Entergy

Entergy Nuclear South
Entergy Operations, Inc.
17265 River Road
Killona, LA 70066
Tel 504 739 6475
Fax 504 739 6698
aharris@entergy.com

Alan J. Harris
Director, Nuclear Safety Assurance
Waterford 3

W3F1-2001-0117
A4.05
PR

December 10, 2001

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

Subject: Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38
Technical Specification Change Request, NPF-38-238
Appendix K Margin Recovery – Power Uprate Request
Response to Requests for Additional Information

Gentlemen:

In accordance with 10CFR50.90, Entergy Operations, Inc. (Entergy) submitted, by letter dated September 21, 2001, a request for changes to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Operating License and Technical Specifications associated with an increase in the licensed power level. The changes involve a proposed increase in the power level from 3,390 MWt to 3,441 MWt representing a measurement uncertainty recapture power uprate. The NRC has returned two Requests for Additional Information (RAI), dated November 6 and November 8, 2001. The response to these RAIs is provided in Attachment 1.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The attached responses do not impact that conclusion.

Entergy requests that the effective date for this TS change to be within 60 days of startup from Refueling Outage (RF) 11. Although this request is neither exigent nor emergency, your prompt review and approval prior to startup from RF 11 is requested. Entergy would like to implement the increased power level upon startup from our upcoming RF11 scheduled to start on March 22, 2002.

A001

There are new commitments associated with the attached responses and these are listed in Attachment 3. A summary of the other commitments associated with the implementation of this request was provided in Attachment 4 of the September 21, 2001 letter. Should you have any questions or comments concerning this response, please contact Jerry Burford at (601) 368-5755.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 10, 2001.

Very truly yours,

Alan J Harris

A.J. Harris
Director, Nuclear Safety Assurance
Waterford 3

AJH/FGB/cbh

Attachments:
1. Response To Requests For Additional Information
2. Report On Dynamic Simulations For Grid Stability
3. List of Regulatory Commitments

cc:
E.W. Merschoff, NRC Region IV
N. Kalyanam, NRC-NRR
J. Smith
N.S. Reynolds
NRC Resident Inspectors Office
Louisiana DEQ/Surveillance Division
American Nuclear Insurers

ATTACHMENT 1

TO

W3F1-2001-0117

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION

By letter dated September 21, 2001, Entergy Operations, Inc. (the licensee), proposed a license amendment to change the Technical Specifications (TS) for Waterford Steam Electric Generating Station, Unit 3 (Waterford 3). The proposed amendment addresses modifications necessary to increase the rated thermal power of Waterford 3 from 3,390 MWt to 3,441 MWt, an increase of 1.5%. These changes result from increased feedwater flow measurement accuracy to be achieved by utilizing high accuracy ultrasonic flow measurement instrumentation to be installed in the main feedwater system piping. The NRC returned two requests for additional information (RAI) in letters dated November 6, 2001 (The I&C Branch questions below) and November 8, 2001 (the Electrical Branch and Radiological Consequences questions below). The responses to the RAIs are provided below.

Electrical Branch Questions

1. Provide details about the grid stability analysis including major assumptions and results and conclusions of the analysis.

   Response:

   The South Louisiana transmission area around Waterford 3 is known as Amite South. A grid stability analysis has been performed assuming projected load growth and a 2% power increase in output of Waterford 3. This is a conservative value compared to the final uprate rating. Waterford 3 was simulated with a total output to the grid of 1172 MW. The analysis concluded that the grid and Waterford 3 generator will remain stable for postulated faults in the vicinity of Waterford 3. The preliminary results of the study are attached (Attachment 2) for reference.

2. Provide the output in megawatts electrical (MWe) corresponding to 3390 MW thermal (MWt) and 3441 MWt.

   Response:

   The Waterford 3 net electrical output of 1104 MW corresponds to an NSSS thermal output of 3411 MWt (core thermal power of 3390 MWt plus 21 MW for reactor coolant pump heat). Dividing these two numbers and multiplying the result by the Appendix K Power Uprate change in thermal output gives the approximate projected increase in plant electrical output:

   $$(1104/3411) \times (3441 - 3390) = 16.5 \text{ MWe}$$

   Thus, with the power uprate the electrical output is expected to be 1120.5 MWe.

