Entergy Nuclear South
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093
Tel 504-739-6496
Fax 504-739-6698
kchris1@entergy.com

Kenny J. Christian
Nuclear Safety Assurance Director
Waterford 3

W3F1-2009-0030

June 30, 2009

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Response to Amendment Request NPF-38-276,
Core Protection Calculator Power Calibration Adjustment Limit
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

REFERENCES:

1. Entergy letter dated September 17, 2008, "License Amendment Request NPF-38-276, Core Protection Calculator Power Calibration Adjustment Limit" (W3F1-2008-0050)
2. NRC Request for Additional Information Regarding "License Amendment Request NPF-38-276 to Modify Core Protection Calculator Power Calibration Adjustment Limit," dated December 2, 2008 (TAC NO. MD9657)
3. RAI Response to Amendment Request NPF-38-276, "Core Protection Calculator Power Calibration Adjustment Limit," dated January 8, 2009 (W3F1-2009-0001)
4. NRC Request #2 for Additional Information Regarding "License Amendment Request NPF-38-276, to Modify Core Power Calculator Power Calibration Adjustment Limit," dated February 6, 2009 (TAC NO. MD9657)
5. RAI #2 Response to Amendment Request NPF-38-276, "Core Protection Calculator Power Calibration Adjustment Limit," dated March 18, 2009 (W3F1-2009-0010)

Dear Sir or Madam:

By letter (Reference 1), Entergy Operations, Inc. (Entergy) proposed a change to the Waterford Steam Electric Station, Unit 3 (Waterford 3) Technical Specification (TS) 3/4.3.1 to revise Note 2 of Technical Specification Table 4.3-1.

A001
NRR

By letter (Reference 2), the NRC issued five RAI questions. Entergy responded by letter (Reference 3) to the five RAI questions.

By letter (Reference 4), the NRC issued four RAI questions. Entergy responded by letter (Reference 5) to the four RAI questions.

By e-mail from the NRC, dated May 5, 2009 (12:56 PM), the NRC issued two RAI questions. Entergy's response to the RAI questions is included in Attachment 1.

Changes (Attachment 2) to the originally submitted (Reference 1) proposed TS changes, address NRC questions. The changes incorporate withdrawing the TS 3/4.3.1 exception of not requiring adjustment of power indication between 15% and 80% of Rated Thermal Power associated with the initial power ascension following a refueling outage. The withdrawal of this exception is returning this aspect of Note 2 of Technical Specification Table 4.3-1 to what is currently in Note 2. Also, for NRC information, Attachment 3 includes pending Technical Specification Bases revised pages associated with the proposed Technical Specification changes. The conclusions of the original no significant hazards consideration included in Reference 1 are not affected by any information contained in this RAI response letter.

There are no new regulatory commitments contained in this submittal. Please contact Robert J. Murillo Manager, Licensing at (504) 739-6715 if you have any questions or require additional information.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 26, 2009.

Sincerely,

KJC/MEM

Attachment(s)

1. RAI #3 Response to Amendment Request NPF-38-276, Core Protection Calculator Power Calibration Adjustment Limit
2. Technical Specification Revised Pages
3. Technical Specification Bases Revised Pages – for information only

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125

NRC Senior Resident Inspector
Waterford Steam Electric Station Unit 3
P.O. Box 822
Killona, LA 70066-0751

U. S. Nuclear Regulatory Commission
Attn: Mr. N. Kalyanam
Mail Stop O-07D1
Washington, DC 20555-0001

Wise, Carter, Child & Caraway
ATTN: J. Smith
P.O. Box 651
Jackson, MS 39205

Winston & Strawn
ATTN: N.S. Reynolds
1700 K Street, NW
Washington, DC 20006-3817

Morgan, Lewis & Bockius LLP
ATTN: T.C. Poindexter
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Attachment 1

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RAI #3 Response to Amendment Request NPF-38-276, Core Protection Calculator Power Calibration Adjustment Limit

RAI 1 - *Explain how 10 CFR 50.36(c)(3) is met, even when not performing a heat balance calibration Surveillance Requirement (SR) during the initial power ascension following refueling.*

Background: Note 2 of Table 4.3-1 currently states, in part, "Between 15% and 80% of RATED THERMAL POWER, compare the CPC at ΔT power and CPC nuclear power signals to the calorimetric calculation. If any signal is greater than the calorimetric calculation by more than 10%, then adjust the affected signal(s) to within 0.0% to 10% of the calorimetric." The LAR proposes to modify Note 2 to state, in part, "Between 15% and 80% of RATED THERMAL POWER, compare the CPC ΔT power and CPC neutron flux power indications to calorimetric power and take the following actions as applicable: IF either the CPC ΔT power or the CPC neutron flux power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, then calibrate the affected CPC power indication such that it is 8% to 10% of RATED THERMAL POWER greater than calorimetric power. This requirement does not apply during the initial power ascension following refueling but becomes applicable after the first calibration of the CPC power indications at or above 80% of RATED THERMAL POWER in the power ascension." Regarding why the requirement does not apply during the initial power ascension following refueling, the LAR states "This is because it is recognized that all power indications are closely monitored during startup testing and significant deviations of CPC power from calorimetric power would be promptly corrected. Therefore, this situation is not explicitly addressed in the setpoint and safety analyses because the likelihood that a power increasing event would occur and result in conditions inconsistent with analysis assumptions is acceptably low."

