SYSTEM ENERGY RESOURCES, INC.

OLIVER D. KINGSLEY, JR.
Vice President
Nuclear Operations

July 1, 1988

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
Modification of Regulatory Guide 1.97
Compliance Schedule for Neutron
Monitoring;
Proposed Amendment to the Operating
License Condition 2.C(36)
(PCOL-88/08)
AECM-88/0110

References:
1) AECM-88/0051 dated March 11, 1988; Status of SERI Actions for O.L. Condition 2.C(36) on Neutron Monitoring System Upgrade
2) GE NEDO 31558 dated April 1, 1988; "BWR Owners Group Topical Report Position on NRC R.G. 1.97 Rev. 3 Requirements for Post-Accident Neutron Monitoring System"
3) AECM-88/0083 dated April 28, 1988; GGNS Plant Specific Design Evaluation for NEDO 31558
4) GE NEDO 31439 (May 1987); Topical Report on "The Nuclear Measurement Analysis and Control - Wide Range Neutron Monitoring System (NUMAC-WRNMS)

System Energy Resources, Inc. (SERI) is submitting by this letter a proposed change to Attachment 1 to Grand Gulf Operating License Condition 2.C(36). The proposed change requests an extension to the implementation date for neutron flux monitoring until the fourth GGNS refueling outage.

As discussed in the enclosed Operating License Change Request (OLCR), SERI has simultaneously pursued an evaluation of (1) the post accident safety function for neutron monitoring through the BWR Owners Group and (2) the potential hardware options for meeting the existing Regulatory Guide (RG) 1.97 requirements. The RG 1.97 neutron flux monitoring issue for BWRs is not considered to be resolved based on the current SERI and BWR Owners Group

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request for NRC review of the Licensing Topical Report; NEDO 31558 (Reference 2). However, as discussed with the NRC Staff, SERI has decided to install an improved incore neutron monitoring system to replace the currently existing Source Range and Intermediate Range Neutron Monitors. The installation of this system will also satisfy the requirements of RG 1.97.

To date, SERI's evaluation of an incore neutron monitoring system has been limited to the General Electric Wide Range Neutron Monitoring (WRNM) System as discussed in GE Topical Reports NEDO 31439 (Reference 4). This system is currently SERI's system of choice for neutron monitoring upgrade. As such, SERI requests that the NRC review the associated GE Licensing Topical Report for generic BWR licensing application of this system.

However, SERI intends to evaluate at least one other incore system being developed in Europe by ASEA-ATOM prior to committing to the specific system vendor. This action is being taken to assure that the most cost effective system is selected. SERI must proceed as a matter of prudence and procedural practice to evaluate competitive bids for system selection. Therefore, the proposed system implementation schedule provided in Attachment 2 to the enclosed OLCR accounts for this vendor evaluation for any alternative incore systems. SERI is committing to submit quarterly reports to the NRC which will provide implementation status of the upgraded incore system.

During evaluation of the above incore system alternatives, SERI will also determine the number of instrument channels to be installed at the fourth refueling outage. SERI intends to eventually replace all channels of IRM and SRM detectors with eight channels of qualified fixed incore detectors. However, due to potential resource limitations this installation may be phased in over more than one outage. A minimum of two channels which will comply with R.G. 1.97 will be installed during the fourth refueling outage.

As discussed in Part D of the enclosed OLCR, SERI still requests NRC review of the BWR Owners Group Topical Report; NEDO 31558, for justifying reduced RG 1.97 neutron monitoring requirements. This topical report along with the GGNS plant specific design evaluation to NEDO 31558 (Reference 3) should be reviewed by the NRC expeditiously in order to resolve this issue within the BWR industry.

Based on this hardware commitment and the associated lead time for design, planning and procurement, SERI requests that an extension be granted to GGNS Operating License Condition 2.C(36) until the fourth GGNS refueling outage for installation of an incore system to meet RG 1.97. The basis for extension of the implementation date is further justified in the attached OLCR.

In accordance with the provisions of 10 CFR 50.4 the original of the requested amendment is enclosed and the appropriate copies will be distributed. The enclosed OLCR-NLS 88/01 provides the technical justification and discussion to support the requested amendment. This amendment has been reviewed and accepted by the Plant Safety Review Committee and the Safety Review Committee.

Based on the guidelines presented in 10 CFR 50.92, SERI has concluded that this proposed amendment involves no significant hazards considerations.

In accordance with the requirements of 10 CFR 170.21, an application fee of $150 is attached to this letter.