3. The initial conditions and assumptions for a station blackout (SBO) under power uprate (3441 MWt) condition shall include an operating history of 100 days at 101.5 percent power conditions. Clarify that the assumption used for the maximum decay heat for the SBO analysis is for the power uprate condition.

Response:

The increased Appendix K power uprate (3441 MWt) decay heat loads impact the Condensate Storage Pool (CSP) inventory requirement and the Emergency Feedwater (EFW) pump flow requirement. The current total feedwater required to remove decay heat through a 4-hour duration station blackout is 580,200 lbm, which is less than the CSP minimum storage requirement of 1,068,000 lbm. The current required average EFW flow rate for the 4-hour period is 293 gpm, which is less than the available minimum flow rate of 575 gpm of the turbine-driven EFW pump. The Appendix K power uprate will increase the maximum decay heat loads for the station blackout analysis by 1.5%, but adequate margin is available to continue to maintain sufficient heat removal capacity.

Using the method prescribed in NUMARC 87-00 Rev 1, "Guidelines And Technical Bases for NUMARC Initiatives Addressing Station Blackout At Light Water Reactors," the condensate inventory required for decay heat removal of a plant rated at 3390 MWt is 74,987 gallons. For the uprated power level of 3441MWt, the required volume is 76,115 gallons. The Waterford 3 calculation of record assumes approximately 80,000 gallons is required. This quantity is less than the Technical Specification value of 170,000 gallons. Hence there is no significant impact on the decay heat removal capability. The SBO discussion in Waterford 3 FSAR section 8.3-1A, remains valid.

4. Section 3.11.3.1 does not provide any conclusion regarding the impact of equipment qualification of equipment located outside the containment due to power uprate. Please provide a discussion about the equipment qualification of equipment located outside the containment due to power uprate.

Response:

Since the containment accident parameters remain bounded as the result of power uprate, safety-related equipment located outside containment will also not be subjected to accident environments more severe than those postulated for current design basis conditions. The current evaluations performed per 10CFR50.49 therefore remain valid.

5. Section 3.9.2, there is no mention of the adequacy of equipment terminal voltages. Provide a discussion about the adequacy of equipment terminal voltages (safety and non-safety loads) due to power uprate.

   Response:

   The Appendix K power uprate does not require the replacement of any equipment. The existing electrical equipment is adequately sized for safe shutdown subsequent to a design bases event with or without a loss of offsite power. The terminal voltage for safety related and non-safety related equipment is governed by degraded grid conditions that are monitored by degraded voltage (DV) relays. The electrical equipment has adequate terminal voltage at the trip point of the DV relays. Since there is no significant increase in the plant electrical loads and the grid system is not adversely impacted due to this power uprate (or other generation changes), there is no change required in the DV relay setpoint. At Waterford 3, the DV relays are conservatively set at 3875 VAC (93.1% of 4160 VAC). The setting of these relays is based on a conservative loading of plant auxiliaries to yield the worst-case voltage drop for the electrical system.

6. Section 4.3 states that "Other elements of the SBO analysis have not significantly changed." Please provide details about the battery margins both before and after power uprate.

   Response:

   The total DC power requirements for a 4-hour station blackout depend on the required loads, their duration of operation, and the capacity of the batteries. The station blackout loads were identified from design basis documents. The battery capacity calculation was performed using the anticipated loading sequence. Since the DC loads and the duration of the event (4 hours) remain the same with power uprate, there is no adverse impact on the battery capacity calculation and the battery margins remain the same. The battery sizing calculations are based on industry standards and include 25% aging factor, 10% design margin, and a 4% temperature correction factor.

Radiological Consequence Question

1. On page 3-81 of attachment 2 to your letter dated September 21, 2001, you state that current design constraints limit the hot rod radial peaking factor to lower than the maximum assumed in the accident analyses. What value was assumed for the maximum radial peaking factor in determining the radiological source term for non-LOCA fuel failure events? To what value is the hot radial peaking factor limited by the current fuel design constraints?

