Entergy

Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

Kevin Mulligan
Site Vice President
Grand Gulf Nuclear Station
Tel. (601) 437-7500

GNRO-2015/00064

October 15, 2015

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

SUBJECT: Grand Gulf Nuclear Station Response to Electronic Request for Additional Information Regarding Modification of Technical Specification (TS) 3.8.4, "DC Sources" Operating Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5 Amendment Request, dated August 28, 2015.
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCES:
1. Electronic Request for Additional Information Regarding Modification of Technical Specification (TS) 3.8.4, "DC Sources" Operating Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5, dated August 28, 2015.

2. Entergy Letter, "Grand Gulf Nuclear Station Response to Electronic Request for Additional Information Regarding Modification of Technical Specification (TS) 3.8.4, "DC Sources" Operating Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5 Amendment Request," GNRO-2015/00002, dated March 27, 2015 (ADAMS Accession No. ML15089A122).

Dear Sir or Madam:

Entergy Operations, Inc. is providing in the Attachment a response to the Reference 1 Request for Additional Information (RAI).

This letter contains no new commitments. If you have any questions or require additional information, please contact Mr. James Nadeau at 601-437-2103.

I declare under penalty of perjury that the foregoing is true and correct; executed on October 15, 2015.

Sincerely,

KM/sas

Attachments: 1. Grand Gulf Nuclear Station Response to Electronic Request for Additional Information Regarding Modification of Technical Specification (TS) 3.8.4, "DC Sources" Operating Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5

2. Clean TS page for the proposed changes including the word "battery"

Enclosures: EC-Q1L21-90023 EC 43968 Markup
EC-Q1L21-90023
EC-Q1L21-90033 EC 43968 Markup
EC-Q1L21-90033
EC-Q1L21-90046 EC 43968 Markup
EC-Q1L21-90046

NOTE: These Enclosures are relatively large documents and therefore are not Enclosed with this letter but are available for review in CERTREC under an inspection titled "Battery Resistance LAR RAI Responses."

cc: with Attachments

U.S. Nuclear Regulatory Commission
ATTN: Mr. Marc L. Dapas
Regional Administrator, Region IV
1600 East Lamar Boulevard
Arlington, TX 76011-4511

U.S. Nuclear Regulatory Commission
ATTN: Mr. A. Wang, NRR/DORL
Mail Stop OWFN/8 G14
Washington, DC 20555-0001

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

State Health Officer
Mississippi Department of Health
P. O. Box 1700
Jackson, MS 39215-1700

Attachment 1 to
GNRO-2015/00064

Grand Gulf Nuclear Station Response to Electronic Request for Additional Information Regarding Modification of Technical Specification (TS) 3.8.4, "DC Sources" Operating Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5

By letter dated June 26, 2014 (Agencywide Document Access and Management System (ADAMS) Accession No. ML14177A270), Entergy Operations Inc. (Entergy, the licensee) submitted a license amendment request (LAR) for Grand Gulf Nuclear Station, Unit No. 1 (GGNS) to modify Technical Specification (TS) 3.8.4, "DC Sources – Operating Surveillance Requirements (SRs) 3.8.4.2 and 3.8.4.5. By letter dated December 9, 2014, the US Nuclear Regulatory Commission (NRC) staff requested additional information regarding the June 26, 2014, submittal. By letter dated March 27, 2015 (ADAMS Accession No. ML15089A122), Entergy responded to this RAI. The NRC staff has reviewed these responses and determined that the following additional information is required to complete its review of the amendment request.

RAI Question #1:

In response to RAI 1.a, on page 1 of Attachment 1, the licensee states: "GGN is deviating from the current requirements in SRs 3.8.4.2 and 3.8.4.5 because terminal resistance is accounted for in the resistance values for inter-cell connections therefore it is appropriate to remove terminal connection resistance values from SR 3.8.4.2 and SR 3.8.4.5. Each battery cell has two terminals, a positive and negative terminal." Also, on page 3, the licensee stated that the battery end connection resistance measured from test points C and D as shown on Figure 2 for Division 1 and 2 batteries is for inter-rack connections, and as such the end terminal connection is included in the terminology of inter-rack. On page 5, the licensee stated that the Division 3 battery's terminal connection resistance is measured in the same manner as Divisions 1 and 2 batteries.

