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GNRO-2011/00034

May 3, 2011

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

SUBJECT: Request for Additional Information Regarding
Extended Power Uprate
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCES: 1. Email from A. Wang to F. Burford dated April 4, 2011, GG EPU SG and
Chemical Engineering Branch Request for Additional Information
(M4679) (Accession Number ML110940136)
2. License Amendment Request, Extended Power Uprate, dated
September 8, 2010 (GNRO-2010/00056, Accession Number
ML102660403)

Dear Sir or Madam:

The Nuclear Regulatory Commission (NRC) requested additional information (Reference 1) regarding certain aspects of the Grand Gulf Nuclear Station, Unit 1 (GGNS) Extended Power Uprate (EPU) License Amendment Request (LAR) (Reference 2). Attachment 1 provides responses to the additional information requested by the Steam Generator and Chemical Engineering Branch.

No change is needed to the no significant hazards consideration included in the initial LAR (Reference 2) as a result of the additional information provided. There are new commitments included in this letter.

If you have any questions or require additional information, please contact Jerry Burford at 601-368-5755.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 3, 2011.

Sincerely,



MAK/FGB/dm

Attachments:

1. Response to Request for Additional Information, Steam Generator and Chemical Engineering Branch
2. List of Regulatory Commitments

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
612 East Lamar Blvd., Suite 400
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U. S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

Attachment 1

GNRO-2011/00034

Grand Gulf Nuclear Station Extended Power Uprate

Response to Request for Additional Information

Steam Generator and Chemical Engineering Branch

Response to Request for Additional Information Steam Generator and Chemical Engineering Branch

By letter dated September 8, 2010, Entergy Operations, Inc. (Entergy) submitted a license amendment request (LAR) for an Extended Power Uprate (EPU) for Grand Gulf Nuclear Station, Unit 1 (GGNS) (ADAMS Accession Number ML102660403). By letter dated March 9, 2011 (GNRO-2011/00017, ADAMS Accession Number ML110680507) Entergy provided responses to the initial set of questions from the Steam Generator and Chemical Engineering Branch. Subsequently, the U.S. Nuclear Regulatory Commission (NRC) staff has determined that the following additional information requested by the Steam Generator and Chemical Engineering Branch (ADAMS Accession Number ML110940136) is needed for the NRC staff to complete their review of the amendment. Entergy's response to each item is also provided below.