   Response:

   The maximum radial peaking factor used for the non-LOCA fuel failure dose calculation is 1.7. The hot rod radial peaking factor is limited to 1.65 in the current design. Thus, this corresponds to an allowable radiological source term power of 3492 MWt (3390 MWt x 1.7 / 1.65 = 3492 MWt) which is greater than the requested uprate power of 3441 MWt. Thus, the current non-LOCA fuel failure doses remain bounding.

Instrumentation Branch Questions

1. In Attachment 2, on page 3-2, the licensee states:

   > The power calorimetric uncertainty calculation described in Section 3.5.10 indicates that with the Leading Edge Flow Meter (LEFM) CheckPlus devices installed, the power measurement uncertainty (based on a 95 percent probability at a 95 percent confidence interval [95/95] is less than 0.5 percent. Therefore, these analyses only need to reflect a 0.5 percent power measurement uncertainty. . . .

   Table 3.2-1 on page 3-5 provides secondary calorimetric power measurement uncertainty components with "1σ normal with mean=0" values. These 1σ values are not 95/95 values because 95/95 requires a 2σ normal distribution about the mean, as opposed to a 1σ normal distribution about the mean. Provide a revised Table 3.2-1 listing the 2σ values, and the supporting calculations of power measurement component uncertainties.

   Additionally, Section 3.5.10 does not describe the power calorimetric uncertainty calculation methodology or the method of determining the power measurement confidence interval, as introduced in the above quoted licensee statement. Provide a clarification of the introductory statement regarding Section 3.5.10.

Response:

Entergy agrees the 1σ uncertainties listed in Table 3.2-1 are not 95/95. A revised Table 3.2-1 that lists the 2σ values for each parameter has been included in this attachment. The 2σ instrument channel uncertainties are converted to 1σ values to be used as raw input to the Westinghouse (CE) stochastic power measurement uncertainty calculation. The result of the Westinghouse stochastic calculation is a 95/95 COLSS power measurement uncertainty. The Westinghouse calculation uses a NRC-approved methodology as described in CEN 356(V)-PA, Revision 01-P-A, "Modified Statistical Combination of Uncertainties."

Westinghouse calculation A-WS-FE-0311, "The WSES-3 Secondary Calorimetric Power Measurement Uncertainty Analysis," calculated the overall plant-specific power measurement uncertainty using the LEFM to be 0.28%. This is conservatively well within the 0.5% uncertainty allowed in the Waterford 3 request for 1.5% power uprate.

2. In Attachment 2, on page 3-3, the licensee states:

> Reactor power is calculated in the Core Operating Limits Supervisory System (COLSS), which resides in the plant monitoring computer (PMC). The inputs to the COLSS secondary calorimetric calculation include feedwater flow, feedwater temperature, steam flow, steam generator pressure, steam header pressure, and blowdown flow. The Caldon LEFM CheckPlus meters will provide the preferred feedwater flow and temperature input to COLSS. The venturi-based feedwater or main steam flow measurement and feedwater temperature element inputs will be available to COLSS for back up in the event the Caldon LEFM CheckPlus units become inoperable.

a) In calculating secondary calorimetric power (BSCAL), the typical COLSS derives steam flowrate by subtracting an operator-entered constant representing steam generator (SG) blowdown flowrate from measured feedwater flowrate, as opposed to using the inputs from the main steam flow sensors. Consequently, main steam flow measurement is not a back up input in a typical COLSS for secondary calorimetric calculations. Does the COLSS at Waterford 3 use the main steam flow sensor inputs to calculate BSCAL?

Response:

The current configuration of COLSS at Waterford 3 uses main steam flow sensor inputs to calculate BSCAL at power levels greater than 95% RTP. The algorithm used to perform the secondary calorimetric based on main steam input is called "MSBSCAL". Below 95%, Waterford 3 uses the feedwater-based algorithm used in a typical COLSS, which is called "FWBSCAL".