GGNS current TS SRs 3.8.4.2 and 3.8.4.5 require verification of resistances for battery inter cell connections, inter-rack connections, inter-tier connections, and terminal connections within specified limits. The staff notes that the TS requirements for battery terminal connections resistance apply to the battery "output" terminal connections (i.e., connections between the battery's output terminals and the cables connecting to the switchgear) since all the other positive and negative terminal connections of the battery cells are part of the inter-cell, inter-rack, and inter- tier connections. This terminology for battery "terminal connections" resistance is consistent with the NRC NUREG-1434, "Standard Technical Specifications – General Electric Plants (BWR/6)," and the industry guidance in Institute of Electrical and Electronics Engineers Standard (IEEE Std.) 450, "Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications." Based on the staff's understanding of the TS requirements for battery terminal connections resistance, the staff finds the licensee's response to RAI 1.a is not acceptable.

Please provide the TS acceptance criteria for Division 1, 2, and 3 battery "output" terminal connections resistances. Also, please consider adding these TS acceptance criteria to SRs 3.8.4.2 and 3.8.4.5 for consistency with GGNS current TS.

Response to RAI Question #1:

The intent of the discussion provided in the previous submittal (RAI 1.a) was an attempt to simplify the number of different terms with the same value. The proposed Division 1, 2, and 3 battery output terminal connection resistances TS acceptance criteria have been added to the clean TS page requested in RAI Item #4 for consistency with the current GGNS

Technical Specifications. The battery's output terminal connection carries a 100 micro-ohm restriction for Division I, II and III.

RAI Question #2:

In the LAR, the licensee proposed the following revised SR 3.8.4.2:

"Verify Division 1 and 2 battery connection resistance is ≤ 0.5 E-4 ohm for inter-cell connections and ≤ 1.0 E-4 ohm for inter-rack or inter-tier connections.

AND

Verify Division 3 connection resistance is ≤ 1.0 E-4 ohm per inter-cell and inter-tier connection."

Based on the clarification provided in the conference call and the guidance provided in Attachment 2, "Surveillance Procedure [SP] 06-EL-1L11-R-0001, 125 Volt Battery Bank Physical Condition Check," of the March 27, 2015 letter, the staff understands that the procedure has an administrative resistance limit of 0.5 E-4 ohm for each positive or negative post connection measured on each side of the interconnecting bars. Since the inter-cell connection resistance consists of the total resistance measured between the positive post of one battery cell and the negative post of the adjacent battery cell, with both posts inter-connected by a bar (see Figure 1 below), it appears that the allowable inter-cell connection resistance for GGNS Division 1 and 2 batteries, according to SP 06-EL-1L11-R-0001 provided in Attachment 2, is 0.5 E-4 ohm + 0.5 E-4 ohm or 1.0 E-4 ohm.

Please explain:

a) How the administrative resistance limit for each positive or negative post connection as measured in SP 06-EL-1L11-R-0001 corresponds to the proposed value for inter-cell connection resistance in the SR.
b) How the inter-cell resistance value is considered in battery capacity calculations
c) How the proposed inter-cell resistance for Division 3 battery is calculated
d) How the resistances of any inter-rack cables is measured and considered in the battery capacity calculations.

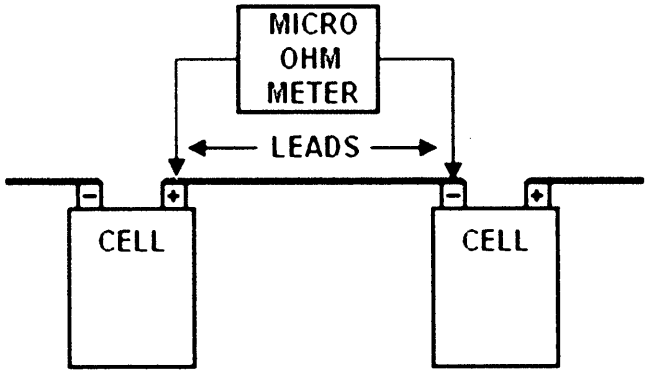

Figure 1 Intercell Resistance measurement

Response to RAI Question #2:

Referring to Figure 1 above (page 2 of 4):

a. Please also refer to page 5 of SP 06-EL-1L11-R0001. This surveillance for Division I and Division II measures resistance across each bolted connection between the cell post (Test Point "A") and the two interconnecting straps (Test Point "B") recording the highest resistance. Each cell that has interconnecting straps is tested in this manner. For Division I and Division II, the administrative limit of each positive and negative connection, with the exception of the battery end connection and cell 30 to cell 31 connection, is 100 micro-ohms. Resulting, the maximum allowed "intercell connection resistance" would be the sum of the post-to-strap allowed connection resistances, or 200 micro-ohms.