Yours truly,

ODK:rg
Enclosures: 1. Remittance of $150 Application Fee
2. Affirmation per 10 CFR 50.30
3. OLCR-NLS 88/01

cc: Mr. T. H. Cloninger (w/a)
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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, O. D. Kingsley, Jr., being duly sworn, state that I am Vice President, Nuclear Operations 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 Operations 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.

O. D. Kingsley, Jr.

STATE OF MISSISSIPPI
COUNTY OF HINDS

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the County and State above named, this 30 day of June 30, 1988.

(SEAL)

Jedne Ann Scales
Notary Public

My commission expires:

My Commission Expires Sept. 21, 1991

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OLCR - NLS 88/01 Extension of Post-Accident Neutron Flux Monitoring Upgrade/Installation

I. SUBJECT

Facility Operating License No. NPF-29; Operating License Condition 2.C (36) Attachment 1 - Emergency Response Facilities.

II. DISCUSSION

The proposed change extends the implementation date for installing or upgrading the neutron flux monitoring system until prior to startup following the fourth refueling outage. The current license condition specifies that the Regulatory Guide (RG) 1.97 requirements for the neutron flux monitoring system be implemented prior to startup following the third refueling outage (Refer to Attachment 1 to NPF-29).

As previously discussed with the NRC, SERI intends to install an improved incore neutron monitoring system for plant enhancement and RG 1.97 compliance by startup from the fourth GGNS refueling outage. However, since the incore system vendor has not been selected at this time, specific design details cannot be provided. However, the system will consist of the following design and licensing considerations:

a) The system will be designed to meet the existing R.G. 1.97 Rev. 2 qualification, range and other design requirements.

b) The system will consist of a minimum of two divisional instrument channels.

c) The system will either (1) replace the existing source range monitor (SRM) and intermediate range monitor (IRM) instruments for an eight channel modification or (2) will be installed to allow continued use of the existing IRM safety functions for a two channel modification. The IRMs provide a ranging trip during startup.

d) The system implementation will be scheduled to permit installation by the fourth GGNS refueling outage.

Based on the above incore hardware commitment, SERI intends to comply with the RG 1.97 requirements by startup from the fourth refueling outage. In support of this commitment, SERI is providing an implementation schedule in Attachment 2 which identifies the major milestones and schedule to be accomplished for system installation. These dates are based on SERI's current planning and outage estimates. SERI also commits to provide quarterly status reports reflecting the actions and progress being accomplished for the fourth refueling outage system implementation.

The proposed extension to the Operating License Condition implementation date is based on the required time to design, procure, and install an incore neutron monitoring system.

III. JUSTIFICATION

As discussed in Reference 1, SERI has evaluated several alternatives for addressing the requirements of a post-accident neutron monitoring system for RG 1.97. Three alternative approaches were evaluated which were to: (1) install an in-core neutron monitoring system, (2) install an ex-core neutron monitoring system, or to (3) justify the existing neutron monitoring system based on alternative design requirements from the results of the Boiling Water Reactor Owners Group Topical Report in NEDO 31558 (Reference 2). Based on the requirements of Operating License Condition 2.C(36) and the need for long term improvement of the existing GGNS neutron monitoring system, SERI has decided to install a fixed safety grade incore neutron monitoring system to satisfy both RG 1.97 range requirements and provide GGNS plant enhancement.

However, due to the significant effort in SERI design, licensing, planning, and procurement of a new fixed incore system, this plant modification cannot be effectively performed on a schedule consistent with the third GGNS refueling outage (February 1989). This is further explained as follows:

A. INSTALLATION CONSTRAINTS OF AN INCORE NEUTRON MONITORING SYSTEM

1. System Design - The currently conceived incore system modification would replace the existing SRM and IRM hardware including drives and motor modules with new wide range fixed detector assemblies, new dry tubes and signal conditioning equipment. The system will be capable of monitoring power from a range of 10E-6% to 100% reactor power. The equipment will be qualified to RG 1.97 qualification standards and GGNS accident environments. The potential long term advantages of this type of system are that plant scrams are reduced, plant operational flexibility is increased, system maintenance is reduced, system surveillances and performance time is improved, normal plant operation is simplified, and post accident neutron monitoring will be more reliable over the required range.

2. System Licensing - Because a full RG 1.97 range fixed incore system has never been implemented in a U.S. BWR power facility and because the system will replace existing SRM and IRM functions, NRC review and approval of the new system will be required. This will include:

   a) NRC approval of the incore system design and operation as appropriate for GGNS application.

   b) NRC approval of changes required to the GGNS Technical Specifications regarding SRM and IRM replacement with fixed incore instrumentation.

