UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 109 TO FACILITY OPERATING LICENSE NO. NPF-29

ENTERGY OPERATIONS, INC., ET AL.

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

1.0 INTRODUCTION

By letter dated May 20, 1993, Entergy Operations, Inc. (the licensee), requested an amendment to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1. The proposed amendment would revise the Technical Specifications (TSs) by removing certain instrumentation operability requirements from the reactor protection system (RPS) and control rod block system specifications (TS Sections 3/4.3.1 and 3/4.3.6, respectively) and adding an associated requirement to a special test exception specification regarding shutdown margin demonstrations (TS Section 3.10.3).

Specifically, the licensee's proposed changes would: (1) delete operability requirements for the intermediate range monitors (IRMs) and average power range monitors (APRMs) in Operational Conditions (OPCONs) 3, 4 (IRMs only), and 5 from the RPS specification, with the exception that the IRMs would be required to be OPERABLE in OPCON 5 when any control rod is withdrawn from a core cell containing one or more fuel assemblies; (2) delete the operability requirements for the IRMs and APRMs from the control rod block system specification; and (3) revise the specification for the Shutdown Margin Demonstration Special Test Exception (TS Section 3.10.3) to require the APRMs to be OPERABLE per the RPS specification requirements for OPCON 2.

The requested changes are consistent with NUREG-1434, Revision 0, "Standard Technical Specifications, General Electric Plants, BWR/6" (STS), with the exception of a difference in the operability requirements for the APRMs. The improved STS require the APRMs to be operable in OPCON 5 when any control rod is withdrawn from a core cell containing one or more fuel assemblies, while the licensee's proposed change would only require OPCON 5 operability of the APRMs during a shutdown margin demonstration. This is consistent with a change which was approved by the staff for the Limerick Generating Station TSs in a safety evaluation dated July 30, 1990.

2.0 EVALUATION

The IRMs are designed to monitor neutron flux levels at local core locations and provide protection against localized criticality events caused by control rod withdrawal errors. The IRMs monitor neutron flux levels from the upper

portion of the source range monitor (SRM) range to the lower portion of the APRM range and provide control rod block and RPS scram functions.

The APRMs monitor core power from about 1% of full reactor power to 125% of full reactor power. The APRMs represent a core average power level while the IRMs and SRMs indicate local power levels. In OPCONs 2, 3, and 5 the APRMs operate in the setdown mode to provide control rod block and RPS scram functions at 12% and 15% core average power, respectively.

The control rod blocks provided by these instruments in OPCONs 1 (APRMs only) and 2 are intended to actuate to prevent IRM or APRM scrams by preventing further positive reactivity addition. Accordingly, these control rod blocks act as backups to the IRM and APRM scrams and are not credited in any design basis transient analyses for OPCONs 1 and 2. Defense-in-depth in these operational conditions is provided by rod pattern control system rod blocks (TS 3.3.6), procedural controls on rod withdrawal sequences, core reload analyses performed each cycle, and RPS scrams. Therefore, the control rod blocks provided by the IRMs and APRMs in OPCONs 1 and 2 may be removed from the TSs.

The design basis transient of concern in OPCONs 3, 4, and 5 for the reactor protection and control rod block systems is an uncontrolled control rod withdrawal from the core while the reactor is subcritical. As discussed below, the IRMs and APRMs are not credited in the analysis of this design basis transient.

In OPCONs 3 and 4, with the reactor mode switch in the shutdown position, a control rod withdrawal block is applied to all control rods. This function prevents criticality by preventing inadvertent control rod withdrawal. Operability of the reactor mode switch shutdown position control rod block is required by TS 3.3.6 in OPCONs 3 and 4.

The reactor mode switch may be placed in the refuel position while in OPCONs 3 and 4 to allow withdrawal of a single control rod, provided that the mode switch refuel position one-rod-out interlock is operable. The refuel position one-rod-out interlock prevents the selection of a second control rod for movement when any other control rod is not fully inserted. The core is designed to remain subcritical with the highest worth control rod withdrawn. Operability of the mode switch refuel position one-rod-out interlock is required by TS 3.9.1 in OPCONs 3 and 4 with the mode switch in the refuel position.

The reactor mode switch shutdown position control rod block and the reactor mode switch refuel position one-rod-out interlock ensure that the reactor will remain subcritical in OPCONs 3 and 4. The RPS and control rod block functions of the IRMs and APRMs are not credited for prevention or mitigation of this or any other design basis transient while in OPCONs 3 and 4; therefore, the RPS and control rod block functions provided by the IRMs and APRMs are not required in OPCONs 3 and 4 and may be removed from the TSs.

