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April 26, 1990

U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Pressure Temperature Limits
Proposed Amendment to the
Operating License (PCOL-90/06)
AECM-90/0048

REFERENCE: NRC Letter from L. L. Kintner to W. T. Cottle, dated
February 21, 1990, Pressure Temperature Limits Relating to Generic
Letter 88-11, MAEC-90/0038

System Energy Resources, Inc. (SERI) is submitting by this letter a proposed amendment to the Grand Gulf Nuclear Station (GGNS) Operating License as requested in the reference letter. The proposed amendment changes the RPV Pressure-Temperature curves (Figure 3.4.6.1-1) using the methodology of Regulatory Guide 1.99, Revision 2. In addition, Bases Figure B 3/4 4.6-1 is revised based on the analysis of the flux wire dosimeter removed during the first refueling outage. The attachment also provides the technical justification and discussion to support the requested amendment.

In accordance with the provisions of 10CFR50.4, the signed original of the requested amendment is enclosed. This amendment has been reviewed and accepted by both the Plant Safety Review Committee and the Safety Review Committee.

Based on the guidelines presented in 10CFR50.92, SERI has concluded that this proposed amendment involves no significant hazards considerations.

Yours truly,

THC:mtc
Attachment: GGNS PCOL-90/06

Enclosure: Affirmation per 10CFR50.30

cc: (See Next Page)

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BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

LICENSE NO. NPF-29

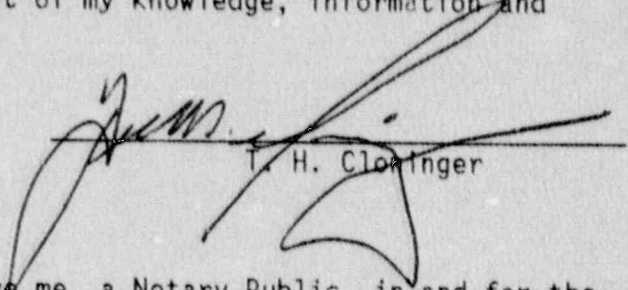
DOCKET NO. 50-416

IN THE MATTER OF
MISSISSIPPI POWER & LIGHT COMPANY
and
SYSTEM ENERGY RESOURCES, INC.
and
SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION

AFFIRMATION

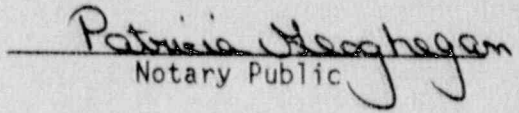
I, T. H. Cloninger, being duly sworn, state that I am Vice President, Nuclear Engineering and Support of System Energy Resources, Inc.; that on behalf of System Energy Resources, Inc., and South Mississippi Electric Power Association I am authorized by System Energy Resources, Inc. to sign and file with the Nuclear Regulatory Commission, this application for amendment of the Operating License of the Grand Gulf Nuclear Station; that I signed this application as Vice President, Nuclear Engineering and Support of System Energy Resources, Inc.; and that the statements made and the matters set forth therein are true and correct to the best of my knowledge, information and belief.

STATE OF MISSISSIPPI
COUNTY OF CLAIBORNE


T. H. Cloninger

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the County and State above named, this 26 day of April, 1990.

(SEAL)


Notary Public

My commission expires:
My Commission Expires July 1, 1993

A. SUBJECT

1. NL 90/01 Pressure-Temperature Limits
2. Revised Technical Specifications:
 - a. Pressure/Temperature Limits - Surveillance Requirements, 4.4.6.1.1, 4.4.6.1.2 and 4.4.6.1.5 - pages 3/4 4-19 and 3/4 4-20.
 - b. Minimum Reactor Pressure Vessel Metal Temperature vs. Reactor Vessel Pressure, Figure 3.4.6.1-1 - page 3/4 4-21.
 - c. Pressure/Temperature Limits, Bases 3/4.4.6 - pages B 3/4 4-4 and B 3/4 4-5.
 - d. Reactor Vessel Toughness, Bases Table B 3/4.4.6-1 - page B 3/4 4-6.
 - e. Fast Neutron Fluence ($E > 1$ MeV) at $1/4$ T as a Function of Service Life, Bases Figure B 3/4 4.6-1 - page B 3/4 4-7.

B. DISCUSSION:

1. On July 12, 1988 the NRC issued Generic Letter 88-11, "NRC Position on Radiation Embrittlement of Reactor Vessel Materials and its Impact on Plant Operations." The purpose of the letter was to require use of the methods described in Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," to predict the effect of neutron radiation on reactor vessel materials as required by Paragraph V.A. of 10CFR Part 50 Appendix G. The existing pressure-temperature limit curves (Figure 3.4.6.1-1) were predicted to be applicable for service periods up to 32 effective full power years (EFPY) and are based on Regulatory Guide 1.99, Revision 1 and a design fluence at end of life (EOL) of $1.9 \text{ E}+18 \text{ n/cm}^2$. The purpose of this change to the Technical Specifications is to incorporate the results of the use of the revised methodology of Regulatory Guide 1.99, Revision 2 and the analysis of flux wire dosimeters removed from the GGNS reactor vessel during the first refueling outage (RF01).
2. On January 9, 1989 (AECM-89/0002), SERI provided the results of the initial technical analysis which was performed to address Generic Letter 88-11. This analysis was preliminary because assumptions were made with regard to the nickel content of the reactor vessel materials. Since the initial analysis was performed, the actual nickel content of the reactor vessel materials was obtained and the analysis was revised based on this new data. The revised analysis was provided to the NRC on February 28, 1989 (AECM-89/0047).

