100% power, and has been entered into the plant corrective action program as a degraded condition. The full results for the plant testing during power ascension have been reviewed by the On-site Safety Review Committee (OSRC). Final results of the testing and equipment performance data gathering have demonstrated acceptable continued plant operation at the uprate power level of 3716 MWt.

4.0 CONCLUSIONS

4.1 PHYSICS TESTING

Based upon the successful completion of all startup tests required, specifically those described above, and the proximity of core physics parameters to predicted values, it is concluded that the measured core parameters verify the Cycle 14 nuclear design calculations and demonstrate adequate conservatism with respect to the limits and requirements of the FSAR and technical specifications, respectively. Results of the testing and equipment performance data gathering have demonstrated acceptable continued plant operation at the uprate power level of 3716 MWt.

4.2 STARTUP TESTING

All required tests have been completed with the exception of a Plant Maneuvering Test, which will be performed during the next performance of the quarterly valve test. Also, several post modification tests (e.g. generator capacity check, turbine valve testing) are not yet complete. The results of these tests, when performed, will be included in a supplemental Startup Report.

Startup and Power Escalation Report for Cycle 14

5.0 REFERENCES

5.1 *Waterford 3* Technical Specifications

5.2 *Waterford 3* Cycle 14 Core Operating Limits Report (COLR)

5.3 *Waterford 3* Final Safety Analysis Report (FSAR)

5.4 *Waterford 3* Cycle 14 Reload Analysis Report

5.5 *Waterford 3* Procedure NE-002-002, Variable Tavg Test

5.6 *Waterford 3* Procedure NE-002-003, Post-Refueling Startup Testing Controlling Document

5.7 *Waterford 3* Procedure NE-002-030, Initial Criticality

5.8 *Waterford 3* Procedure NE-002-040, CEA Group Worth Measurement

5.9 *Waterford 3* Procedure NE-002-050, Critical Boron Concentration Measurement

5.10 *Waterford 3* Procedure NE-002-060, Isothermal Temperature Coefficient Measurement

5.11 *Waterford 3* Procedure NE-002-110, Fuel Symmetry Verification

5.12 *Waterford 3* Procedure NE-002-140, Core Power Distribution Measurement

5.13 *Waterford 3* Procedure NE-002-150, Radial Peaking Factor and CEA Shadowing Factor Measurement