3. System Engineering and Procurement - The installation of a new fixed incore system is a major design change which includes installing a new design of incore detectors, engineering seismic supports and high energy line break protection, routing new cables and conduit in the drywell and containment, and installing new controllers and control room instrumentation.

SERI will also need an outage of sufficient length to evaluate the drywell access areas, undervessel space, potential system installation interferences and seismic and dynamic support locations for the new system. SERI plans to conduct this inspection during the third GGNS refueling outage. This effort will also be accomplished prior to issuing the procurement specification for system design and delivery.

4. System Delivery - The incore vendor will be responsible for system manufacturing and delivery and will provide installation support, licensing support, initial drawing modifications and a certain amount of design interface support. The system delivery time is expected to be six to twelve months.

Based on the above, SERI is unable to effectively plan, design and install a safety grade fixed incore system by the third GGNS refueling outage.

B. CURRENT GGNS NEUTRON MONITORING SYSTEM CAPABILITY FOR INTERIM OPERATION

Post-trip or post-accident operator actions for power level determination are based on the GGNS Emergency Procedures (EPs) as developed from the BWR Emergency Procedure Guidelines. The initial power determination action by the operator is to confirm that the control rods have been sufficiently inserted into the core to establish plant shutdown. If rod position is greater than that to establish shutdown conditions or if rod position is not sufficiently known, the operator's next power level determination is based on neutron flux levels. Per the GGNS EPs the operator actions for power level determination are at the Average Power Range Monitor (APRM) downscale alarm setpoint which is 4% reactor power. In order to determine power levels at approximately 4% power, the operator will use indication from both the APRMs and the SRMs/IRMs, if available. At power levels above this alarm setpoint and with a high suppression pool temperature, the operator will take actions to further reduce power by injecting boron

and reducing water level, if required. Other means of determining power includes observing SRV cycling or main steam line bypass valve position. If power cannot be determined, subsequent operator actions are the same as if power is greater than 4%.

The GGNS APRM system is a highly reliable safety grade system. Based on currently known GE environmental design considerations, this system is expected to be available during most post-accident conditions where power level determination is required. In addition, once a reactor scram is confirmed the operator takes action to insert the SRMs and IRMs. The monitoring portion of the IRM system has similar design considerations to that of the APRMs and will provide post-accident monitoring capability. Therefore, once inserted into the reactor core, the IRMs will also provide sufficient power level determination for post-accident monitoring if required. Even though the SRMs are not environmentally designed they can provide initial indication of power level decreasing upon a scram.

Therefore, interim GGNS operation without the enhanced safety grade full range neutron monitoring will not significantly reduce post-accident monitoring capability and subsequent operator actions. This is further discussed in the attached no significant hazards considerations.

C. NRC REVIEW OF GE WIDE RANGE NEUTRON MONITORING (WRNM) SYSTEM

General Electric, in support of the WRNM System, has developed and issued a licensing topical report describing the system design considerations. NEDO 31439 (Reference 4) provides the design details of the NUMAC instrumentation as it applies to the WRNM System. This system is represented by GE to be an environmentally and seismically qualified design which covers a range of approximately 10^{-9}% to 100% of full power. Therefore, this system is currently anticipated to meet the RG 1.97 requirements. GGNS plant specific system design and qualification would be confirmed by SERI to meet RG 1.97 requirements prior to system implementation.

Since the GE WRNM System is currently the SERI incore system of choice, SERI requests NRC review of the GE Topical Reports to support generic system licensing by the NRC.

As noted in Attachment 2, SERI intends to establish the incore system design requirements by September 1988. If a vendor other than GE is selected, system design information will be presented to the NRC in a future submittal. SERI will notify the NRC of our vendor decision in a quarterly RG 1.97 neutron monitoring status report.

D. NRC REVIEW OF BWROG LTR (NEDO 31558) and GGNS PLANT SPECIFIC EVALUATION

The BWROG submitted Licensing Topical Report NEDO 31558 (Reference 2) on April 1, 1988. NEDO 31558 provides the BWROG's evaluation of the post-accident neutron monitoring system as applied to boiling water reactors for the purposes of establishing post accident system requirements. The results of the evaluation performed in NEDO 31558 for the analysed events and the associated operator actions conclude that the specified requirements of RG 1.97 should be reduced.