The NRC reviewed SERI's submittals and provided an evaluation in their letter dated February 21, 1990, MAEC-90/0038. They concluded that the proposed pressure-temperature limits are acceptable for use up to 10 EFPY.

3. TS 4.4.6.1.5 requires that reactor flux wire specimens be removed at the first refueling outage and examined to determine the reactor pressure vessel fluence as a function of time and power level and be used to modify Bases Figure B 3/4.4.6-1. This was done during RF01 and this change resulted in a revised Bases Figure B 3/4.4.6-1. The revised figure was used in the analysis which revised TS Figure 3.4.6.1-1.
4. The existing pressure-temperature limit curves, Figure 3.4.6.1-1, were applicable for 32 EFPY. The proposed revised Figure 3.4.6.1-1, using the flux wire results and Regulatory Guide 1.99 Revision 2 methodology would be applicable for 10 EFPY maintaining current operating conditions. Consistent with our current material testing program, samples will be removed and tested which more accurately reflect the influence of neutron flux on embrittlement of the reactor vessel components. Revised pressure-temperature limit curves will be prepared based on actual material test results and analysis prior to exceeding 10 EFPY.
5. In order to reflect the above, the following TS changes are proposed:
 - a. Revise TS 4.4.6.1.1 to delete: and B'
 - b. Revise TS 4.4.6.1.2 to change curves to curve and to delete: and C
 - c. Delete TS 4.4.6.1.5 text and replace with: The Pressure-Temperature Limit Figure 3.4.6.1-1 is valid through 10 EFPYs and shall be re-evaluated prior to exceeding 10 EFPYs.
 - d. Revise TS Figure 3.4.6.1-1 to reflect the revised methodology of Regulatory Guide 1.99, Revision 2 and the revised Bases Figure B 3/4 4.6-1. Also the applicable service period of 32 EFPY is revised to 10 EFPY. The Initial Non-Nuclear Heating Limit (Curve B) and Initial Nuclear (Core Critical) (Curve C) curves are deleted as these curves are no longer applicable. The Initial System Hydrotest Limit (Curve A) is re-labeled Inservice Leak and Hydrotest. The prime references have been deleted.
 - e. Revise Bases 3/4.6.6 to: (1) replace the reference to phosphorus content of reactor vessels materials with a reference to nickel content of the material; (2) to replace the reference to Regulatory Guide 1.99, Revision 1, "Effects of Residual Elements on Predicted Radiation Damage to Reactor Vessel Material" with a reference to Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials" and; (3) add a discussion of the revision of Bases Figure B 3/4.4.6-1 based on the analysis of the flux wire dosimeter removed during RF01. In addition, the statement with regard to EOL fluence is deleted and replaced with 10 EFPYs of exposure. In addition, revise the last sentence to include the need to revise Figure 3.4.6.1-1 for increased exposure levels.

- f. Revise Bases Table B 3/4.4.6-1 to include the nickel content of the reactor vessel components and make changes to values in the Table which change based on the revised analysis and the use of 10 EFPY exposure instead of EOL exposure.
- g. Revise Bases Figure B 3/4 4.6-1 to incorporate the results of the analysis of the flux wire dosimeter removed during RF01.

C. JUSTIFICATION:

1. The existing pressure-temperature limit curves were predicted to be applicable for service periods up to 32 EFPY and are based on Regulatory Guide 1.99, Revision 1 and a design fluence at EOL of $1.9\text{E}+18$ n/cm². Existing Bases Figure B 3/4 4.6-1 incorrectly shows fluence to be scaled as 10-18. The proposed revised pressure-temperature limit curves are based on Regulatory Guide 1.99, Revision 2, the proposed revised Bases Figure B 3/4 4.6-1 and reactor vessel exposure of 10 EFPY.
2. The fundamental difference between Revision 1 and Revision 2 of Regulatory Guide 1.99 is in the determination of reference temperature (RT_{NDT}) shift due to material chemistry. Revision 1 accounted for the shift due to phosphorous and copper content while Revision 2 accounts for the shift due to copper and nickel content. Sensitivity to neutron radiation embrittlement may be affected by elements other than copper and nickel, however, Revision 2 was based on studies which found other elements such as phosphorous to be of secondary importance, (i.e., including them in the analysis did not produce a significantly better fit of the data). The proposed Figure 3.4.6.1-1 is based on the Revision 2 methodology outlined in Section C.1 of the regulatory guide and the actual nickel and copper content of the GGNS Unit 1 reactor belt line materials.
3. The proposed Bases Figure B 3/4 4.6-1 has been revised to reflect the analysis of the flux wire dosimeter removed during RF01. The flux wires were analyzed to determine the flux and fluence at the dosimeter location and then lead factors were calculated which related the flux magnitude at the dosimeter location to that at the location of peak flux. The peak fluence is predicted according to the following equation:

$$\text{Peak Fluence} = (\text{Dosimeter Flux}) * (\text{Full Power Seconds}) / \text{Lead Factor}$$

