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GNRO-2012/00050

May 25, 2012

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

**SUBJECT:** Response to Request for Additional Information (RAI) dated April 30, 2012  
Grand Gulf Nuclear Station, Unit 1  
Docket No. 50-416  
License No. NPF-29

**REFERENCE:** NRC Letter, "Requests for Additional Information for the Review of the  
Grand Gulf Nuclear Station, License Renewal Application," dated April  
30, 2012 (Accession No. ML12104a219, GNRI-2012/00103)

Dear Sir or Madam:

Entergy Operations, Inc is providing, in the Attachment, the response to the referenced request for additional information (RAI).

This letter does not contain any new commitments. If you have any questions or require additional information, please contact Christina L. Perino at 601-437-6299.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 25th day of May, 2012.

Sincerely,

A handwritten signature in black ink, appearing to read "M Perito".

MP/jas

Attachment: Response to Request for Additional Information (RAI)

cc: (see next page)

cc: with Attachment

Mr. John P. Boska, Project Manager  
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cc: without Attachment

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NRC Senior Resident Inspector  
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Port Gibson, MS 39150

**Attachment to**

**GNRO-2012/00050**

**Response to Request for Additional Information (RAI)**

The format for the License Renewal Application (LRA) Request for Additional Information (RAI) responses below is as follows. The RAI is listed in its entirety as received from the Nuclear Regulatory Commission (NRC) with a background, issue and request subparts. This is followed by the Grand Gulf Nuclear Station (GGNS) RAI response to the individual question.

#### **RAI B.1.28-1**

**Background.** The license renewal application (LRA) states that the Non-EQ Cable Connections Program is consistent with GALL Report AMP XI.E6. The GALL Report “parameters monitored/inspected” program element recommends that the following factors are considered for sampling:

- voltage level (medium and low voltage)
- circuit loading (high load)
- connection type
- location (high temperature, high humidity, vibration, etc.)

Most connections used in nuclear power plants include splices (butt or bolted), crimp-type ring lugs, connectors, and terminal blocks. The program basis document GGNS-EP-08-LRD08, Revision 1, states that the representative sample of electrical cable connections will be tested, and the factors considered for sample selection will be application (medium and low voltage), circuit loading (high voltage), and location (high temperature, high humidity, vibration, etc.).

**Issue.** The “parameters monitored or inspected” program element of the applicant’s basis document GGNS-EP-08-LRD08, Revision 1, does not consider or address connection types in the sample selection criteria.

**Request.** Clarify how the Non-EQ Cable Connections Program is consistent with GALL Report AMP XI.E6 with respect to sample selection criteria including connection type.

#### **RAI B.1.28-1 RESPONSE**

As stated in LRA Section B.1.28, the GGNS Non-EQ Cable Connections Program is consistent with the program described in NUREG-1801, Section XI.E6, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements, without exception. In addition, LRA Section B.1.28 states, “The factors considered for sample selection will be application (medium and low voltage, defined as < 35 kiloVolts (kV)), circuit loading (high loading), connection type, and location (high temperature, high humidity, vibration, etc.).” Therefore, connection type is a factor that will be considered in sample selection.

### **RAI B.1.28-2**

**Background.** The GALL Report AMP XI.E6 “detection of aging affects” program element states that testing may include thermography, contact resistance testing, or other appropriate testing methods without removing the connection insulation, such as heat shrink tape, sleeving, insulation boots, etc. The program basis document, GGNS-EP-08-LRD08, states that inspection methods may include thermography, contact resistance testing, or other appropriate quantitative methods based on plant configuration and industry guidance.

**Issue.** Based on the program description in the program basis document, it appears that the applicant may be using other quantitative methods that may include removing the connection insulation.

**Request.** Clarify if there are other appropriate quantitative methods, which may include removing connection insulation, that will be used at GGNS. If there are other methods, justify why this practice is consistent with the recommendations in GALL Report AMP XI.E6.

### **RAI B.1.28-2 RESPONSE**

The aging management program evaluation report for the GGNS Non-EQ Cable Connections Program does not state or imply that destructive examination or removing connection insulation is required of this program. The program described in LRA Section B.1.28 is consistent with NUREG-1801, Section XI.E6.