The Waterford 3 COLSS uses measured blowdown flow. This measured value is subtracted from the measured feedwater flow rate to determine main steam flow rate in FWBSCAL. The measured blowdown flow rate is added to the measured mainsteam flow rate to determine feedwater flow rate in MSBSCAL. It should be noted that in the event measured blowdown flow rate is unavailable, an operator-entered constant representing steam generator blowdown flow rate is used.

The proposed configuration of COLSS using the LEFM will use an algorithm similar to FWBSCAL. This algorithm will be used for power levels between 20% and 100% RTP. On a loss of the LEFM, MSBSCAL or FWBSCAL will be used.

b) Will the existing feedwater temperature RTDs and venturi flow meters be periodically calibrated and tested to ensure operability in the event an LEFM CheckPlus becomes inoperable?

Response:

Yes, the existing feedwater temperature instrumentation and the steam and feedwater venturi flow meter instrumentation will continue to be periodically calibrated and tested to ensure operability in the event an LEFM CheckPlus becomes inoperable. Note the current Waterford 3 feedwater temperature input is not an RTD but a thermocouple input.

3. In Attachment 2, on page 3-3, the licensee states:

> The LEFM CheckPlus feedwater mass flow and temperature input will also be used in COLSS to adjust or "calibrate" the feedwater and main steam venturi-based flow meters calculated mass flows. The LEFM CheckPlus temperature input will be used in COLSS to adjust or "calibrate" the feedwater temperature input. The adjustments are made continuously in COLSS by comparing the Caldon LEFM CheckPlus output to the venturi and temperature element

outputs. The venturi and temperature element outputs are compensated by comparison-based multipliers to match the Caldon LEFM CheckPlus output. The comparison-based multipliers are stored in memory within the COLSS program.

In the event the Caldon LEFM CheckPlus units become inoperable, the control room operators are promptly alerted by the control room annunciator and computer alarms. COLSS will automatically use the venturi and temperature element outputs, adjusted by the comparison-based multipliers retrieved from memory, to continue calculating reactor power based on the secondary calorimetric.

a) Since the COLSS secondary calorimetric calculation uses a steam flow value that is derived from the feedwater flow and an operator-entered constant representing SG blowdown flow, why does the COLSS "calibrate" the main steam flow meters?

Response:

As discussed in response 2a, measured main steam flow is used at power levels above 95%. At power levels below 95% main steam flow is derived in FWBSCAL by subtracting measured blowdown flow from measured feedwater flow. The COLSS calibration of the main steam flow meters is achieved by subtracting measured blowdown flow from the LEFM CheckPlus-measured feedwater flow. In the event measured blowdown flow rate is unavailable, an operator-entered constant representing steam generator blowdown flow rate is used. Use of measured main steam flow is preferred because the feedwater venturi has shown historical evidence of fouling during the course of a fuel cycle and tends to de-foul if transients occur where the feedwater flow rate changes significantly. This phenomenon is documented in EPRI TR-100514 "Survey and Characterization of Feedwater Venturi Fouling at Nuclear Power Plants". The main steam venturi is not subject to this phenomenon.

Note that this main steam calibration is performed as a backup in the event the LEFM units fail. The LEFM is the primary source of feedwater mass flow input and will be processed in COLSS through an algorithm similar to FWBSCAL.

b) Will the feedwater control system use the LEFM CheckPlus "calibrated" feedwater flow, steam flow, and feedwater temperature signals to control feedwater flow?

Response:

No, the feedwater control system will not use the LEFM CheckPlus "calibrated" feedwater flow, steam flow, or feedwater temperature signals to control feedwater flow at this time. Waterford 3 may consider using this for a potential future system upgrade.

4. In Attachment 2, on page 3-4, the licensee states:

> In the event the Caldon LEFM CheckPlus units become inoperable, the control room operators are promptly alerted by the control room annunciator and computer alarms. COLSS will automatically use the venturi and temperature element outputs, adjusted by the comparison based multipliers retrieved from memory, to continue calculating reactor power based on the secondary calorimetric. Without the Caldon LEFM CheckPlus units in operation, the comparison based multipliers are no longer continuously updated. The uncertainties of the venturi and temperature element based inputs are expected to increase over time due to drift and ambient temperature uncertainty effects. These effects will be addressed through administrative controls.