RAI # 1

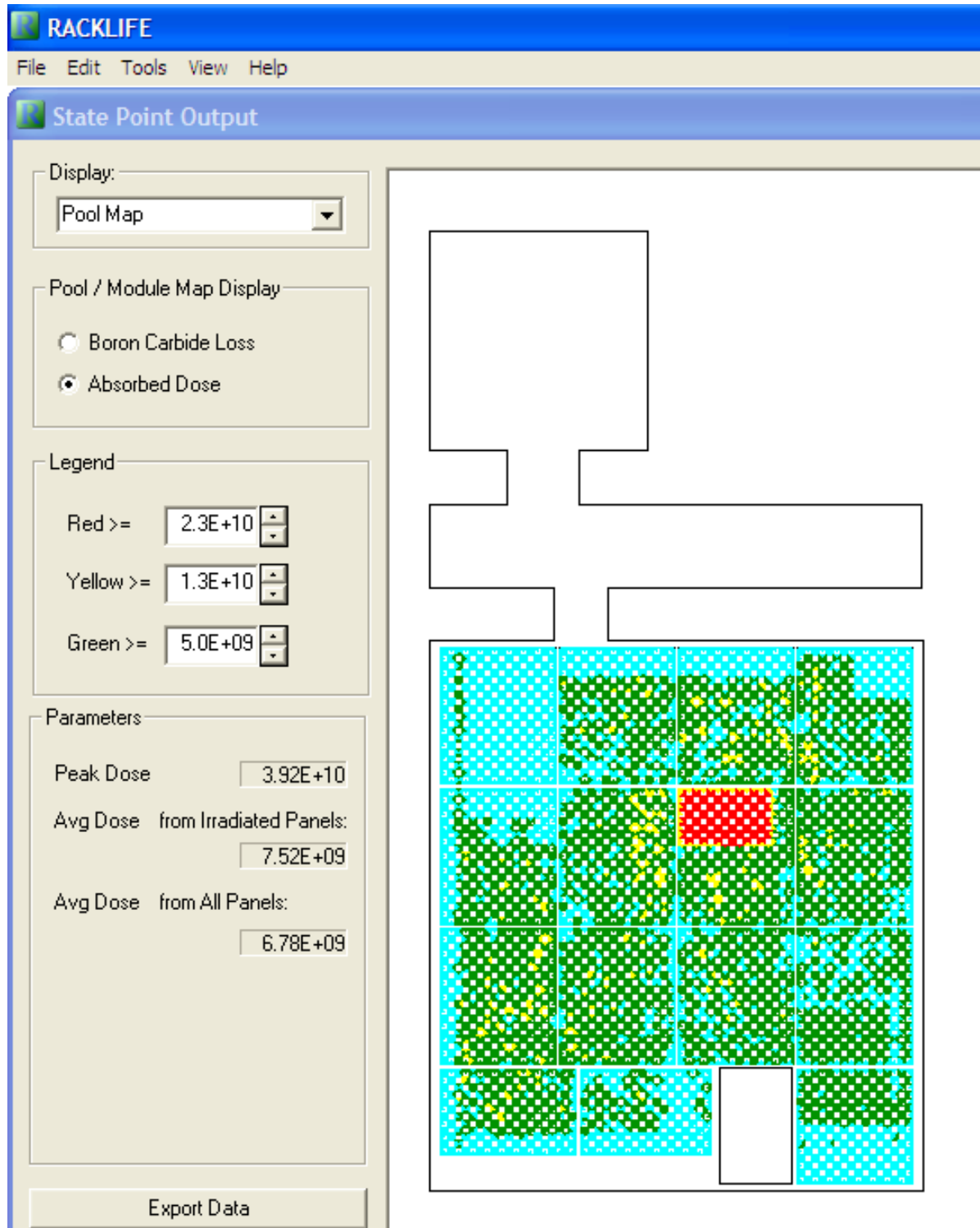
Based on industry operating experience, degradation of Boraflex panels occur in a much less uniform configuration than is shown in the spent fuel pool map provided in your letter dated March 9, 2011. That map shows that Region II racks (the racks that are degraded beyond a usable condition) are located together in the center of the pool. Please provide a map of the spent fuel pool which shows the cumulative dose to each panel in the pool. Also, discuss why Region II cells would be located in one specific area of the pool, and other cells outside of that area would not experience similar degradation after housing recently discharged fuel.

Response

A map of the GGNS spent fuel pool (SFP) is provided in Figure 1-1. As depicted in the legend, the cells that are red have a cumulative dose greater than or equal to 2.3×10^{10} rads; those that are yellow have a cumulative dose less than 2.3×10^{10} rads and greater than or equal to 1.3×10^{10} rads; those that are dark green have a cumulative dose less than 1.3×10^{10} rads and greater than or equal to 5.9×10^9 rads; and those that are light blue have a cumulative dose less than 5.9×10^9 rads. As described in the March 9, 2011 response, Region II cells are those that have reached a cumulative dose of 2.3×10^{10} rads.

Region II is a discrete area due to freshly discharged high dose rate fuel that was placed in the current Region II locations in support of the Blackness test campaigns. This fuel remained in these locations for approximately one year. These high dose fuel assemblies were replaced with freshly discharged fuel in subsequent cycles. Other areas of the pool have been typically loaded with a single assembly that has remained in that location. Since a large fraction of the dose emitted by a discharged fuel assembly occurs during the first year, the Region II area leads the balance of the pool. Recent SFP loading patterns have been established to distribute discharged fuel assemblies to minimize the cumulative dose to Region I Boraflex panels, thereby limiting the number of Boraflex panels that exceed the dose threshold of 2.3×10^{10} rads.