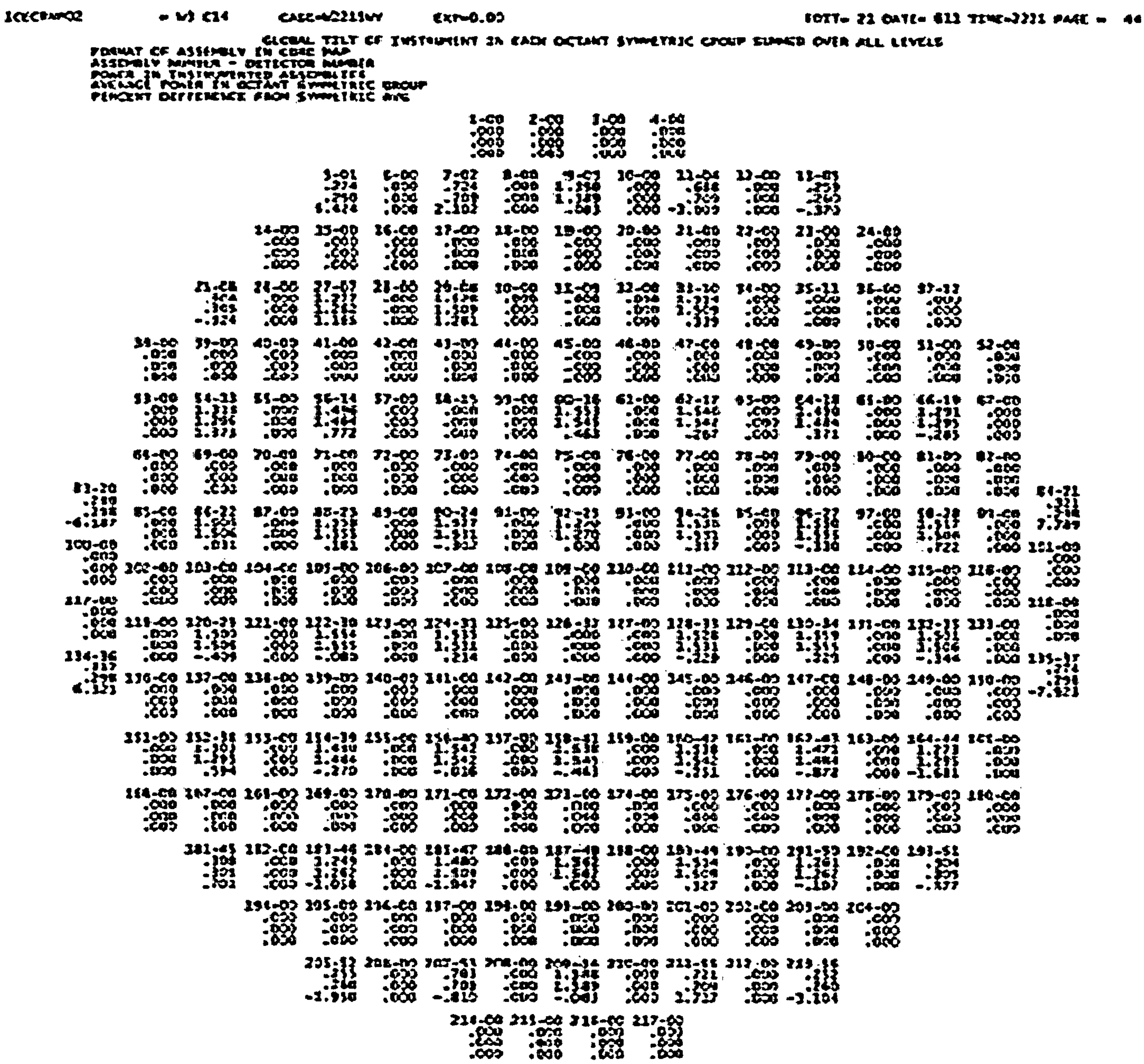
5.14 *Waterford 3* Procedure NE-004-002, Radial Peaking Factor Verification

5.15 *Waterford 3* Procedure NE-004-006, RCS Flow Rate With COLSS Operable

5.16 *Waterford 3* Procedure NE-005-201, Heat Balance Calculations

Startup and Power Escalation Report for Cycle 14

Figure 1
CECOR Results for Fuel Symmetry Verification



Startup and Power Escalation Report for Cycle 14

Figure 2
GETARP Results at 68% Power with Westinghouse Predictions W2216VA on June 12, 2005

```
GGGGGGGGGG EEEEEEEEEE TTTTTTTTTT    AAAA     RRRRRRRRR  PPPPPPPPP
GGGGGGGGGG EEEEEEEEEE TTTTTTTTTT   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:
PREDICTED DATA EXTRACTED FROM: c14p88
```

RELATIVE RADIAL POWER DISTRIBUTION COMPARISON

Legend (each cell): PREDICTED / MEASURED / % DIFFER

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

Top edge row:

.274 .296 8.09	.433 .453 4.63	.424 .443 4.37	.239 .256 7.01

Main map:

