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April 27, 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
Alternate Decay Heat Removal System
and LPCI Manual Realignment
Proposed Amendment to the Operating
License (PCOL-90/03)
AECM-90/0056

System Energy Resources, Inc. (SERI) is submitting by this letter a proposed amendment to the Grand Gulf Nuclear Station (GGNS) Operating License (OL). This proposed amendment requests changes to the GGNS Technical Specifications (TS) due to the addition of the Alternate Decay Heat Removal System (ADHRS). In addition, TS changes are proposed to address the Staff concern regarding manual realignment of low pressure coolant injection emergency core cooling subsystems during plant shutdown. The Staff concern was identified in the Safety Evaluations for OL Amendments 58 and 59 dated March 16, 1989 and March 27, 1989, respectively.

Attachment 2 provides the technical justification and discussion to support the requested amendment.

Attachment 3 provides SERI's resolutions for the two potential adverse ADHRS system interactions identified in the Safety Evaluations for OL Amendments 58 and 59.

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.

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The use of the ADHRS is required in order to support the upcoming fourth refueling outage (RF04) at GGNS. As now scheduled, the fourth refueling outage is to begin approximately October 1, 1990. In order to support the current outage schedule, SERI requests that the NRC complete its review of the proposed TS amendment by no later than September 24, 1990 to allow sufficient time for implementation of the TS amendment prior to RF04.

Yours truly,

THC:mtc
Attachments: 1. Affirmation per 10CFR50.30
2. GGNS PCOL-90/03
3. Resolutions of Potential ADHRS Adverse System Interactions

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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.

T. H. Cloninger

STATE OF MISSISSIPPI
COUNTY OF CLAIBORNE

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)

Patricia Meaghegan
Notary Public

My commission expires:
My Commission Expires July 1, 1993

A9003191/SNLICFLR - 4

A. SUBJECT

1. NL-90/02 Alternate Decay Heat Removal System and LPCI Manual Realignment

2. Affected Technical Specifications:

   a. Isolation Actuation Instrumentation, Table 3.3.2-1 - Pages 3/4 3-13, 3/4 3-14 and 3/4 3-15

   b. Isolation Actuation Instrumentation Surveillance Requirements, Table 4.3.2.1-1 - Page 3/4 3-25

   c. Residual Heat Removal - Cold Shutdown, 3/4.4.9.2 - Page 3/4 4-27

   d. ECCS - Shutdown, 3.5.2 - Page 3/4 5-6

   e. Containment and Drywell Isolation Valves, 3.6.4 - Page 3/4 6-28

   f. Residual Heat Removal and Coolant Circulation - High Water Level, 3/4.9.11.1 - Page 3/4 9-18

   g. Residual Heat Removal and Coolant Circulation - Low Water Level, 3/4.9.11.2 - Page 3/4 9-19

   h. Bases 3/4.4.9, 3/4.5.1 and 3/4.5.2 and 3/4.9.11 - Pages B 3/4 4-5, B 3/4 5-2 and B 3/4 9-2.

B. DISCUSSION

1. System Energy Resources, Inc. (SERI) proposes the Grand Gulf Nuclear Station (GGNS) Technical Specifications (TS) and Bases be revised on a permanent basis to permit use of the Alternate Decay Heat Removal System (ADHRS) during future GGNS outages. In addition, TS and Bases changes are proposed to address an NRC Staff concern regarding the manual realignment provisions of TS 3.5.2.

2. During outages, the RHR shutdown cooling mode of operation is normally used to provide core cooling at GGNS. In this mode of operation, reactor coolant is pumped from the "B" recirculation loop through a common suction line to either the Residual Heat Removal (RHR) system "A" or "B" pump and then on to the respective RHR heat exchanger to be cooled by the Standby Service Water System. The reactor coolant is returned to the vessel via the upper containment pool or either "A" or "B" feedwater lines depending on which RHR shutdown cooling loop is being used. The operation of RHR shutdown cooling during Operational Conditions (OCs) 4 and 5 is controlled by TS 3.4.9.2, 3.9.11.1 or 3.9.11.2.

In accordance with the present GGNS TS, an alternate method of decay heat removal must be demonstrated operable for each required loop of RHR shutdown cooling that is inoperable. Prior to the third refueling outage (RF03), reactor water cleanup (RWCU), control rod drive (CRD), fuel pool cooling and cleanup (FPCCU) or other systems were used in various combinations for alternate decay heat removal. Because of the relatively limited decay heat removal capability of these systems, their use as alternate decay heat removal systems is restricted to time periods when decay heat loads are substantially reduced.

