Entergy

Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150
Tel 601 437 2800

GNRO-2007/00031

May 7, 2007

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

SUBJECT: Supplement 2 to Amendment Request
Changes to the Local Power Range Monitor (LPRM) Calibration Frequency
(TAC No. MD3469)
Grand Gulf Nuclear Station, Unit 1 (GGNS)
Docket No. 50-416
License No. NPF-29

REFERENCES:

1. Letter GNRO-2006/00058 from W. R. Brian, Entergy Operations, Inc., to USNRC, "License Amendment Request: Changes to the Local Power Range Monitor (LPRM) Calibration Frequency," dated November 1, 2006 (ADAMS Accession No. ML063130372)

2. Letter GNRO-2007/00018 from M. A. Krupa, Entergy Operations, Inc., to USNRC, "Supplement to License Amendment Request: Changes to the Local Power Range Monitor (LPRM) Calibration Frequency," dated April 4, 2007 (ADAMS Accession No. ML070950059)

Dear Sir or Madam:

By Reference 1, Entergy Operations, Inc. (Entergy) proposed a change to the Grand Gulf Nuclear Station, Unit 1 (GGNS) Technical Specifications (TS) to extend the Local Power Range Monitor (LPRM) calibration interval from 1000 megawatt days per ton (MWD/T) to 2000 MWD/T (i.e., from approximately every 36 days to approximately every 72 days).

Entergy provided supplemental information by Reference 2 and held a call with the NRC staff on April 20, 2007 to discuss additional follow-up questions. As a result of the call, four questions were determined to need formal response. Entergy's response is contained in Attachment 1.

There are no technical changes proposed. The original no significant hazards consideration included in the referenced letter is not affected by any information contained in the supplemental letter. There are no new commitments contained in this letter.

By Reference 1, Entergy requested approval of the proposed change by June 1, 2007. While timely approval would maximize the benefit of the extended calibration interval, the NRC's review may be extended as needed with no significant impact to any current plans or schedules. If you have any questions or require additional information, please contact Ron Byrd at 601-368-5792.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 7, 2007.

Sincerely,

Arthur D. Barfield
Director, Nuclear Safety Assurance
ADB/RWB

Attachment: Response to Request For Additional Information

cc: Dr. Bruce S. Mallett
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
61 1 Ryan Plaza Drive, Suite 400
Arlington, TX 7601 1-4005

U.S. Nuclear Regulatory Commission
ATTN: Mr. Bhalchandra Vaidya, NRR/DORL (w/2)
**ATTN: ADDRESSEE ONLY**
ATTN: U.S. Postal Delivery Address Only
Mail Stop OWFN/O-7D1A
Washington, D.C. 20555-0001

Mr. Brian W. Amy, MD, MHA, MPH
Mississippi Department of Health
P. O. Box 1700
Jackson, MS 3921 5-1 700

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

**Attachment 1**

**To**

**GNRO-2007/00031**

**Response to Request for Additional Information**

**Response to Request for Additional Information Related to Changes to the Local Power Range Monitor (LPRM) Calibration Frequency TAC No. MD3469**

Question 1:

In the second paragraph of the response, the licensee stated, "Based on previous analysis experience, the measured bundle power uncertainty was determined assuming that the extended LPRM interval would increase the LPRM uncertainty from the original 3.4% to 4.3%." Is the current SLMCPR calculated based on this measured bundle power uncertainty (using 4.3% LPRM uncertainty)? In other words, is 4.3% used in Equation 9-13 of EMF-2158(P)(A) for the * LPRM term?

Response:

The LPRM uncertainty value of 4.3 was used in Equation 9-13 of EMF-2158(P)(A) for the evaluation of the safety limit for Grand Gulf in order to support operation with extended calibration intervals. It should be noted that this equation alone is not sufficient to determine the measured radial assembly power uncertainty used in the safety limit analysis. Additional terms have been added to include allowance for inoperable detectors and potential failures of TIP machines. These terms increase the resultant measured radial assembly power uncertainty beyond the specifics of this equation.

Question 2:

a) Please elaborate on LPRM GAF functionality described in first paragraph of the response and explain how a physical adjustment of LPRM gain amplifier could be avoided and a calibration still can be accounted for.

b) Based on the table provided in page 4 for one particular LPRM, is it true that not all LPRMs are physically calibrated every 1000 ± 250 MWD/MTU? The delta exposures show data points with exposure more than 2000 MWD/MTU.