			.224 .239 6.79	.454 .465 2.49	.637 .631 -.92	1.102 1.096 -.53	1.177 1.182 .42	1.085 1.071 -1.28	.625 .600 -3.93	.449 .453 .83	.222 .229 3.25			
		.275 .295 7.43	.963 .934 -.97	1.127 1.113 -1.23	1.175 1.159 -1.33	1.289 1.275 -1.06	1.207 1.202 -.45	1.282 1.264 -1.39	1.167 1.143 -2.04	1.120 1.101 -1.73	.963 .943 -2.12	.269 .290 7.77		
	.269 .276 2.42	.637 .643 .94	1.114 1.104 -.87	1.099 1.093 -.53	1.292 1.292 -.01	1.149 1.152 .22	1.330 1.332 .16	1.147 1.149 .16	1.289 1.285 -.28	1.098 1.091 -.63	1.111 1.100 -.98	.637 .645 1.30	.275 .291 5.75	
.222 .240 8.09	.963 .960 -.36	1.111 1.104 -.60	1.053 1.043 -.96	1.286 1.281 -.41	1.226 1.227 .11	1.331 1.337 .44	1.152 1.157 .44	1.331 1.336 .36	1.227 1.227 -.04	1.286 1.279 -.52	1.053 1.043 -.96	1.114 1.102 -1.04	.963 .953 -1.06	.224 .240 7.16
.449 .471 4.88	1.120 1.131 .99	1.098 1.096 -.18	1.286 1.280 -.48	1.145 1.142 -.24	1.326 1.323 -.24	1.148 1.160 1.06	1.319 1.329 .80	1.150 1.161 .94	1.325 1.312 -1.02	1.145 1.141 -.38	1.286 1.273 -1.02	1.099 1.088 -.99	1.127 1.117 -.91	.454 .470 3.63
.625 .637 1.99	1.167 1.165 -.18	1.289 1.282 -.57	1.227 1.223 -.31	1.325 1.323 -.15	1.227 1.231 .36	1.308 1.314 .47	1.178 1.186 .71	1.312 1.318 .44	1.227 1.230 .22	1.326 1.321 -.37	1.226 1.218 -.63	1.292 1.280 -.92	1.175 1.168 -.62	.637 .650 1.98
1.085 1.078 -.67	1.282 1.282 -.03	1.147 1.147 -.02	1.331 1.329 -.12	1.150 1.158 .66	1.312 1.306 -.45	1.159 1.172 1.15	1.099 1.095 -.37	1.159 1.179 1.70	1.308 1.310 .15	1.148 1.151 .28	1.331 1.327 -.32	1.149 1.153 .31	1.289 1.296 .57	1.102 1.100 -.17
1.177 1.163 -1.21	1.207 1.202 -.42	1.330 1.329 -.09	1.152 1.152 -.01	1.319 1.324 .41	1.178 1.189 .91	1.099 1.124 2.25	.873 .917 5.09	1.099 1.137 3.50	1.178 1.192 1.18	1.319 1.325 .46	1.152 1.157 .40	1.330 1.335 .40	1.207 1.208 .08	1.177 1.168 -.73
1.102 1.090 -1.06	1.289 1.277 -.90	1.149 1.147 -.20	1.331 1.324 -.52	1.148 1.156 .67	1.308 1.310 .19	1.159 1.182 2.03	1.099 1.129 2.70	1.159 1.185 2.22	1.312 1.307 -.40	1.150 1.158 .66	1.331 1.334 .23	1.147 1.153 .54	1.282 1.286 .33	1.085 1.080 -.51
.637 .646 1.49	1.175 1.164 -.96	1.292 1.277 -1.13	1.226 1.216 -.79	1.326 1.319 -.56	1.227 1.227 .04	1.312 1.318 .44	1.178 1.190 1.05	1.308 1.316 .64	1.227 1.229 .16	1.325 1.321 -.33	1.227 1.221 -.52	1.289 1.278 -.85	1.167 1.159 -.69	.625 .635 1.60
.454 .472 4.06	1.127 1.126 -.08	1.099 1.090 -.82	1.286 1.270 -1.25	1.145 1.131 -1.26	1.325 1.312 -.98	1.150 1.153 .30	1.319 1.317 -.17	1.148 1.155 .64	1.326 1.316 -.77	1.145 1.140 -.47	1.286 1.269 -1.34	1.098 1.086 -1.10	1.120 1.110 -.87	.449 .465 3.53
.224 .241 7.63	.963 .949 -1.41	1.114 1.098 -1.44	1.053 1.038 -1.45	1.286 1.268 -1.43	1.227 1.215 -1.00	1.331 1.327 -.26	1.152 1.156 .35	1.331 1.334 .22	1.226 1.224 -.13	1.286 1.277 -.63	1.053 1.041 -1.12	1.111 1.097 -1.29	.963 .949 -1.43	.222 .239 7.54
	.275 .275 .08	.637 .637 .00	1.111 1.093 -1.64	1.098 1.077 -1.87	1.289 1.268 -1.60	1.147 1.140 -.61	1.330 1.330 .02	1.149 1.150 .11	1.292 1.290 -.16	1.099 1.089 -.93	1.114 1.097 -1.51	.637 .640 .46	.269 .276 2.64	
		.269 .286 6.32	.963 .942 -2.21	1.120 1.093 -2.37	1.167 1.140 -2.34	1.282 1.262 -1.58	1.207 1.199 -.63	1.289 1.273 -1.21	1.175 1.156 -1.65	1.127 1.106 -1.91	.963 .949 -1.46	.275 .293 6.39		
			.222 .228 2.49	.449 .453 .95	.625 .614 -1.69	1.085 1.077 -.73	1.177 1.187 .83	1.102 1.097 -.47	.637 .629 -1.20	.454 .459 1.13	.224 .226 .71			