In Attachment 2, on pages 3-6 to 3-7, the licensee states:

> The LEFM CheckPlus operability requirements will be contained in the Waterford 3 Technical Requirements Manual (TRM). A Limiting Condition for Operation (LCO) has been drafted for inclusion in the TRM stating that an operable Leading Edge Flow Meter (LEFM CheckPlus) shall be used in the performance of the calorimetric heat balance measurements whenever power is greater than the pre-uprate level of 3390 MWt. If the LEFM CheckPlus is not operable, plant operation will be administratively controlled at a power level consistent with the accuracy of the available instrumentation. With these controls, the effect on plant operations is that power will be reduced and maintained to a level that accounts for the appropriate instrumentation uncertainties thereby preserving ECCS limits.

a) The use of comparison-based multipliers to allow continued operation at the uprated power level assumes that the Caldon LEFM CheckPlus units become inoperable before updating the values of the comparison-based multipliers with potentially incorrect "calibration" data. If this last set of comparison-based multipliers could not be validated, the accuracy of the venturi and temperature elements should not be assumed. Consequently, the reactor power level could not be determined from a secondary calorimetric based on these uncertainties, and the reactor power should be reduced to a power level commensurate with the current accuracy of the instrumentation, which is 3390 MWt. Provide a justification for operating at power levels greater than the current 3390 MWt power level when an LEFM CheckPlus instrument is not operable.

Response:

COLSS will be set up to recognize the "failure" signal from the Caldon units. On receipt of a failure message, COLSS will default to MSBSCAL, with main steam mass flow and feedwater temperature adjusted to the comparison based multipliers stored in memory. The LEFM signal input prior to receipt of the failure message will not be incorrect calibration data. On this basis, the accuracy of the venturi instrument loop and temperature element instrument loop calibrations is preserved. Consequently, the reactor power level may continue to be determined from a secondary calorimetric based on these uncertainties, and the reactor power level does not have to be reduced. See response to question 5 below.

b) During plant power level transitions, which can occur at rates up to 5% RTP per minute, or as a result of a 10% step change in power, changes in turbine power cause the steam flow to change before the feedwater flow changes. Since the LEFM CheckPlus feedwater mass flow and temperature input are used in COLSS to adjust or "calibrate" the feedwater and main steam venturi-based flow meter mass flows; and if the LEFM CheckPlus becomes inoperable during or immediately following a power transition, the continuously updated comparison-based multipliers obtained just prior to the LEFM CheckPlus becoming inoperable may not reflect the correct steam flow rate. Describe the effect this condition would have on safe plant operations.

Response:

During normal, steady state plant operation, the comparison-based multipliers are not expected to change significantly between updates. This is because they are intended to correct for gradual instrument loop de-calibration effects such as time or ambient temperature related drift or feedwater venturi fouling. The comparison-based multipliers are derived by averaging many discrete data comparisons between the LEFM output and the venturi output over a period of time.

A step change in power or other transient could result in a momentary difference between steam flow and feedwater flow. This could affect one or two steam flow comparison data points obtained during the transient but just prior to the LEFM becoming inoperable. Additionally, the potential sudden change in feedwater flow to compensate for steam flow could cause feedwater venturi de-fouling, potentially biasing the compensated feedwater output in a non-conservative direction.

To address this potential non-conservative effect, COLSS will be modified to omit the comparison data provided by the LEFM when a step change in power is detected. In this way, the temporary difference in the steam flow – feedwater flow relationship will not affect the comparison-based calibration multipliers. The multipliers will continue to be used to calibrate the feedwater and main steam based power measurements during the transient using the last multiplier obtained prior to the transient. Thus, these multipliers will not be affected by the transient.

5. In Attachment 2, page 3-19, Section 3.5.10 states:

> If the ultrasonic feedwater flow measurement equipment is out of service for more than the allowed outage time (AOT), it will be necessary to reduce the LPL [licensed power level] in COLSS (see Section 3.2).