b. The resistances are incorporated in calculations EC-Q1L21-90033, EC-Q1L21-90046, and EC-Q1L21-90023 by the bolted connection resistances as described in the 2.a. response in this RAI, not as the "intercell connection resistance". To clarify, the values are incorporated in the manner that the surveillance is executed in that the resistance is incorporated based on terminal connections. How this resistance is calculated and incorporated into each calculation is discussed in section 3.3 of EC-Q1L21-90033 and EC-Q1L21-90046, and section 3.4 in EC-Q1L21-90023. The calculations are provided in response to RAI #3.

c. Please also refer to page 6 of SP 06-EL-1L11-R0001. This surveillance for Division III measures resistance across each bolted terminal connection between the cell post flag (Test Point "A") and the intercell strap (Test Point "B") and records the measured resistance. Each positive and negative terminal connector is measured in this manner with an administrative limit of 100 micro-ohms. Resulting, the maximum allowed "intercell connection resistance" would be the sum of the measurements, or 200 micro-ohms.

d. Please refer to page 5 of SP 06-EL-1L11-R-0001. Step two refers to the process of measuring resistance for the inter rack connection. Each connection is administratively restricted to 100 micro-ohms, summing to 200 micro-ohms for the inter rack connection. How this resistance is calculated and incorporated into each calculation is discussed in section 3.3 of EC-Q1L21-90033 and EC-Q1L21-90046. The calculations are provided in response to RAI #3.

RAI Question #3:

In response to RAI 1.a, the licensee stated that adequacy of battery terminal voltage using the resistance values for inter-cell, inter-rack(if applicable), and inter-tier are validated by calculations EC-Q1L21-90033 (Division 1), EC-Q1L21-90046 (Division 2), and EC-Q1L21-90023 (Division 3) in Engineering Change EC-43968. In Attachment 3, the licensee provided a copy of EC-43968 Topic Notes. The EC-43968 Topic Notes does not include the referenced calculations for Divisions1, 2, and 3.

Please provide summaries of the calculations, including assumptions, performed to determine the TS acceptance criteria for battery inter-cell, inter-tier, inter-rack, and terminal connections resistances for Divisions 1, 2, and 3, and to validate the adequacy of battery terminal voltages using the resistances values.

Response to RAI Question #3:

The requested documents are included as Enclosures as the base calculation and the mark-up to the calculation to account for the additional proposed resistance values. Those Enclosures are relatively large documents and therefore are available for review in CERTREC under an inspection titled "Battery Resistance LAR RAI Responses."

RAI Question #4:

In response to RAI 1.b, the licensee stated that the word "battery" will be added to the TS statements for clarification. Please provide a clean TS page for the proposed changes including the word "battery."

Response to RAI Question #4:

A clean TS page for the proposed changes, including the additional word "battery" for clarification, is included as Attachment 2.

Attachment 2 to
GNRO-2015/00064

Clean TS page for the proposed changes including the word "battery"

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Division 3 DC electrical power subsystem inoperable for reasons other than Condition A.	D.1 Declare High Pressure Core Spray System inoperable.	Immediately
F. Required Action and associated Completion Time of Condition C or D not met.	E.1 Be in MODE 3. AND E.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ 129 V on float charge.	7 days
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify Division 1 and 2 battery connection resistance is ≤ 1.0 E-4 ohm for inter-cell connections, ≤ 2.0 E-4 ohm for inter-rack connections, ≤ 2.0 E-4 ohm for inter-tier connections, and ≤ 1.0 E-4 ohm for battery terminal connections. AND Verify Division 3 battery connection resistance is ≤ 2.0 E-4 ohm for inter-cell, ≤ 2.0 E-4 ohm for inter-tier connection, and ≤ 1.0 E-4 ohm for terminal connections.	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	24 months
SR 3.8.4.4	Remove visible corrosion and verify battery cell to cell and terminal connections are coated with anti-corrosion material.	24 months
SR 3.8.4.5	Verify Division 1 and 2 battery connection resistance is ≤ 1.0 E-4 ohm for inter-cell connections, ≤ 2.0 E-4 ohm for inter-rack connections, ≤ 2.0 E-4 ohm for inter-tier connections, and ≤ 1.0 E-4 ohm for terminal connections. AND Verify Division 3 battery connection resistance is ≤ 2.0 E-4 ohm for inter-cell, ≤ 2.0 E-4 ohm for inter-tier connection, and ≤ 1.0 E-4 ohm for terminal connections.	24 months
SR 3.8.4.6	Verify each Division 1 and 2 required battery charger supplies ≥ 400 amps at ≥ 125 V for ≥ 10 hours; and the Division 3 battery charger supplies ≥ 50 amps at ≥ 125 V for ≥ 4 hours.	24 months

(continued)