Left edge column (top to bottom):

.239 .247 3.23	.424 .439 3.42	.433 .447 3.28	.274 .283 3.27

Right edge column (top to bottom):

.274 .287 4.83	.433 .450 3.84	.424 .439 3.65	.239 .244 2.18

Bottom edge row:

.239 .258 7.78	.424 .445 4.87	.433 .454 4.93	.274 .296 7.95

Startup and Power Escalation Report for Cycle 14

Figure 2
GETARP Results at 68% Power with Westinghouse Predictions (Continued)

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.3670	.4498	22.5512
2	.4980	.5384	8.1157
3	.6160	.6198	.6165
4	.6860	.6933	1.0645
5	.7460	.7586	1.6929
6	.7970	.8158	2.3557
7	.8380	.8650	3.2236
8	.8730	.9069	3.8784
9	.9040	.9420	4.2046
10	.9310	.9713	4.3295
11	.9540	.9957	4.3673
12	.9750	1.0160	4.2057
13	.9950	1.0332	3.8408
14	1.0140	1.0481	3.3620
15	1.0300	1.0613	3.0385
16	1.0460	1.0733	2.6146
17	1.0600	1.0846	2.3204
18	1.0740	1.0952	1.9768
19	1.0870	1.1053	1.6830
20	1.0990	1.1147	1.4297
21	1.1090	1.1233	1.2918
22	1.1200	1.1309	.9758
23	1.1290	1.1373	.7360
24	1.1370	1.1423	.4652
25	1.1450	1.1458	.0656
26	1.1520	1.1477	-.3762
27	1.1580	1.1481	-.8550
28	1.1630	1.1472	-1.3574
29	1.1680	1.1453	-1.9475
30	1.1710	1.1425	-2.4318
31	1.1730	1.1393	-2.8688
32	1.1740	1.1360	-3.2336
33	1.1740	1.1328	-3.5065
34	1.1730	1.1299	-3.6767
35	1.1710	1.1271	-3.7456
36	1.1660	1.1244	-3.5645
37	1.1610	1.1214	-3.4137
38	1.1530	1.1173	-3.0951
39	1.1430	1.1115	-2.7594
40	1.1300	1.1028	-2.4064
41	1.1150	1.0902	-2.2229
42	1.0960	1.0725	-2.1483
43	1.0710	1.0483	-2.1221
44	1.0390	1.0165	-2.1696
45	1.0010	.9759	-2.5048
46	.9540	.9258	-2.9575
47	.8930	.8654	-3.0909
48	.8180	.7944	-2.8794
49	.7320	.7130	-2.5997
50	.5910	.6214	5.1411
51	.4350	.5205	19.6528