This paragraph should state that the LPL in COLSS should be reduced to 3390 MWT.

Response:

If the LEFM is out of service for more than 31 days, reactor power will be reduced to 98.5% power (3390 MWt) in accordance with administrative controls. With the LEFMs out of service for greater than 48 hours, the full 22.5 month time drift effect and full range ambient temperature drift of the venturi instrumentation loops is included in the uncertainty. This is a very conservative uncertainty assumption for the 48-hour to 31-day range in time that the LEFMs are out of service. Other uncertainty attributes, such as calibration tolerance or M&TE effects, do not change over time. This allows a smaller reduction in reactor power in a time range from 48 hours to 31 days while using compensated MSBSCAL or compensated FWBSCAL. During this time a channel check will be performed to provide added assurance that the power measurement uncertainty is not increasing beyond the original assumptions. For the period of the first 48 hours after the failure of the LEFM, the drift effects are not expected to be significant and no power reduction is required. See response to question 4a above.

6. In Attachment 2, on page 3-55, Section 3.10.3.1, the licensee states:

> The CPCS SPVMIN [Setpoint Variable Minimum Value], the floor for the VOPT [Variable Overpower Trip], is used as mitigating action against transients starting from a low power state (e.g., CEAW from Hot Zero Power (HZP)) (Table 4-2, UFSAR Section 15.4.1.2). Currently the floor of the VOPT, SPVMIN, is set at 30% of 3,990 MWt. To maintain the credited reactor trip at the same absolute power level, SPVMIN will be reduced by the ratio of the new and old Rated Thermal Power definitions. Thus, for operation at a Rated Thermal Power of 3,441 MWt, SPVMIN will have a setpoint of 29.6% of 3,441 MWt.

a) The text should be corrected to state the current floor of the VOPT, SPVMIN, Rated Thermal Power as 30% of 3,390 MWt instead of 3,990 MWt.

Response:

Entergy agrees this value should be 3,390 MWt.

b) In the cited statement, the absolute power of the old SPVMIN is 1017 MWt, and the absolute power of the proposed SPVMIN (using 29.6% of 3,441 MWt) would be ~1018.5 MWt, or 1.5 MWt higher. To maintain a conservative value for SPVMIN, the absolute power of 1017 MWt should be retained for the proposed SPVMIN. Provide a justification for using an absolute power greater than 1017 MWt (e.g., 29.6% of 3,441 MWt) instead of the existing SPVMIN value.

Response:

The current VOPT SPVMIN setpoint is 30% x 3390 MWt, which corresponds to an equivalent power of 1017 MWt. The new SPVMIN setpoint for the Appendix K power uprate will be reduced by the ratio of the new and old Rated Thermal Power values (i.e., 30% x 3390 MWt / 3441 MWt, or 29.55536%, which is rounded to 29.6%). While the setpoint has been reduced, the floor of the VOPT will now be equivalent to 1018.5 MWt. The VOPT SPVMIN trip function is similar to the High Log Power Trip (refer to Section 3.10.1 of the original submittal). While this rounding will result in a slightly higher equivalent power for the floor of the VOPT, it will have a negligible effect on the reactor trip time and the corresponding accident consequences.

Table 1
Revision of Information in Table 3.2-1
(see response to I&C Question 1)

Measured Parameter	2 sigma uncertainty	
Feedwater Mass Flow - Venturi	15.37	inwc
Feedwater Mass Flow - LEFM	40146	lbm/hr
Feedwater Temperature - T/C	5.0	deg F
Feedwater Temperature- LEFM	0.60	deg F
Feedwater Pressure - LEFM	15	psi
Blowdown Mass Flow- Random	6.6	inwc
Blowdown Mass Flow - Bias	1.7	% flow reading
Steam Generator Pressure	19.7	psi
Steam Header Pressure	22	psi
Main Steam Mass Flow	14.73	inwc

ATTACHMENT 2

TO

W3F1-2001-0117

REPORT ON DYNAMIC SIMULATIONS FOR GRID STABILITY

REPORT ON DYNAMIC SIMULATIONS FOR WATERFORD OFFSITE POWER STUDY

This report is written as a part of the SOER (Significant Operating Experience Report) study for the year 2001. It summarizes the stability study results performed on the Waterford Nuclear Unit 3.