NUREG-1801, Section XI.E6, “Detection of Aging Effects” addresses test methods with the statement, “Testing may include thermography, contact resistance testing, or other appropriate testing methods without removing the connection insulation, such as heat shrink tape, sleeving, insulating boots, etc.”

The aging management program evaluation report for the GGNS Non-EQ Cable Connections Program (GGNS-EP-08-LRD08) statement for “Detection of Aging Effects” will be clarified to state the following. Additions are shown with underline.

“Inspection methods may include thermography, contact resistance testing, or other appropriate quantitative test methods without removing the connection insulation, such as heat shrink tape, sleeving, insulating boots, etc., based on plant configuration and industry guidance.”

**RAI B.1.28-3**

Background. The SRP-LR, Table 3.0.1, "FSAR Supplement for Aging Management of Applicable Systems," item for GALL Report AMP XI.E6, recommends that the program consists of a representative sample of electrical connections within the scope of license renewal, which is tested at least once prior to the period of extended operation to confirm that there are no aging effects requiring management during that period. Testing may include thermography, contact resistance testing, or other appropriate testing methods without removing the connection insulation, such as heat shrink tape, sleeving, insulating boots, etc. LRA Section A.1.28 states that the Non-EQ Cable Connections Program is a one-time inspection program that provides reasonable assurance that the intended function of the metallic parts of electrical connections is maintained with the current license basis through the period of extended operation. The LRA further states that cable connections included are those connections susceptible to age-related degradation resulting in increased resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, or oxidation that are not subject to the environmental qualification requirements of 10 CFR 50.49. This program provides for one time quantitative inspection that will be completed prior to the period of extended operation on a sample of connections.

Issue. LRA Section A.1.28 states that the Non-EQ Cable Connections Program is consistent with GALL Report AMP XI.E6. However, in the Updated Final Safety Analysis Report (UFSAR) Supplement description for the program does not describe the type of testing that may be performed.

Request. Justify why the UFSAR supplement description does not describe the type of testing that may be performed, consistent with that in SRP-LR Table 3.0-1 for GALL Report AMP XI.E6.

**RAI B.1.28-3 RESPONSE**

The type of testing is described in the aging management program evaluation report for the GGNS Non-EQ Cable Connections Program. This description will be added to LRA Section A.1.28 as shown below. Additions are shown with underline.

**A.1.28 Non-EQ Cable Connections Program**

The Non-EQ Cable Connections Program is a one-time inspection program that provides reasonable assurance that the intended functions of the metallic parts of electrical cable connections are maintained consistent with the current licensing basis through the period of extended operation. Cable connections included are those connections susceptible to age-related degradation resulting in increased resistance of connection due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, or oxidation that are not subject to the environmental qualification requirements of 10 CFR 50.49.

This program provides for one-time quantitative inspections that will be completed prior to the period of extended operation on a sample of connections. The factors considered for sample selection will be application (medium and low voltage, defined as < 35 kV), circuit loading (high loading), connection type, and location (high temperature, high humidity, vibration, etc.). The representative sample size will be based on twenty percent of the connection population with a maximum sample of 25.

Inspection methods may include thermography, contact resistance testing, or other appropriate quantitative test methods without removing the connection insulation, such as heat shrink tape, sleeving, insulating boots, etc., based on plant configuration and industry guidance.”

This program will be completed prior to the period of extended operation.

#### **RAI B.1.31-1**

Background. The LRA states that Non-EQ Insulated Cables and Connections Program will be consistent with GALL Report AMP XI.E1. GALL Report, item VI.A.LP-33 states that one of the applicable aging effects is reduced insulation resistance due to photolysis ultra violet (UV) of organic polymers (cable jacket). The GALL Report AMP XI.E1 “scope of program” program element states this program applies to accessible electrical cables and connections within the scope of license renewal that are located in adverse localized environments caused by temperature, radiation, or moisture. During the onsite walkdown, the staff identified cables from engineered safety feature (ESF) transformer Nos. 11, 12, and 21, which sits on support trays.

Issue. These ESF transformer cable trays do not use covers, leaving cables exposed to open-air environment, which will subject cables to moisture and ultra violet radiation. It is not clear how the Non-EQ Insulated Cables and Connections Program will be used to manage the aging effects of reduced insulation resistance in this open-air environment.