Response to 2a) and 2b):

The LPRM calibration is performed by normalizing the measured LPRM detector response to the measured TIP distribution. This "digital" calibration is performed by the Core Monitoring System for all operable LPRMs and does not require the mechanical adjustment of LPRM amplifier gains for use in subsequent thermal limit evaluations. The LPRM sensitivity adjustments are reset to 0.0 at the time of this calibration.

The LPRM meter readings may be scaled to any desired units by adjusting the normalization constants. A typical selection is core average heat flux (BTU/hr/ft$^2$). The Core Monitor System calculates a Gain Adjustment Factor (GAF) for each LPRM which is the ratio of the desired meter reading to the indicated meter reading. A GAF of 1.05 for a given LPRM indicates that the scale for that detector is slightly below the desired scale. Manual adjustments are made to the LPRM amplifier gains for detectors that are less than 0.95 or greater than 1.05. Approximately one-half of the detectors' amplifiers are typically adjusted at a given calibration interval. More may be adjusted at beginning of cycle. This approach is consistent with GE recommendations. This practice is acceptable since it does not effect the Core Monitoring System's thermal limit evaluation. Exposure corrected GAF's are used in the Core Monitoring System to adjust the measured LPRM response between calibrations. The other two systems which use LPRM's as inputs (APRM's and the stability monitor- Period Based Detection System (PBDS)) are not impacted by the calibration. The APRM's are calibrated independently to the plant heat balance. The PBDS monitors low frequency neutron noise and therefore is not sensitive to the magnitude of an LPRM's signal.

Question 3:

In the discussion on "nominal" decay factor, discuss how the nominal value was selected and why the results are insensitive to the value selected.

Response:

A sensitivity study was performed to evaluate the dependence of a fixed detector sensitivity to the change in standard deviation for the two calibration intervals. The results of this study were not presented in the amendment request. Various fixed values of the detector sensitivity ranging from -0.094 to -0.1197 demonstrated that the change in standard deviation was insensitive to the value used. The value reported was the one with the highest change in standard deviation. The standard deviation is insensitive to the actual value used because it measures the variation between the actual sensitivity of each detector to the fixed value.

Question 4:

a) Is the “fixed” lambda used in the response a “nominal” decay factor or a “detector specific” one?

b) For 1500 to 2500 MWD/MTU, the standard deviation is 3% versus 2.76% (Table 1 using detector specific decay factor in original application) for 2000 MWD/T with range of 1600 to 3000 MWD/T. Please explain why the deviation is larger when the range is narrower.

c) The increase of standard deviation derived is not exactly consistent with the Table 1 results in the original application, e.g. 0.48% versus 0.59% (or 0.8 % for nominal) due to different exposure intervals. Please demonstrate that the results are applicable for the maximum allowed interval of 2500 MWD/T.

Response to 4a):

The term "fixed" is synonymous to "nominal" for the discussions in the response.

Response to 4b):

The value of 2.76% comes from the evaluation of the detector specific sensitivity. The value of 3.0% comes from an evaluation using a fixed detector sensitivity. These two values are not comparable based on the range of data.

Response to 4c):

The actual plant calibration data was used to evaluate the LPRM uncertainties for intervals up to 2500 MWD/MTU. The evaluation was performed using the 434 calibration points between 2000 MWD/MTU and 3000 MWD/MTU and a fixed detector sensitivity of 0.1197. This resulted in a relative difference between the actual and predicted calibration currents of 3.36%. The value reported for a 1000 MWD/MTU interval was 2.51% so the delta standard deviation is 0.85% which is less than the delta of 0.9% that was used in the safety limit analysis. It should be noted that the actual practice at Grand Gulf is to use detector specific sensitivity values based on recent measurements. Using detector specific sensitivity values for the same calibration data resulted in an uncertainty of 2.32% for the calibration interval from 2000 MWD/MTU to 3000 MWD/MTU as compared to a value of 2.17% for the calibration interval from 500 MWD/MTU to 1600 MWD/MTU. This uncertainty, as well as the change in uncertainties is significantly less than that determined with fixed detector sensitivities. This analysis demonstrates that operation with calibration intervals up to 2500 MWD/MTU is conservatively included in the measured radial assembly power uncertainties applied to the safety limit analysis.