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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
Criticality Analysis for Cycle 5
AECM-90/0068

System Energy Resources, Inc. (SERI) representatives met with NRC staff on January 4, 1990 to discuss various aspects of the reload for Grand Gulf Nuclear Station's (GGNS) upcoming refueling outage (4th refueling outage followed by Cycle 5 of plant operations). This letter provides additional information regarding that reload as requested by the NRC staff.

The Cycle 5 reload will contain a Uranium-235 enrichment higher than that of the current fuel. Operability of this fuel in the Cycle 5 core will be discussed in SERI's licensing submittal to support the Cycle 5 reload. This submittal is scheduled for June 1990.

In preparation for the refueling outage, SERI intends to store the new fuel in the plant's spent fuel storage racks. In the referenced meeting the NRC requested that the criticality analysis supporting this storage be submitted for NRC review.

The completed criticality analysis for the 9x9-5 Cycle 5 reload fuel is attached for NRC review. Please note that this analysis (Attachment 2, ANF-90-060(P)), contains privileged or confidential commercial information and should be withheld from public disclosure in accordance with 10CFR2.790(b)(1). The required affidavit is enclosed.

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SERI requests NRC review and approval of this analysis prior to August 1, 1990 to support new fuel handling activities for the upcoming outage. The GGNS Plant Safety Review Committee has reviewed and approved this information for submittal to NRC.

Yours truly,

FOR
WTCOTTLE

WTC:tkm
Enclosure: Affidavit by ANF

Attachments: 1) Analysis Summary
2) Detailed Criticality Analysis Report

cc: Mr. D. C. Hintz (w/a)
Mr. T. H. Cloninger (w/a)
Mr. R. B. McGehee (w/a)
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AFFIDAVIT

STATE OF WASHINGTON)
) ss.
COUNTY OF BENTON)

I, R. A. Copeland being duly sworn, hereby say and depose:

1. I am Manager, Reload Licensing, for Advanced Nuclear Fuels Corporation, ("ANF"), and as such I am authorized to execute this Affidavit.

2. I am familiar with ANF's detailed document control system and policies which govern the protection and control of information.

3. I am familiar with the topical report ANF-90-060(P) entitled "Criticality Safety Analysis for the Grand Gulf Spent Fuel Storage Racks with ANF-1.4 Fuel Assemblies," referred to as "Document." Information contained in this Document has been classified by ANF as proprietary in accordance with the control system and policies established by ANF for the control and protection of information.

4. The Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by ANF and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in the Document as proprietary and confidential.

5. The Document has been made available to the U.S. Nuclear Regulatory Commission in confidence, with the request that the information contained in the Document will not be disclosed or divulged.

6. The Document contains information which is vital to a competitive advantage of ANF and would be helpful to competitors of ANF when competing with ANF.

7. The information contained in the Document is considered to be proprietary by ANF because it reveals certain distinguishing aspects of ANF licensing methodology which secure competitive advantage to ANF for fuel design optimization and marketability, and includes information utilized by ANF in its business which affords ANF an opportunity to obtain a competitive advantage over its competitors who do not or may not know or use the information contained in the Document.

8. The disclosure of the proprietary information contained in the Document to a competitor would permit the competitor to reduce its expenditure of money and manpower and to improve its competitive position by giving it valuable insights into ANF licensing methodology and would result in substantial harm to the competitive position of ANF.

9. The Document contains proprietary information which is held in confidence by ANF and is not available in public sources.

10. In accordance with ANF's policies governing the protection and control of information, proprietary information contained in the Document has been made available, on a limited basis, to others outside ANF only as required and under suitable agreement providing for nondisclosure and limited use of the information.

11. ANF policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

12. Information in this Document provides insight into ANF licensing methodology developed by ANF. ANF has invested significant resources in developing the methodology as well as the strategy for this application. Assuming a competitor had available the same

background data and incentives as ANF, the competitor might, at a minimum, develop the information for the same expenditure of manpower and money as ANF.

THAT the statements made hereinabove are, to the best of my knowledge, information, and belief, truthful and complete.

FURTHER AFFIANT SAYETH NOT.

Robert A Copeland

SUBSCRIBED before me this 10

day of April, 1990.