SERI has been an active member of the RG 1.97 BWR Owners Group Subcommittee to evaluate the Regulatory Guide 1.97 requirements based on a review of the neutron monitoring system's post accident safety functions including the control room operators instrumentation needs during an accident. While SERI commits to install an incore system at the fourth refueling outage which will meet RG 1.97, we believe that NRC review of the BWR Owners Group Topical Report should continue. The NRC review is requested in order (1) to support ongoing BWR industry efforts on this matter, (2) to establish an appropriate BWR post accident design basis of the neutron monitoring system, and (3) to resolve any potential questions that may arise in the future regarding the GGNS plant specific application of an incore system.

In support of the existing neutron monitoring system design, SERI submitted the plant specific design characteristics of the existing GGNS neutron monitoring system as it pertains to the alternate requirements presented in NEDO 31558 (Reference 3).

SERI requests NRC review of this Topical Report and the GGNS plant specific submittal in support of establishing appropriate RG 1.97 requirements for neutron monitoring.

IV. CONCLUSION

In evaluation of the overall merits of the hardware alternatives for meeting RG 1.97, an improved incore system design offers the most significant long term benefit for GGNS. Due to the time constraints associated with the planning, design, and the NRC review of such a system, it cannot be effectively installed during the third refueling outage. Therefore, SERI commits to install an incore system which meets RG 1.97 at the fourth GGNS refueling outage, contingent upon NRC acceptance of this request for an extension. SERI concludes that sufficient justification exists to allow an extension for compliance with the post-accident neutron monitoring system requirements of RG 1.97 until startup following the fourth refueling outage.

V. NO SIGNIFICANT HAZARDS CONSIDERATIONS

As discussed below, the proposed change does not involve a significant hazards consideration.

1) The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated as discussed below.

   a. The absence of a post accident neutron monitoring system during the fourth fuel cycle does not involve a significant increase in the probability of an accident previously evaluated since the absence of the proposed system modification would not affect reactor operation. The post accident neutron flux monitoring system provides post-accident indication of reactor power and does not provide any signals to actuate engineered safety features or to trip the reactor. Furthermore, reactor trip signals from the present neutron flux monitoring system to the reactor protection system will not be changed as a result of the installation of a post accident neutron monitoring system.

   b. The consequences of an accident previously analyzed have been evaluated for significant increase as a result of the proposed delay in installation of the post accident neutron flux monitoring system. If the new system were installed during the third refueling outage, it would provide improvements over the presently installed system. However, the presently installed system is expected to function during the initial phase of an accident (including a LOCA) to indicate subcritical reactor power. Long term monitoring is available through the APRM channels where operator action is required at the APRM downscale alarm. However, since the presently installed system is not fully qualified to RG 1.97 Category 1 requirements, long term monitoring in a harsh environment may not be directly available over the entire RG 1.97 range. In this event, other measures and indications can provide the operator with reactor power information as discussed below:

a) The present control rod position indication system provides the reactor operator with information that all rods are inserted.

b) Qualified instrumentation such as reactor pressure, suppression pool temperature and safety relief valve (SRV) actuation provide the reactor operator with post-accident information for assessment of reactor power if direct neutron monitoring capability was not available.

c) The Emergency Procedures are symptom based and provide appropriate conservative actions if reactor power can not be directly measured in a post-accident situation. The EP's contain action steps which mitigate the symptomatic effects of design basis events (such as LOCA), and beyond design basis events (such as ATWS).

The compensatory measures listed above ensure that the consequences of an accident previously evaluated will not be significantly increased by the absence of a post accident neutron flux monitoring system during the fourth fuel cycle.

2) The neutron monitoring system required by RG 1.97 will enhance post accident monitoring capability by performing a mitigative role during an accident. Its installation will not preclude or prevent any accident. As such, delaying the installation of the RG 1.97 post accident neutron monitoring system will not create the possibility of a new or different kind of accident. During the extension period, the present neutron monitoring system will remain unchanged from the configuration that was previously evaluated in the FSAR. Therefore, delaying installation of the RG 1.97 post accident neutron monitoring system will not create the possibility of a new or different kind of accident from any previously evaluated.

3) Since [illegible] tional reactor protective trip functions are performed by this p[illegible] nt instrumentation and the post-accident neutron flux monitor[illegible] rumentation is an enhancement to previously installed instrumen[illegible]on, the absence of the capabilities provided by a post-accident neutron monitoring system as required by RG 1.97 during the period of this extension would not significantly reduce the margin of safety.