10 CFR 50.36(c)(3) states "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

It is unclear how the justification in the LAR is sufficient enough to support the assertion that a SR, as required by 10 CFR 50.36(c)(3), does not need to apply during the initial power ascension following refueling. The licensee's justification that indications are closely monitored and significant deviations would be promptly corrected appears insufficient. The ability to closely monitor and promptly correct deviations does not negate the regulatory requirement for inclusion in TS.

Entergy Response:

The W3 LAR is not changing this statement of Note 2 in a substantive manner. The passage ["If any signal is within -0.5% to +10% of the calorimetric calculation, then do not] calibrate except as required during initial power ascension following refueling."] is being changed to [IF RPS Linear Power or either CPC power indication is within -0.5% to +10% of RATED THERMAL POWER of calorimetric power, THEN do not calibrate the affected indication except as required during the initial power ascension following refueling."]. The change is merely breaking out the term 'any signal' to the pertinent signals which constitute the term 'any signal', which are RPS Linear Power or either CPC power indication.

Regarding system design, the W3 heat balance (calorimetric power) calculates continuously automatically and updates every 30 seconds (COLSS). The calorimetric power is an automatically calculated function performed by COLSS. Additionally, during the initial power ascension following refueling, a key aspect is that not adjusting CPC power indications downward is conservative; for example, if CPC power indications are adjusted downward by 5% at 20% power and this results in the CPC power indications being lower by 5% when 80% power is reached, then the plant power indication is non-conservative (i.e. CPC power indication is less than actual plant power). When using venturi input instrumentation instead of Ultrasonic Flow Measurement Instrumentation, the typical uncertainty in the secondary calorimetric power measurement is significantly larger at low power than at high power. For example, the uncertainty at 20% power is approximately 3% of full power or 15% of the measured power while the uncertainty at 80% power is approximately 1% of full power or 1.25% of the measured power. Therefore, during the initial power ascension following refueling, it is possible that the CPC power indications are more accurate than the calorimetric. If the CPC indicated power is greater than the calorimetric by any amount during the initial power ascension, the best approach is to wait until a calibration is performed at 80% power before adjusting them, thus maintaining conservatism in the CPC trip decisions during the power ascension. Regarding RPS Linear Power indication, during initial power ascension following refueling, the power indication is checked per procedure, but is not credited in the Safety Analysis.

RAI 2 *–Please ask the licensee to consider the following case and respond to my comment:*

Before calibration - *CPC power (% of RTP)* *calorimetric power (% of RTP)*

30.1 *20*

Since the CPC power is greater than the calorimetric power by more than 10% of the rated thermal power (RTP) , the CPC power should be calibrated to 8% to 10% RTP greater than the calorimetric power in accordance with paragraph 5 of item b in the proposed TS.

Thus, the CPC power after the required calibration is at least 28% RTP [(20 + (8 to 10)]% RTP. As indicated in the RAI response, the uncertainty of the calorimetric power at 20 % RTP is approximately 3% RTP. After subtracting the uncertainty of 3%, the CPC power is 25% (28% - 3%), with a conservative margin of 5% (25% - 20%). The margin of 5% is sufficient to compensate for 1% uncertainty for the calorimetric power at 80% RTP.

With the above consideration, I would think that the following exception is not justified and should be removed from the proposed TS:

"This requirement does not apply during the initial power ascension following refueling but becomes applicable after the first calibration of the CPC power indications at or above 80% of RATED THERMAL POWER in the power ascension."

Entergy Response:

Upon consideration of the example provided and re-review of Amendments issued to ANO Unit 2 and Palo Verde, Table 4.3-1 Note 2, the exception (of not adjusting power indication) associated with the initial power ascension following refueling outage (between 15% and 80% RTP) for condition of either CPC power indication being greater than calorimetric power by greater than 10% is withdrawn.

Attachment 2

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Technical Specification Revised Pages

TABLE 4.3-1 (Continued)

TABLE NOTATIONS

*With the reactor trip breakers in the closed position, the CEA drive system capable of CEA withdrawal, and fuel in the reactor vessel.