In OPCON 5 with the reactor mode switch in the refuel position, refueling equipment interlocks and the mode switch refuel position one-rod-out interlock restrict the operation of the refueling equipment or the withdrawal of control rods to reinforce unit procedures in preventing the reactor from achieving criticality during refueling. Explicit safety analyses in the Updated Final Safety Analysis Report (UFSAR) demonstrate that the refueling interlocks and adequate shutdown margin (SDM) provide the primary means of preventing unacceptable reactivity excursions in OPCON 5; therefore, the RPS and control rod block functions provided by the IRMs and APRMs are not required in OPCON 5 and may be removed from the TSs.

It is desirable, however, to maintain the ability to scram a withdrawn control rod in the unlikely event of an inadvertent criticality in OPCON 5. Therefore, in OPCON 5, when a control rod is withdrawn from a fueled cell, the IRMs will continue to be required to be operable to provide monitoring for and protection against unexpected reactivity excursions. The source range monitors are also available in OPCON 5 to provide monitoring for and, when the "shorting links" are removed per TS 3.9.2, protection against unexpected reactivity excursions.

The TSs require that adequate SDM be demonstrated prior to or during the first startup after each refueling (TS 3.1.1, "SHUTDOWN MARGIN"). Performing the SDM demonstration prior to startup requires that the test be performed in OPCON 5, in accordance with Special Test Exception TS 3.10.3. In OPCON 5, the reactor mode switch is required to be in the shutdown or refuel position, where the applicable control rod blocks or refueling interlocks ensure that the reactor will not become critical as discussed above. The SDM demonstration requires the reactor mode switch to be in the startup or hot standby position, since more than one control rod must be withdrawn for the purpose of demonstrating adequate SDM.

Because multiple control rods will be withdrawn, additional requirements must be stipulated to ensure that adequate protection against potential reactivity excursions is available. Prevention and mitigation of unacceptable reactivity excursions during control rod withdrawal is provided by the rod pattern control system, the SRMs, which are required by TS 3.10.3 to be operable, and the RPS inputs from the IRMs, which are required to be operable in OPCON 5 any time a control rod is withdrawn from a fueled cell.

Prior to this requested change, protection was also provided by the requirement that the RPS inputs from the APRMs be operable in OPCON 5. To maintain this level of protection, TS 3.10.3 will be modified to require that the RPS inputs from the APRMs be operable during SDM demonstrations. For most operation at low power levels, the APRMs will provide a backup to the IRM scram because of the relative scram setpoints. No specific safety analyses take direct credit for the APRMs in this operational condition. The staff finds that addition of the APRM operability requirement to the SDM TS provides a level of protection consistent with the protection previously provided by the OPCON 5 RPS operability requirement for the APRMs. Therefore, the proposed addition to the SDM TS is acceptable.

The staff reviewed the UFSAR Chapter 7 system descriptions and the Chapter 15 accident analyses sequences and determined that the functions the licensee has requested to remove from the TSs are not credited in any design basis transient analysis. The subject functions of the IRM and APRM systems are not credited in mitigation of any design basis transient. Therefore, the subject requirements are not required to be maintained in the TSs and may be deleted.

The staff notes that the control rods and control rod scram accumulators (TSs 3/4.1.3.1 and 3/4.1.3.3 respectively) are not required to be operable in OPCONs 3 or 4 or in OPCON 5 for fully inserted control rods. The function of the RPS is to initiate signals to actuate the control rod scram system to rapidly insert control rods into the core. Because the actuated equipment (i.e, control rods and control rod scram accumulators) is not required to be operable in OPCONs 3, 4, or 5 (for fully inserted control rods), the staff finds that deletion of the operability requirements for the actuating equipment (i.e., RPS scram signals from the IRMs and APRMs) does not significantly affect safe operation of the facility.

The staff finds that other TS requirements, plant procedures, and administrative controls exist which provide adequate defense-in-depth to preclude the need for these requirements to be maintained in the TSs. The proposed changes will insure that the IRMs continue to provide the capability to initiate signals to rapidly insert any control rod which is withdrawn from a fueled cell and that the APRMs will be available to provide backup protection during shutdown margin demonstrations. The staff finds that removal of these requirements from the TSs will not have a significant effect on safety and are, therefore, acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Mississippi State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (58 FR 34077). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: December 13, 1993