There is an uncertainty of $\pm 25\%$ on the > 1 MeV flux and fluence from the flux wire analysis. The upper bound values for the dosimeter flux were used in generating the proposed Bases Figure B 3/4 4.6-1. The previous peak EOL (32 EFPY) fast neutron fluence at 1/4 T was $1.9 \times 10\text{E}+18$ n/cm² while the new determination results in a value of $2.4 \times 10\text{E}+18$ n/cm² at EOL. The revised TS Figure 3.4.6.1-1 utilizes the corresponding fluence value for 10 EFPY from the proposed Bases Figure B 3/4 4.6-1.

4. The proposed TS Figure 3.4.6.1-1 is applicable for service periods up to 10 EFPY. This exposure period was selected to maintain plant operational flexibility during the performance of the in-service leak test. Curves based on an exposure of 32 EFPY, Regulatory Guide 1.99, Revision 2, and the revised fluence estimate would have narrowed the range between the lower temperature limit for conducting this test and the temperature at which both primary and secondary containment must be established (200 F). The proposed curves provide appropriate limits up to 10 EFPY but will have to be revised prior to the point at which the reactor exposure exceeds 10 EFPY for a higher exposure level.
5. The proposed pressure-temperature limit curves ensure that GGNS will continue to meet the beltline material requirements in Appendix G of 10CFR Part 50 up until the reactor exposure exceeds 10 EFPY. The curves include the safety margins required by Appendix G and were developed using the revised methodology of Regulatory Guide 1.99, Revision 2 and actual measurements of fluence from the reactor vessel. This new methodology makes use of more recent research than the previous revision of the regulatory guide. There are no changes to the limits for operations below 312 psig. Therefore, there is no impact on the safe operation of GGNS.

D. NO SIGNIFICANT HAZARDS CONSIDERATIONS

SERI is proposing with this amendment request a revision to the Technical Specifications and their bases to:

1. Incorporate the use of the revised methodology contained in Regulatory Guide 1.99, Revision 2.
2. Modify the Bases Figure 3/4 4.6-1 and TS Figure 3.4.6.1-1 using the methodology of Regulatory Guide 1.99, Revision 2 and the flux wire analysis results.
3. Reduce the period of applicability of Figure 3.4.6.1-1 from 32 EFPY to 10 EFPY.
4. Revise Bases Table B 3/4.4.6-1 to reflect Regulatory Guide 1.99, Revision 2 methodology, actual beltline material analysis, and the results of analysis of the flux wire dosimeter.

The Commission has provided standards for determining whether a no significant hazards consideration exists as stated in 10CFR50.92(c). A proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

SERI has evaluated the no significant hazards consideration in its request for a license amendment. In accordance with 10CFR50.91(a), SERI is providing the analysis of the proposed amendment against the three standards in 10CFR50.92:

1. No significant increase in the probability or consequences of an accident previously evaluated results from this change.
 - a. While the revised methodology of Regulatory Guide 1.99, Revision 2 and the higher fluence values from the proposed Bases Figure B 3/4 4.6-1 do result in more restrictive temperature-pressure limitations for a given EFPY exposure level, the proposed TS Figure 3.4.6.1-1 limits are in accordance with the requirements of Appendix G and were determined using NRC approved methodology. Operation of the plant within the limitations of the proposed figure will ensure that the requirements of 10CFR50, Appendix G are met up to 10 EFPY of operation. Except for a reduction in the period of applicability from 32 EFPY to 10 EFPY, the pressure-temperature limit curves are unchanged.
 - b. Therefore, there is no significant increase in the probability or consequences of previously analyzed accidents due to the proposed change.
2. This change would not create the possibility of a new or different kind of accident from any previously evaluated.
 - a. The proposed curves establish a new period of applicability (10 EFPY) for the current pressure-temperature limitations based on new NRC methodology and actual fluence measurements. These limitations are appropriate for 10 EFPY exposure and operation of the plant within the figure's limitations will ensure that the requirements of 10CFR50, Appendix G are met for that time frame.
 - b. Therefore, the possibility of a new or different kind of accident from any previously evaluated is not created.
3. This change would not involve a significant reduction in the margin of safety.
 - a. The proposed curves were developed using the methodology of of Regulatory Guide 1.99, Revision 2. This methodology includes an allowance for margin that is to be included in the upper-bound values of the adjusted reference temperature (ART). The revised analysis demonstrates that the existing Tech Spec pressure-temperature limit curves are applicable for a period of 10 EFPY. The revised methodology in Regulatory Guide 1.99 Revision 2 and the use of fluence based on actual exposure provides for an increase in conservatism and therefore, further assures the existence of current margins of Safety.
 - b. Therefore, this proposed change will not involve a significant reduction in the margin of safety.