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4579	1.4700	-.8222 %
FR	1.4260	1.4500	-1.6583 %
FZ	1.1481	1.1700	-1.8718 %
FQ	1.6683	1.6900	-1.2844 %

CALCULATED RMS VALUES
RADIAL = 1.2527
AXIAL = 3.2363
MEASURED ASI = -.0313
PREDICTED ASI = -.0554

ACCEPTANCE CRITERIA REPORT

9.4 MEASURED FXY WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
MEASURED FR WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
MEASURED FZ WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
MEASURED FQ WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
9.[illegible] RMS ERROR ON AXIAL DISTRIBUTION WAS LESS THAN OR EQUAL TO 5.000 %.
9.1 RMS ERROR ON RADIAL DISTRIBUTION WAS LESS THAN OR EQUAL TO 5.000 %.
ALL PREDICTED RADIAL POWERS LESS THAN 0.9
9.2.1 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.

Startup and Power Escalation Report for Cycle 14

Figure 3
GETARP Results at 100% Power with Westinghouse Predictions W22215L on June 17, 2005

GETARP (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: w22215L.S01
PREDICTED DATA EXTRACTED FROM: c14p100

RELATIVE RADIAL POWER DISTRIBUTION COMPARISON

PREDICTED
MEASURED
% DIFFER

% DIFFERENCE = (MEAS.-PREDICTED) / PREDICTED x 100.0

						.278	.436	.428	.243							
						.298	.448	.438	.233							
						6.30	2.85	2.26	4.93							
				.227	.459	.639	1.090	1.161	1.073	.628	.455	.226				
				.247	.469	.639	1.091	1.165	1.066	.608	.456	.237				
				9.00	2.18	.01	.11	.31	-.64	-3.13	.33	5.02				
			.281	.959	1.118	1.163	1.273	1.195	1.267	1.156	1.113	.962	.274			
			.296	.958	1.115	1.159	1.271	1.194	1.260	1.143	1.103	.947	.290			
			5.42	-.07	-.24	-.38	-.18	-.10	-.56	-1.16	-.90	-1.53	5.94			
		.274	.644	1.110	1.096	1.283	1.146	1.321	1.144	1.280	1.095	1.108	.644	.281		
		.287	.646	1.106	1.091	1.282	1.146	1.328	1.144	1.276	1.089	1.102	.647	.298		
		4.88	.35	-.37	-.47	-.09	.01	.60	-.02	-.33	-.54	-.53	.48	5.01		
	.226	.962	1.108	1.055	1.283	1.226	1.329	1.155	1.329	1.226	1.282	1.055	1.110	.959	.227	
	.240	.963	1.106	1.043	1.279	1.223	1.335	1.155	1.335	1.224	1.279	1.043	1.103	.954	.239	
	5.99	.10	-.15	-1.16	-.29	-.25	.43	.04	.42	-.19	-.25	-1.18	-.60	-.50	5.45	
	.455	1.113	1.095	1.282	1.149	1.327	1.156	1.324	1.158	1.326	1.149	1.283	1.096	1.118	.459	
	.469	1.127	1.094	1.279	1.141	1.319	1.160	1.332	1.162	1.313	1.140	1.271	1.086	1.113	.469	
	3.04	1.26	-.11	-.23	-.74	-.57	.35	.62	.35	-1.02	-.75	-.90	-.93	-.45	2.14	
	.628	1.156	1.280	1.226	1.326	1.236	1.318	1.193	1.322	1.236	1.327	1.226	1.283	1.163	.639	