Loadflow Base Case Assumptions:

• Base Case	August 2001 Operational Case (Summer Peak)
• Waterford Unit 3 output	P = 1172 MW (1150 + 2% for App. K Uprate) Q = 400 MVAR
• Waterford Unit 3 load	P = 53 MW Q = 26 MVAR
• Load in Amite South	6000 MW (Constant Power; conservative load)
• P.F in Amite South	0.92
• All units in Amite South	Operational

Stability Study Assumptions:

• Load Mix:	Real load	90% (constant current) 10% (constant impedance)
	Reactive load	100 % (constant impedance)

- Dynamic simulations were done based on 3-ϕ faults with 6-cycle primary clearance time. Table below summarizes the different simulations

- Worst case 3-ϕ faulted condition from the table was rerun with the following different scenarios:
  - 3-ϕ 6-cycle fault with primary clearance of 2 phases followed by a remaining phase fault (1-ϕ) cleared in 15 cycles (6+9) by backup relays
  - 1-ϕ fault with a stuck-breaker condition cleared in 15 cycles by backup relay
  - 3-ϕ fault with 5-cycle primary clearance time

- Monitored elements: Waterford 230 kV bus voltage
  Waterford U3 angle

Conclusions:

- Based on the review of dynamic simulation results, no stability concerns are postulated for safe operation of Waterford Unit 3.

Stability Simulation Summary

3-ϕ Faults Simulations

SIMULATION ID	FACILITY CLEARED DUE TO PRIMARY RELAY ACTUATION	CLEARING TIME	REMARKS	
			VOLTAGE	ANGLE
1	Waterford - Waterford Unit 1 230 kV	6-cycle	Recovered	Stable
2	Waterford - Waterford Unit 2 230 kV	6-cycle	Recovered	Stable
3	Waterford 500/ 230 transformer	6-cycle	Recovered	Stable -Oscillatory
4	Waterford - Ninemile 230 kV	6-cycle	Recovered	Stable
5	Waterford - Hooker 230 kV	6-cycle	Recovered	Stable
6	Waterford – Little Gypsy 230 kV Ckt 1	6-cycle	Recovered	Stable
7	Waterford - Frisco 230 kV	6-cycle	Recovered	Stable
8	Waterford 500/ 230 transformer	5-cycle	Recovered	Stable -Oscillatory

Worst-Case 3-ϕ faulted conditions

Simulation 3 – Waterford 500/ 230 kV transformer cleared at Primary

SIMULATION ID	FACILITY CLEARED DUE TO PRIMARY RELAY ACTUATION	FAULT TYPE	CLEARING TIME	FACILITY CLEARED DUE TO BACKUP RELAY ACTUATION	CLEARING TIME	REMARKS	
						VOLTAGE	ANGLE
9	Waterford 500/ 230 transformer	3-ϕ - 1-ϕ	6-cycle	Waterford – Vacheire 230 kV	6+9 cycles	Recovered	Stable - Oscillatory
10	Waterford 500/ 230 transformer	1-ϕ - 1-ϕ	6-cycle	Waterford – Vacheire 230 kV	6+9 cycles	Recovered	Stable - Oscillatory

ATTACHMENT 3

TO

W3F1-2001-0117

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	
If the LEFM is out of service for more than 31 days, reactor power will be reduced to 98.5% power (3390 MWt) in accordance with administrative controls. .... This allows a smaller reduction in reactor power in a time range from 48 hours to 31 days.		X	when implemented
During this time (2d to 31d), a channel check will be performed to provide added assurance that the power measurement uncertainty is not increasing beyond the original assumptions		X	when implemented
COLSS will be set up to recognize the "failure" signal from the Caldon units.	X		when implemented
COLSS will be modified to omit the comparison data provided by the LEFM when a step change in power is detected.	X		when implemented