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GNRO-2013/00024

August 15<sup>th</sup>, 2013

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

**SUBJECT:** Response to Request for Additional Information Regarding 18 to 24 Month License Amendment Request, dated March 18, 2013 (TAC ME9764)  
Grand Gulf Nuclear Station, Unit 1  
Docket No. 50-416  
License No. NPF-29

**REFERENCES:**

1. License Amendment Request for Implementing a 24-Month Fuel Cycle, dated October 2, 2012 (Accession No. ML122770130, GNRO-2012/00096)
2. Electronic Request for Additional Information Regarding 18 to 24 Month License Amendment Request (TAC ME9764), dated March 18, 2013 (GNRI-2013/00064)

Dear Sir or Madam:

On October 2, 2012, Entergy Operations, Inc. (Entergy) submitted a license amendment request (Reference 1) to the U.S. Nuclear Regulatory Commission (NRC) to implement a 24-month fuel cycle at Grand Gulf Nuclear Station (GGNS). On March 18, 2013, the NRC provided GGNS with an electronic request for additional information (Reference 2). Entergy is providing, in the Attachment, the response to the request for additional information.

This letter contains no new commitments. If you have any questions, please contact Mr. Thomas Thornton at (601) 437-6176.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of August, 2013.

Sincerely,

A handwritten signature in black ink, appearing to read "KJM", followed by a long horizontal line that ends in a decorative flourish.

KJM/slw

Attachment: Response to Request for Additional Information

cc: U.S. Nuclear Regulatory Commission  
ATTN: Mr. Stephen A. Reynolds (w/2)  
Regional Administrator, Region IV  
1600 East Lamar Boulevard  
Arlington, TX 76011-4511

U.S. Nuclear Regulatory Commission  
ATTN: Mr. Alan Wang, NRR/DORL (w/2)  
Mail Stop OWFN/8 B1  
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NRC Senior Resident Inspector  
Grand Gulf Nuclear Station  
Port Gibson, MS 39150

**Attachment to GNRO-2013/00024**

**Response to Request for Additional Information**

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION  
18 TO 24 MONTH FUEL CYCLE LICENSE AMENDMENT REQUEST  
GRAND GULF NUCLEAR STATION, UNIT NO. 1  
50-416

The format for the Request for Additional Information (RAI) responses below is as follows. The RAI is listed in its entirety as received from the U.S. Nuclear Regulatory Commission (NRC). This is followed by the Grand Gulf Nuclear Station (GGNS) RAI response to the individual question.

1. In Attachment 5, Section 3.8.1, AC Sources-Operating, of the License Amendment Request (LAR), the licensee stated that a review of the applicable surveillance history for the alternating current (AC) sources demonstrated that there have been seven previous failures of the technical specification (TS) functions that would have been detected solely by the periodic performance of these surveillance requirements (SRs).

Explain how each of these failures were identified. Also, explain how each of these failures would have been identified by the TS SRs and why the failures were not identified during the performance of these TS SRs.

*Grand Gulf Response:*

The statement “*seven previous failures of the technical specification (TS) functions that would have been detected solely by the periodic performance of these surveillance requirements (SRs)*” in attachment 5 of the LAR submittal has been revised for clarity, as follows:

“The seven identified failures were detected solely during performance of the TS SR performed every 18 months; however, other more frequent Tech Spec SRs could have detected four of these seven failures, as well. The scope of the 24 month fuel cycle LAR failure evaluation performed by Grand Gulf only considered failures of existing TS SRs performed every 18 months.”

Failures that could have been detected by more frequently performed TS SRs would still be identified after the fuel cycle change, since these surveillance intervals will not be changed. These more frequent TS SRs will continue to verify that the equipment is OPERABLE within the requirements of the Technical Specifications, since they typically require operation of many of the components that were identified as failures during the performance of the 18 month TS SRs. Four out of the seven failures previously identified failures would have been detected by the more frequent TS SRs.