	.636	1.158	1.277	1.220	1.323	1.233	1.321	1.196	1.326	1.233	1.323	1.217	1.277	1.163	.649	
.243	1.22	.19	-.22	-.45	-.21	-.25	.23	.21	.29	-.24	-.30	-.75	-.44	.00	1.64	.278
.254																.296
4.51	1.073	1.267	1.144	1.329	1.158	1.322	1.180	1.125	1.180	1.318	1.156	1.329	1.146	1.273	1.090	6.45
	1.074	1.266	1.139	1.326	1.157	1.311	1.182	1.119	1.190	1.316	1.152	1.326	1.148	1.284	1.100	
.428	.08	-.11	-.43	-.24	-.06	-.84	.21	-.55	.81	-.15	-.31	-.25	.13	.86	.89	.436
.438																.450
2.26	1.161	1.195	1.321	1.155	1.324	1.193	1.125	.902	1.125	1.193	1.324	1.155	1.321	1.195	1.161	3.29
	1.159	1.192	1.322	1.148	1.326	1.194	1.131	.926	1.146	1.198	1.328	1.155	1.332	1.202	1.168	
.430	-.22	-.25	.04	-.38	.18	.08	.57	2.71	1.83	.38	.34	.04	.81	.59	.60	.428
.447																.440
2.47	1.090	1.273	1.146	1.329	1.156	1.318	1.180	1.125	1.180	1.322	1.158	1.329	1.144	1.267	1.073	2.88
	1.087	1.262	1.139	1.320	1.157	1.320	1.189	1.135	1.191	1.315	1.159	1.333	1.149	1.277	1.080	
.278	-.23	-.83	-.59	-.69	.07	.17	.79	.92	.94	-.51	.13	.31	.45	.81	.68	.243
.292																.253
4.94	.639	1.163	1.281	1.226	1.327	1.236	1.322	1.193	1.318	1.236	1.326	1.226	1.280	1.156	.628	4.07
	.645	1.157	1.273	1.213	1.320	1.231	1.323	1.195	1.321	1.231	1.322	1.220	1.277	1.156	.636	
	.98	-.50	-.79	-1.02	-.50	-.37	.11	.14	.22	-.39	-.26	-.48	-.25	.03	1.24	
	.459	1.118	1.096	1.283	1.149	1.326	1.158	1.324	1.156	1.327	1.149	1.282	1.095	1.113	.455	
	.470	1.121	1.087	1.268	1.131	1.314	1.155	1.321	1.155	1.313	1.139	1.269	1.086	1.109	.464	
	2.43	.26	-.82	-1.20	-1.59	-.88	-.29	-.25	-.11	-1.06	-.89	-.98	-.85	-.38	2.00	
	.227	.959	1.110	1.055	1.282	1.226	1.329	1.155	1.329	1.226	1.283	1.055	1.108	.962	.226	
	.241	.952	1.100	1.039	1.268	1.213	1.326	1.153	1.331	1.219	1.276	1.042	1.100	.954	.239	
	5.96	-.72	-.90	-1.56	-1.07	-1.10	-.22	-.14	.14	-.54	-.55	-1.25	-.73	-.83	5.63	
		.281	.644	1.108	1.095	1.280	1.144	1.321	1.146	1.283	1.096	1.110	.644	.274		
		.286	.641	1.098	1.077	1.260	1.134	1.322	1.143	1.279	1.086	1.099	.643	.287		
		1.76	-.48	-.89	-1.63	-1.56	-.85	.04	-.24	-.35	-.91	-.96	-.08	4.90		
			.274	.962	1.113	1.156	1.267	1.195	1.273	1.163	1.118	.959	.281			
			.287	.948	1.097	1.140	1.258	1.191	1.268	1.154	1.107	.953	.293			
			4.80	-1.41	-1.40	-1.38	-.73	-.34	-.38	-.78	-.97	-.58	4.41			
				.226	.455	.628	1.073	1.161	1.090	.639	.459	.227				
				.236	.458	.623	1.073	1.171	1.092	.637	.462	.233				
				4.26	.55	-.78	.01	.88	.19	-.38	.75	2.83				
						.243	.428	.436	.278							
						.257	.440	.450	.293							
						5.81	2.90	3.20	6.15							