#The provisions of Specification 4.0.4 are not applicable when reducing reactor power to less than 10^{-4}% of RATED THERMAL POWER[2] from a reactor power level greater than 10^{-4}% of RATED THERMAL POWER[4]. Upon reducing power below 10^{-4}% of RATED THERMAL POWER[4], a CHANNEL FUNCTIONAL TEST shall be performed within 2 hours if not performed during the previous 31 days. This requirement does not apply with the reactor trip breakers open.

(1) Each startup or when required with the reactor trip breakers closed and the CEA drive system capable of rod withdrawal, if not performed in the previous 7 days.

(2) Heat balance only (CHANNEL FUNCTIONAL TEST not included):

REPLACE WITH INSERT 'A'

a. Between 15% and 80% of RATED THERMAL POWER, compare the Linear Power Level, the CPC at ΔT power, and CPC nuclear power signals to the calorimetric calculation.

If any signal is within -0.5% to +10% of the calorimetric calculation, then do not calibrate except as required during initial power ascension following refueling.

If any signal is less than the calorimetric calculation by more than 0.5%, then adjust the affected signal(s) to within 0.0% to +10.0% of the calorimetric caluclation.

If any signal is greater than the calorimetric calculation by more than 10%, then adjust the affected signal(s) to within 0.0% to 10% of the calorimetric.

b. At or above 80% of RATED THERMAL POWER, compare the Linear Power Level, the CPC Δ T power, and CPC nuclear power signals to the calorimetric calculation. If any signal differs from the calorimetric calculation by an absolute difference of more than 2%, then adjust the affected signal(s) to agree with the calorimetric calculation within -2% to +2%.

During PHYSICS TESTS, these daily calibrations may be suspended provided these calibrations are performed upon reaching each major test power plateau and prior to proceeding to the next major test power plateau.

(3) Above 15% of RATED THERMAL POWER, verify that the linear power subchannel gains of the excore detectors are consistent with the values used to establish the shape annealing matrix elements in the Core Protection Calculators.

(4) Neutron detectors may be excluded from CHANNEL CALIBRATION.

(5) After each fuel loading and prior to exceeding 70% of RATED THERMAL POWER, the incore detectors shall be used to determine or verify acceptable values for the shape annealing matrix elements used in the Core Protection Calculators.

[4]As measured by the Logarithmic Power Channels.

INSERT A

a. No adjustments to RPS linear Power or CPC power indications are required below 15% of RATED THERMAL POWER.

b. Between 15% and 80% of RATED THERMAL POWER, compare the RPS linear Power, CPC ΔT power, and CPC neutron flux power indications to calorimetric power and take the following actions as applicable:

   IF RPS linear Power or either CPC power indication is within -0.5% to +10% of RATED THERMAL POWER of calorimetric power, THEN do not calibrate the affected indication except as required during the initial power ascension following refueling.

   IF RPS linear Power or either CPC power indication is less than calorimetric power by more than 0.5% of RATED THERMAL POWER, THEN calibrate the affected indication as close as practical to calorimetric power and within -0.5% to +10% of RATED THERMAL POWER of calorimetric power.

   IF the RPS linear Power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, THEN calibrate it such that it is within 0% to 10% of RATED THERMAL POWER greater than calorimetric power.

   IF either the CPC ΔT power or the CPC neutron flux power indication is greater than calorimetric power by more than 10% of RATED THERMAL POWER, THEN calibrate the affected CPC power indication such that it is 8% to 10% of RATED THERMAL POWER greater than calorimetric power.

c. At or above 80% of RATED THERMAL POWER, compare the RPS linear Power, CPC ΔT power, and CPC neutron flux power indications to calorimetric power. IF any indication is not within $\pm$2% of RATED THERMAL POWER of calorimetric power, THEN calibrate the affected indication as close as practical to calorimetric power but within -0.5% to +2% of RATED THERMAL POWER of calorimetric power.

Attachment 3

W3F1-2009-0029

Technical Specification Bases Revised Pages – For Information Only

3/4.3 INSTRUMENTATION

BASES

3/4.3.1 and 3/4.3.2 REACTOR PROTECTIVE AND ENGINEERED SAFETY FEATURES ACTUATION SYSTEMS INSTRUMENTATION

The OPERABILITY of the Reactor Protective and Engineered Safety Features Actuation Systems instrumentation and bypasses ensures that (1) the associated Engineered Safety Features Actuation action and/or reactor trip will be initiated when the parameter monitored by each channel or combination thereof reaches its setpoint, (2) the specified coincidence logic is maintained, (3) sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance, and (4) sufficient system functional capability is available from diverse parameters.

The OPERABILITY of these systems is required to provide the overall reliability, redundancy, and diversity assumed available in the facility design for the protection and mitigation of accident and transient conditions. The integrated operation of each of these systems is consistent with the assumptions used in the safety analyses.