Request. Explain how these ESF transformer cables will be managed for aging, during the period of extended operation.

#### **RAI B.1.31-1 RESPONSE**

The ESF transformer cables will be managed by the GGNS Non-EQ Insulated Cables and Connections Program. The GGNS Non-EQ Insulated Cables and Connections Program will include accessible (e.g. able to be approached and viewed easily) insulated cables and connections within the scope of license renewal that are installed in adverse localized environments caused by heat, radiation, or moisture in the presence of air (oxygen). The program described in GGNS LRA Section B.1.31 is consistent with NUREG-1801, Section XI.E1.

Based on the bounding approach, the scope of this program includes the engineered cable bus to the ESF transformers. These cables were specifically designed for the environment and application where they are used. The potential aging effect of reduced insulation resistance (IR) due to radiolysis, photolysis (UV sensitive materials only) of organics, radiation induced oxidation, or moisture intrusion from an environment of radiation, moisture, and air is managed by the program described in GGNS LRA Section B.1.31 which is consistent with NUREG-1801, Section XI.E1, Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements as indicated in NUREG-1801, Table VI.A, Item VI.A.LP-33.

### **RAI B.1.31-2**

Background. The LRA states that Non-EQ Insulated Cables and Connections Program will be consistent with GALL Report AMP XI.E1. The GALL Report AMP XI.E1 “scope of program” program element states that this program applies to accessible electrical cables and connections within the scope of license renewal that are located in adverse localized environments caused by temperature, radiation, or moisture. An adverse localized environment exists based on the most limiting condition for temperature, radiation, or moisture for the insulation material of the electrical cables or connections. GALL Report AMP XI.E1 “parameters monitored or inspected” program element states that an adverse localized environment is a plant-specific condition; therefore the applicant should clearly define how this condition is determined. The program element also states that the applicant should determine and inspect the adverse condition localized environment for each of the most limiting temperature, radiation, or moisture conditions for the accessible cables and connections that are within the scope of license renewal.

Issue. The LRA does not identify the Non-EQ Insulated Cables and Connections Program will determine an adverse localized environment or the most limiting condition for the insulation material of electrical cables or connections.

Request. Describe how the Non-EQ Insulated Cables and Connections Program will identify an adverse localized environment or what limiting conditions for temperature, radiation, or moisture of insulation material of electrical cables and connections will be applied in the identification of an adverse localized environment.

### **RAI B.1.31-2 RESPONSE**

In the GGNS Non-EQ Insulated Cables and Connections Program, an adverse localized environment is a plant-specific condition that will be determined based on a plant spaces approach. The plant spaces approach provides for a review of all buildings and rooms in the scope of license renewal to determine potential adverse localized environments. The determination of an adverse localized environment will be based on the most limiting temperature, radiation, or moisture conditions for the cables and connection insulation material located within that plant space.

LRA Section B.1.31 will be modified to include the following statement after the paragraph describing the representative sample. Additions are shown with underline.

### **B.1.31 NON-EQ INSULATED CABLES AND CONNECTIONS**

#### **Program Description**

The Non-EQ Insulated Cables and Connections Program is a new condition monitoring program that assures the intended functions of insulated cables and connections exposed to adverse localized environments caused by heat, radiation and moisture can be maintained consistent with the current licensing basis through the period of extended operation. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the plant design environment for the cable or connection insulation materials.

A representative sample consisting of accessible insulated cables and connections within the scope of license renewal installed in an adverse localized environment will be visually inspected



for cable and connection jacket surface anomalies such as embrittlement, discoloration, cracking or surface contamination. The program sample consists of all accessible cables and connections in localized adverse environments. This program sample of accessible cables will represent, with reasonable assurance, all cables and connections in the adverse localized environment.

An adverse localized equipment environment is a plant-specific condition that will be determined based on a plant spaces approach. The plant spaces approach provides for a review of all buildings and rooms in the scope of license renewal to determine potential adverse localized environments. The determination of a potential adverse localized equipment environment will be based on the most limiting temperature, radiation, or moisture conditions for the cables and connection insulation material located at GGNS. The evaluation of an adverse localized equipment environment will be based on the most limiting temperature, radiation, or moisture conditions for the cables and connection insulation material located within that plant space that has a potential adverse localized equipment environment.