Startup and Power Escalation Report for Cycle 14

Figure 3
GETARP Results at 100% Power with Westinghouse Predictions (Continued)

RELATIVE AXIAL POWER DISTRIBUTION COMPARISON

NODE	PREDICTED	MEAS.	% DIFFERENCE
1	.4050	.4997	23.3858
2	.5470	.5974	9.2128
3	.6740	.6865	1.8576
4	.7480	.7664	2.4535
5	.8120	.8365	3.0175
6	.8650	.8969	3.6908
7	.9070	.9479	4.5097
8	.9430	.9900	4.9836
9	.9740	1.0240	5.1332
10	1.0000	1.0509	5.0873
11	1.0220	1.0717	4.8617
12	1.0410	1.0875	4.4707
13	1.0580	1.0995	3.9229
14	1.0740	1.1086	3.2179
15	1.0870	1.1156	2.6277
16	1.0990	1.1212	2.0198
17	1.1100	1.1260	1.4389
18	1.1200	1.1302	.9113
19	1.1280	1.1340	.5363
20	1.1360	1.1375	.1322
21	1.1420	1.1405	-.1356
22	1.1470	1.1427	-.3742
23	1.1520	1.1441	-.6900
24	1.1550	1.1443	-.9288
25	1.1570	1.1432	-1.1921
26	1.1590	1.1408	-1.5735
27	1.1590	1.1369	-1.9034
28	1.1590	1.1318	-2.3439
29	1.1570	1.1256	-2.7112
30	1.1550	1.1186	-3.1528
31	1.1520	1.1110	-3.5599
32	1.1470	1.1031	-3.8240
33	1.1420	1.0953	-4.0905
34	1.1350	1.0876	-4.1760
35	1.1270	1.0801	-4.1591
36	1.1170	1.0727	-3.9621
37	1.1060	1.0651	-3.6936
38	1.0930	1.0568	-3.3080
39	1.0790	1.0471	-2.9529
40	1.0620	1.0352	-2.5269
41	1.0420	1.0199	-2.1196
42	1.0190	1.0003	1.8365
43	.9920	.9751	-1.6993
44	.9590	.9434	-1.6292
45	.9190	.9040	-1.6349
46	.8710	.8561	-1.7106
47	.8120	.7991	-1.5837
48	.7420	.7328	-1.2441
49	.6620	.6570	-.7578
50	.5350	.5721	6.9400
51	.3960	.4789	20.9353

PEAKING PARAMETER COMPARISON

PARAMETER	MEAS.	PREDICTED	% DIFFERENCE
FXY	1.4569	1.4700	-.8924 %
FR	1.4254	1.4500	-1.6964 %
FZ	1.1443	1.1600	-1.3558 %
FQ	1.6531	1.6700	-1.0137 %

CALCULATED RMS VALUES
RADIAL = .8994
AXIAL = 3.5244
MEASURED ASI = .0185
PREDICTED ASI = -.0047

ACCEPTANCE CRITERIA REPORT

MEASURED FXY WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
MEASURED FR WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
MEASURED FZ WAS WITHIN PLUS OR MINUS 5.000 % OF THE PREDICTED VALUE.
MEASURED FQ WAS WITHIN PLUS OR MINUS 5.000 % 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

W3F1-2005-0067

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
A more detailed report of the EPU test results will be provided in a supplemental Startup Report submitted pursuant to Waterford 3 Technical Specification 6.9.1.3.	X		Per TS 6.9.1.3