Figure 1-1
GGNS Spent Fuel Pool Boraflex Panel Cumulative Dose Distribution



RAI # 2

In your response letter dated March 9, 2011, it states, "an additional BADGER [Boron-10 Areal Density Gauge for Evaluating Racks] measurement will be performed prior to the end of 2012. The need for additional tests will be determined following the 2012 test campaign, based on the test results along with projected rack performance." The NRC staff believes that the data from the performance of a one-time BADGER campaign is insufficient to ensure that the Boraflex neutron absorber material will continue to perform its intended function.

- a. Please provide the future (i.e., after 2012) surveillance approach and BADGER testing for the Boraflex material. The NRC staff has provided the details of one acceptable program for periodic surveillance of Boraflex neutron absorbing materials in the Generic Aging Lessons Learned, Rev 2, program XI.M22, "Boraflex Monitoring."

Response

GGNS will perform periodic surveillances of the Boraflex neutron absorbing material at least every five years using Boron-10 Areal Density Gauge for Evaluating Racks (BADGER) testing. The first test campaign will be completed by December 31, 2012.

The following test approach, which was described in response to RAI # 2 in Entergy's March 9, 2011 letter to the NRC, will be used. The tests will consist of at least 30 panels. The Badger to Racklife uncertainty will be developed from the test results. This value will be considered acceptable if it is less than the existing Badger/Racklife uncertainty. Additionally, the minimum Badger areal density results will be confirmed to be greater than the CSA assumption. The gap size and location probability distributions will also be compared to those used in the CSA. The acceptability of these parameters will be based on verifying that all of the CSA distributions bound the corresponding Badger measured distributions. Alternatively, the measured gap distributions are acceptable if the CSA calculations are repeated using the measured gap distributions and the resulting 95/95 k-effective is bounded by the corresponding CSA Region 1 result (see Table 1 of NEDC-33621P, Grand Gulf Nuclear Station Fuel Storage Criticality Safety Analysis of Spent and New Fuel Storage Racks, Attachment 2 to the November 23, 2010 letter (ADAMS Accession Number ML103330093)).

RACKLIFE analysis will continue to be performed each cycle. This analysis will include a comparison of the RACKLIFE predicted silica to the plant measured silica. This comparison will determine if adjustments to the RACKLIFE loss coefficient are merited. The analysis will include projections to the next planned RACKLIFE analysis date to ensure current Region I storage locations will not need to be reclassified as Region II storage locations in the analysis interval.

This commitment supersedes the commitments made by Entergy letter to the NRC dated March 9, 2011.

Attachment 2

GNRO-2011/00034

Grand Gulf Nuclear Station Extended Power Uprate

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE- TIME ACTION	CONTINUING COMPLIANCE	
<p>GGNS will perform periodic surveillances of the Boraflex neutron absorbing material on at least a five year frequency using Boron-10 Areal Density Gage for Evaluating Racks (BADGER) testing. The first test campaign will be completed by December 31, 2012.</p> <p>The tests will consist of at least 30 panels. The Badger to Racklife uncertainty will be developed from the test results. This value will be considered acceptable if it is less than the existing Badger/Racklife uncertainty. Additionally, the minimum Badger areal density results will be confirmed to be greater than the CSA assumption. The gap size and location probability distributions will also be compared to those used in the CSA. The acceptability of these parameters will be based on verifying that all of the CSA distributions bound the corresponding Badger measured distributions. Alternatively, the measured gap distributions are acceptable if the CSA calculations are repeated using the measured gap distributions and the resulting 95/95 k-effective is bounded by the corresponding CSA Region 1 result (see Table 1 of NEDC-33621P, Grand Gulf Nuclear Station Fuel Storage Criticality Safety Analysis of Spent and New Fuel Storage Racks, Attachment 2 to the November 23, 2010 letter (ADAMS Accession Number ML103330093)).</p> <p>RACKLIFE analysis will continue to be performed each cycle. This analysis will include a comparison of the RACKLIFE predicted silica to the plant measured silica. This comparison will determine if adjustments to the RACKLIFE loss coefficient are merited. The analysis will include projections to the next planned RACKLIFE analysis date to ensure current Region I storage locations will not need to be reclassified as Region II storage locations in the analysis interval.</p>		x	