The redundancy design of the Control Element Assembly Calculators (CEAC) provides reactor protection in the event one or both CEACs become inoperable. If one CEAC is in test or inoperable, verification of CEA position is performed at least every 4 hours. If the second CEAC fails, the CPCs will use DNBR and LPD penalty factors to restrict reactor operation to some maximum fraction of RATED THERMAL POWER. If this maximum fraction is exceeded, a reactor trip will occur.

ADD INSERT 'B'

Table 3.3-3 ACTION 19 allows for continued operation in the applicable MODE(S) with one of the Refueling Water Storage Pool (RWSP) - Low or Steam Generator ΔP Emergency Feedwater Actuation Signal (EFAS) channels inoperable provided the channel is placed in the bypass or tripped condition within 1 hour. If an inoperable channel of the RWSP - Low or Steam Generator ΔP EFAS channel is required to be placed in the tripped condition within one hour, then within 48 hours the channel must either be restored to OPERABLE status or be placed in the bypassed condition. The bypassed channel must be restored to OPERABLE status prior to entering the applicable MODE(S) following the next MODE 5 entry. With one of the RWSP - Low or Steam Generator ΔP (EFAS) channels inoperable and in bypass, and a failure occurs or repairs are necessary on one of the remaining channels, ACTION 20 must be entered.

ACTION 19a is annotated with a 3.0.4 exemption to allow the changing of MODE(S) even though one channel is bypassed. MODE changes between MODES 1 and 4 with this configuration are allowed, to permit maintenance and testing on the inoperable channel. In this configuration, the protection system is in a two-out-of-three logic, and the probability of a random failure affecting two of the OPERABLE channels is remote. The tripped condition does not have this annotation as a single failure could cause the Emergency Core Cooling System and Containment Spray System suctions to be supplied from the Safety Injection System Sump prematurely and loss of the Low Pressure Safety Injection Systems with a premature

INSERT B

Note 2 of Table 4.3-1 provides requirements for the periodic calibration of CPC power indications using calorimetric power as the calibration standard.

No calibration of CPC power indications are required at less than 15% RATED THERMAL POWER since inherent conservatisms in the CPC calculations at these power levels compensate for any potential decalibration. Significant differences between CPC power indications and calorimetric power observed during surveillances should always be investigated to determine the cause of the deviation. The most accurate calorimetric power indication available at the time of calibration should be used.

Between 15% and 80% power, if the daily surveillance finds that a CPC power indication is greater than the calorimetric power indication by more than 10% RTP, it should be adjusted to be within 8.0% and 10.0% RTP above the calorimetric. If the CPC power indications have been calibrated properly to the calorimetric power indication at high power (meaning 80% or above), then the most appropriate thing to do is not calibrate CPC powers below 80% power if they are conservative relative to calorimetric. In the extremely unlikely event that a CPC power indication is found to be more than 10.0% RTP higher than the calorimetric, it should be adjusted as little as possible to meet the requirements of the Technical Specifications. If this situation were to occur, it is likely that there is an anomaly in the calibration data or instrumentation. The safety and setpoint analysis does not explicitly address this situation because it is an unreasonable scenario without some other anomaly in the measurements, calibration or instrumentation. The probability of being greater than +10.0% from calibration following a power reduction from a calibrated condition, recalibrating to between +8.0% and +10.0% and then having a power increasing event which requires a CPC trip and having CPC be non-conservative at the point the trip is needed is too low to consider it as being within the CPC design basis.

At or above 80% RATED THERMAL POWER, the Note 2 phrase "as close as practical to calorimetric power" implies that the as-left difference between the affected CPC power indication and calorimetric power should be as near to 0% RATED THERMAL POWER as possible.

CPCs use the addressable constant PCALIB to determine power dependent biases for use in its calculations. Thus, when calibrations of CPC power indications are performed, it may be necessary to adjust the CPC constant PCALIB as described below:

- While operating below 80% RATED THERMAL POWER, whenever the calibration of either CPC neutron flux power or CPC ΔT power is adjusted, PCALIB must be set equal to the lower of the power level (in % RATED THERMAL POWER) of that adjustment and the power level (in % RATED THERMAL POWER) of the most recent calibration adjustment (or verification) of the other power indication (the one not being calibrated).

- PCALIB can be set to the current power level (in % RATED THERMAL POWER) whenever both CPC neutron flux power and CPC ΔT power are adjusted or verified to be within the Technical Specification requirements at that power level.

INSERT B (Continued)

- PCALIB can be set to 100.0 whenever both CPC neutron flux power and CPC ΔT power have been adjusted or verified to be within the Technical Specification requirements at or above 80% RATED THERMAL POWER (plus uncertainty).

- PCALIB must be set to 20.0 prior to initial power ascension following refueling.