TS SRs 3.8.1.2 and 3.8.1.3 are required to be performed on a 31 day frequency. These TS SRs verify that each DG starts from standby conditions, achieves its rated frequency and voltage, and operates at rated load for greater than or equal to sixty minutes. TS SR 3.8.1.21 is required to be performed on a 184 day frequency. This TS SR verifies that each DG starts from standby conditions and achieves rated speed and voltage in a required amount of time in addition to verifying that it meets steady state voltage and frequency requirements. These requirements are consistent with Regulatory Guide 1.9 Rev 3, to which Grand Gulf is committed. Referring to pages 26 and 27, section 3.8.1, attachment 5 of the Grand Gulf 24 month fuel cycle LAR, the seven failures are listed in chronological order. Failures #2, #3, #4, and #5 would have been detected by the performance of TS SRs 3.8.1.3 and either 3.8.1.2 or 3.8.1.21.

Failure #1 (TS SR 3.8.1.11) was a failure of an EDG outside air fan breaker to close after the load shedding sequence of its associated bus was completed. Although the outside air fan is started for each diesel generator run, it is not started in the same way that it is started during the 18 month TS SR that performs load shedding and sequence testing. During normal standby operation, the fan's circuit breaker remains closed and the fan motor is started via the associated 42 relay upon a DG start for the monthly TS SR. Conversely, during the 18 month TS SR, the breaker is actually opened during the load shed and then sequenced back on later via the LSS panel.

Failure #6 (TS SR 3.8.1.9) was associated with the EDG overspeed trip microswitch. This TS SR is only performed during refueling outages (every 18 months).

Failure #7 (TS SR 3.8.1.19) is associated with the load shedding and sequencing relay, which is a TS SR performed every 18 months.

Therefore, failures #1, #6, and #7 would have only been detected during the performance of the TS SR performed every 18 months.

As previously stated in the LAR submittal, these systems are highly reliable, the identified failures were unique, failures #1, #6 and #7 did not occur as a result of a time-based failure mechanism.

2. In Attachment 5, Section 3.8.4, DC Sources-Operating, of the LAR, the licensee stated that a review of the applicable surveillance history demonstrated that direct current (DC) electric power subsystem had three previous failures of the TS functions that would have been detected solely by the periodic performance of these SRs. The licensee identified these three failures related to the current limit board of the Battery Charger 1A4 in 2003, 2007 and 2009.

- a) Provide a discussion as to why these three failures related to Battery Charger 1A4 were not considered in the technical evaluation of the LAR as repetitive and of common cause failure nature.

*Grand Gulf Response:*

The Class IE 125 volt DC batteries A and B are provided with two chargers, each of which is capable of recharging its battery from a minimum discharged state in 12 hours while supplying the largest combined demand of the various steady-state DC loads. All the failures were associated with only one specific battery charger and only one control board in that specific battery charger. The other three battery chargers had no control board or circuit board failures. The lack of failures in any other battery charger indicated that this was not a generically repetitive or common mode failure. Additionally, the fact that no other charger exhibited similar failures indicated that there was no time-based failure mechanism.

- b) Explain how each of these failures was identified. Also, explain how each of these failures would have been identified by these TS SRs and why the failures were not identified during the performance of these TS SRs.

*Grand Gulf Response:*

The scope of the 24 month fuel cycle LAR failure evaluation performed by Grand Gulf only considered failures of existing TS SRs performed every 18 months. Failures detected by other plant activities, such as more frequently performed TS SRs, will not be impacted by this change and will continue to detect failures which they have previously detected. Failures detected by other plant activities were not evaluated within the scope of the 24 month fuel cycle LAR.

To simplify the evaluations necessary for this study, Surveillance Test failures have been classified into categories which can, in most cases, be generically justified. The classification categories are:

- Category A – No Loss of Design/Safety Function
- Category B – Failure identified by more frequent testing
- Category C – Event driven failures
- Category D – Unique failures not due to the above categories

Category A, B, or C failures are categorized as having no impact on changing the 18 month surveillance frequency. Category D failures could result in the loss of the Design or Safety Function and would not be identified by more frequent testing (such as quarterly functional tests). For the Category D failures, the root cause of the failure is investigated and evaluated to identify any time-based failure mechanisms. A separate evaluation reviewed the Category D failures (based on manufacturer or

functional type), as a group, to determine if there is any evidence of repetitive failures among similar plant components which could indicate common mode failures or time-based failures across systems. These two evaluations (failure categorization and review of unique failures) identify any repetitive failures which could potentially invalidate the conclusion that the impact on system availability, if any, will be small from the change to a 24 month surveillance test interval. The evaluation identifies failures that would have only been discovered by the 18-month surveillance, and therefore, would only be discovered by a 24-month surveillance (after the LAR approval). This could result in the failure going for a longer period of time undetected if it were a time based or repetitive failure.