Susan K. McCoy

Susan K. McCoy
NOTARY PUBLIC, STATE OF WASHINGTON
MY COMMISSION EXPIRES: 1/10/92

Attachment 1 to
AECM-90/0068

Summary

GGNS-1 Cycle 5 Criticality Analysis

Introduction

The Grand Gulf Nuclear Station Unit 1 (GGNS-1) Spent Fuel Storage racks were designed to store 8x8 fuel bundles containing up to 3.5 weight percent (w/o) enriched fuel. The storage racks were reanalyzed for the Cycle 4 reload fuel which utilized 3.61 w/o enriched 8x8 fuel and four 3.47 w/o enriched 9x9-5 LTA bundles. An analysis including the effects of Boraflex gap behavior has been submitted and is currently under review.

The Cycle 5 reload will be the first full 9x9-5 reload for GGNS-1. This fuel is similar to the LTA bundles loaded in Cycle 4. The bundles contain naturally enriched reflector regions at the top and bottom and a 3.80 w/o enriched central region. The Cycle 5 fuel also makes extensive use of axially distributed Gadolinia.

Safety Analysis

The spent fuel racks were reanalyzed to account for the changes in the fuel design. Using a conservative model the criticality safety analysis demonstrates that the rack k-effective is less than 0.946 with a 95% probability at the 95% confidence level. This is less than the 0.95 k-effective acceptance criterion.

A detailed description of the assumptions, methodology and results of the Cycle 5 criticality safety analysis is provided in attachment 2 (ANF-90-060(P)). The analysis is similar to the Cycle 4 analysis. The Cycle 4 analysis assumed the fuel was unirradiated and contained no Gadolinia poison. The Cycle 5 analysis uses a more realistic treatment of the effects of Gadolinia and fuel burnup. The Cycle 5 analysis assumes that the fuel segment with the minimum Gadolinia content exists over the entire enriched zone and it is depleted to its peak reactivity. Because the most reactive point in life is assumed, no additional administrative controls are needed.

The Cycle 5 analysis includes Boraflex gap effects. Based upon comparisons of the peak reactivity, the most reactive fuel segment (3.79 w/o, 9 Gadolinia rods at 3.0 w/o) in the Cycle 5 fuel bounds the peak reactivity for all other GGNS-1 fuel designs. Therefore, the results of this analysis are bounding for all other GGNS-1 fuel designs.

Boraflex Testing Program

The Boraflex testing program includes Boraflex gap measurements, Boraflex coupon measurements and gamma fluence tracking. The gamma fluence and coupon testing portions of the program remain applicable. However, the previous description of the gap measurement program was specific to the Cycle 4 criticality analysis.

The Boraflex gap measurement acceptance criteria is revised for Cycle 5 and future cycles as follows:

> The Boraflex gap measurement acceptance criteria is based upon comparisons with the criticality safety analysis assumptions. The gap measurements are acceptable if assumptions concerning Boraflex gap size and probability of occurrence are replaced with the measurement results and the resulting k-effective is below the safety analysis result. Bounding values assumed in the analysis will be confirmed to remain bounding. Probability distribution assumptions will be confirmed by applying the same statistical treatment used in the safety analysis. The k-effective associated with each configuration will be the same as described in the criticality analysis.

New Fuel Vault

The new fuel will arrive on the site by truck. It is currently SERI's plan to place the new fuel in the spent fuel storage racks. However, the option to load the fuel into the new fuel storage racks exists. The current safety analysis for the new fuel storage racks restricts fuel to a maximum reactivity based upon bundle k-infinity for in-reactor geometry. The applicability of the current safety analysis will be confirmed through the 10CFR50.59 review process for all Cycle 5 reload fuel prior to its arrival on site.

Environmental Effect of Transportation

The Cycle 5 reload fuel was designed to achieve a batch average discharge exposure of approximately 36 GWd/MTU. This is above the assumption (33 GWd/MTU) used in assessing the environmental effects of transportation of fuel and waste as set forth in Table S-4 of 10 CFR 51.52(c). The environmental impacts of transportation resulting from the use of extended irradiation and higher enrichment fuel are discussed in an NRC staff assessment, ("NRC Assessment of the Environmental Effects of Transportation Resulting from Extended Fuel Enrichment and Irradiation", July 7, 1988).

The assumptions related to transportation used in that assessment and the supporting analyses were reviewed and found applicable and/or bounding for the Cycle 5 reload. The assumptions were also found to be applicable to GGNS-1 reloads using ANF 9x9-5 fuel with energies less than or equal to 480 effective full power days (EFPD). Therefore the conclusion of that assessment, that the environmental impacts of transportation are unchanged by the use of extended irradiation and higher enrichment, is applicable to the Cycle 5 reload. It is also applicable to future GGNS-1 reloads using ANF 9x9-5 fuel with energies less than or equal to 480 EFPDs.