One failure (TS SRs 3.8.4.6 or 3.8.5.1) was found during performance of 06-EL-1L51-R-0001 "125VDC Battery Charger Capability Test" on February 19, 2003. Battery Charger 1A4 Current Limit Amperes was found out of tolerance low and not within TS limits. Maintenance Action Item (MAI) 329253 replaced a card in Control Board B. All TS criteria were met after the repairs.

One failure (TS SRs 3.8.4.6 or 3.8.5.1) was found during performance of 06-EL-1L51-R-0001 "125VDC Battery Charger Capability Test" on October 24, 2007. Battery Charger 1A4 Current Limit Amperes was found out of tolerance low and not within TS limits. Work Order 127610-01 replaced six control cards. After repairs were completed all TS requirements were satisfactory.

One failure (TS SRs 3.8.4.6 or 3.8.5.1) was found during performance of 06-EL-1L51-R-0001 "125VDC Battery Charger Capability Test" on April 24, 2009. During performance of Work Order 51690933, the 1A4 Battery Charger current limit amperes As-Found data value was out of tolerance low and the Current Limit Board of the 1A4 Battery Charger was out of calibration. The existing card was recalibrated on April 24, 2009 with all TS acceptance criteria met.

- c) Provide a discussion on how the determination was made that no timed-based mechanisms are apparent for these failures.

*Grand Gulf Response:*

The Class IE 125 volt DC batteries A and B are provided with two chargers, each of which is capable of recharging its battery from a minimum discharged state in 12 hours while supplying the largest combined demand of the various steady-state DC loads. All the failures were associated with only one specific battery charger and only one control board in that specific battery charger. The other three battery chargers had no control board or circuit board failures. The lack of failures in any other battery charger indicated that this was not a generically repetitive or common mode failure.

Additionally, the fact that no other charger exhibited similar failures indicated that there was no time-based failure mechanism.

3. In Attachment 5, Section 3.8.4 of the LAR, the licensee stated:

Additionally, upon approval of this amendment request, commitments outlined in the GGNS UFSAR (Updated Final Safety Analysis Report) related to RG 1.32, "Criteria for Safety-related Electric Power Systems for Nuclear Power Plants," RG 1.129, "Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," and to IEEE-450, "Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," to perform the battery service test (i.e., SR 3.8.4.3) during refueling outages, or at some other outage, with intervals between tests "not to exceed 18 months," will be revised to reflect intervals between tests "not to exceed 30 months."

However, the NRC staff notes that the 18 month frequency of SR 3.8.4.3 is based on engineering judgment taking into consideration the desired unit conditions to perform the surveillance as stated in the GGNS TSs Bases and, also, on aging characteristics of vented lead-acid batteries as known in the industry. Also, SR 3.8.4.3 is not a service discharge test, but a visual inspection of the battery cells, cell plates, and battery racks.

- a) Regarding the statement above, provide a discussion as to why SR 3.8.4.3 is considered a service discharge test and clarify if the commitments related to Regulatory Guide (RG) 1.32, RG 1.129, and IEEE-450 are applicable to SR 3.8.4.3.

*Grand Gulf Response:*

The reference to SR 3.8.4.3 was a typographical error. The intent of the statement was to perform the SR 3.8.4.8 performance discharge test, or a modified performance discharge test at the 30 month interval rather than the service test at the 18-month interval. The performance discharge test is currently performed for degraded conditions when the battery may have reached 85% of performance life.

- b) The versions of RG 1.32 and RG 1.129 in the UFSAR endorse the performance of battery service discharge tests at 18-month surveillance intervals. Since the proposed change to the battery service discharge tests at 24-month surveillance intervals is endorsed in the latest versions of these RGs, provide a regulatory commitment to follow the guidance in the latest versions of RG 1.32 and RG 1.129 and incorporate these RG versions into the next revision of the GGNS UFSAR.

*Grand Gulf Response:*

NUREG-1434, Revision 1, "Standard Technical Specifications for General Electric Plants BWR/6," substitutes a modified performance discharge test for the performance discharge test for Note 1 to SR 3.8.4.7. Grand Gulf Nuclear Station adopted NUREG-1434, Revision 0, when converting to the improved standard

technical specifications. The modified performance discharge test is typically a simulated duty cycle consisting of two rates: the one-minute rate published for the battery or the largest current load of duty cycle, and the test rate employed for the performance test. Thus, the modified discharge test would envelope the full service test without compromising the results of the discharge test. Grand Gulf Nuclear Station will continue to comply with the current RG 1.32 and RG 1.129 positions stated in the Updated Final Safety Analysis Report (UFSAR).

The current surveillance test performance requirements are provided in the attached table.

Battery	Service Discharge Test (06-EL-1L11-R-0003)	Performance Discharge Test (06-EL-1L21-O-0001)
1A3	≥ 513 amps for 20 seconds ≥ 388 amps for 40 seconds ≥ 201 amps for 238 minutes ≥ 216 amps for 1 minute	290 amps (rated) for 9 hours
1B3	≥ 346 amps for 30 seconds ≥ 240 amps for 30 seconds ≥ 189 amps for 239 minutes	290 amps (rated) for 9 hours
1C3	≥ 61.3 amps for 1 minute ≥ 17.5 amps for 59 minutes ≥ 17.5 amps for 60 minutes	12.5 amps (rated) for 9 hours

4. In Attachment 5, Sections 3.8.1 and 3.8.4, the licensee stated that the surveillance test interval of these SRs is being increased from once every 18 months to once every 24 months including the 25% grace period.

However, the NRC staff notes that SR 3.0.2 allows certain surveillances to be performed within 1.25 times the interval specified in the Frequency in situations where plant conditions (e.g., transient conditions or other ongoing surveillance or maintenance activities) are not suitable for conducting these surveillances at their specified frequencies.

- a) Since SR 3.8.1.8 and SR 3.8.1.12 are required to be performed in Mode 3, 4 or 5, and SR 3.8.1.11, SR 3.8.1.16, SR 3.8.1.18, SR 3.8.1.19 and SR 3.8.4.7 are required to be performed in Mode 4 or 5, explain how SR 3.0.2 would be applied if either one of those surveillances was not performed during plant shutdown for some reason.

*Grand Gulf Response:*

The mode of applicability would be followed in all cases; however, the actual interval between surveillance tests may be greater than 24 months based on plant operating conditions, forced outages, or other conditions. Thus, the time between mode applicability may be longer than 24 months; under these circumstances, SR 3.0.2 is applicable to this surveillance.

SR 3.8.4.8 currently has a 24-month interval if battery capacity is > 100% and the battery has reached 85% of expected life. SR 3.0.2 currently applies to this SR and would apply to the frequency interval when used to replace the service test.

The 25% grace period and the 1.25 time interval in SR 3.0.2 refer to the same time interval, and allow for a margin for surveillance performance when required by plant operating conditions. This margin allows the plant to optimize fuel use during reactor coast down, and gives the plant the option to not shutdown the reactor to complete surveillance within the defined frequency when the mode requirement is 3, 4 or 5.

- b) NRC RGs limit surveillance intervals for service discharge tests to once per 18 or 24 months, depending on which revision. Given this, explain why SR 3.0.2 should be applicable to SR 3.8.4.7 when extending the surveillance interval from 18 to 24 months.

*Grand Gulf Response:*

SR 3.0.2 basis discussion states that the 25% extension does not significantly degrade the (continued) reliability that results from performing the surveillance at its specified frequency. This is based on the recognition that the most probable result of any particular surveillance being performed is the verification of conformance with the SRs. The exceptions to SR 3.0.2 are those surveillance tests for which the 25% extension of the interval specified in the frequency does not apply. These exceptions are stated in the individual specifications. For example, the requirements of regulations take precedence over the TS. The TS cannot in and of themselves extend a test interval specified in the regulations. Therefore, there is a note in the frequency stating SR 3.0.2 is not applicable. No such note exists for SR 3.8.4.7 or SR 3.8.4.8.

RG 1.129, Revision 1 identified an 18 month frequency (during refuel outages) as acceptable and the 18 month + 25% was published in the NUREG-1434 Revision 0. Additionally, NRC has approved similar changes to battery testing in the 24-Month Fuel Cycle Safety Evaluation Reports for Plant Hatch, Perry, and River Bend.