During each refueling outage, one or both loops of the RHR shutdown cooling systems must be removed from service in order to perform required surveillances and/or routine maintenance. In addition, required surveillances and/or maintenance activities on either Division I or II RHR system components or supporting system components can require that either RHR shutdown cooling "A" or "B" loops be declared inoperable.

It is the intent of SERI to conduct and manage all outages in a safe and prudent manner. It is also SERI's goal to maximize plant availability by scheduling refueling outages such that the critical path is controlled by refueling activities and mandatory safety issues. With that goal in mind SERI established a generic refueling outage goal of not more than 46 days. In order to support the 46 day outage goal, SERI identified the need for an improved alternate decay heat removal method for OCs 4 and 5. SERI evaluated alternatives and selected as the best alternative the addition of a new system, the ADHRS.

Without ADHRS, it is estimated that future outages at GGNS would be unnecessarily extended. Lowering of the reactor cavity water level could not occur until outage day 38. Thus, the schedule for reactor vessel reassembly work would be impacted. The net effect would be an extension of the schedule for refueling floor activities by approximately 14 days.

SERI designed and installed the ADHRS for use beginning with the third GGNS refueling outage to supplement the decay heat removal capability of the RHR system during OC 4 and OC 5.

The design objectives of the ADHRS were to provide available alternate decay heat removal capacity by the end of outage day 1 and to be as independent as possible from other plant systems. The ADHRS was designed to meet certain design criteria including the following:

a. Maintain TS coolant temperature limits

   i. $\leq$ 200°F during OC 4

   ii. $\leq$ 140°F during OC 5

b. Operate in OCs 4 and 5 only

c. Provide capability to isolate the system in OCs 1, 2 and 3

d. Provide no safety function related to

   i. shutdown capability

   ii. accident mitigation

e. Create no adverse interaction with existing plant systems

f. Provide a pressure boundary

   i. ASME Section III, Class 3

   ii. Seismic Category I

g. Provide the capability for operation from the control room.

The ADHRS uses a combination of existing plant systems and ADHRS specific piping and valves to establish flowpaths for the various ADHRS modes as described below. The ADHRS equipment is located in the RHR "C" pump room. Functional control from the control room is provided. Plant Service Water (PSW) provides cooling water to the ADHRS heat exchangers.

The ADHRS is designed to operate in OC 4 (cold shutdown) and OC 5 (refueling). During OCs 1, 2, and 3, ADHRS is isolated by locked closed or deenergized valves from connected plant systems. The ADHRS can be operated in different modes as follows:

a. Suppression pool to suppression pool flush/test mode: From the suppression pool suction line, the suppression pool water is pumped through the ADHRS pumps, heat exchangers, flow control valve and back to the suppression pool via the RHR "C" full flow test return line.

b. Shutdown cooling mode via RHR "A" or "B": Using the existing RHR shutdown cooling common suction line, reactor coolant is pumped from the reactor coolant "B" recirculation loop through valves E12-F006A and E12-F066A (RHR "A" loop) or valves E12-F006B and E12-F066B (RHR "B" loop) to the ADHRS pumps, then to the heat exchangers and back to the reactor vessel via RHR "C" LPCI injection line.

c. Spent fuel pool to reactor vessel mode: Coolant is pumped from the spent fuel pool to the ADHRS heat exchangers and back to the reactor vessel through the RHR 'C' LPCI injection line. Operation in this mode is applicable only to OC 5 when the reactor cavity is flooded. This mode provides an ADHRS shutdown cooling flow path and allows the RHR shutdown cooling suction line to be taken out of service for maintenance.

The functional purpose of the ADHRS is not safety related, since the ADHRS does not automatically mitigate the consequences resulting from accidents. However, safety-related components are used in various portions of the ADHRS to ensure that current safety-related requirements of the Emergency Core Cooling System (ECCS) and RHR system are not compromised by the installation or use of the ADHRS.

By letter dated September 23, 1988 (AECM-88/0186), as revised November 30, 1988 (AECM-88/0236), December 16, 1988 (AECM-88/0246) and December 21, 1988 (AECM-88/0252), SERI provided detailed ADHRS design, system interaction, and operation information and requested an amendment to the GGNS Operating License. The proposed amendment requested changes to the GGNS TS due to the addition of the ADHRS. By letters dated February 6, 1989 (AECM-89/0028), February 23, 1989 (AECM-89/0042), March 6, 1989 (AECM-89/0052) and March 8, 1989 (AECM-89/0053), SERI provided additional information regarding the ADHRS design, earlier submitted safety analyses and limitations on ADHRS use.

Based upon the information SERI provided, the NRC approved in GGNS Operating License (OL) Amendment 59 a one-time use of the ADHRS during RF03. For long term use of the ADHRS (i.e., after RF03), the NRC determined that additional TS should be considered for operation of ECCS subsystems and shutdown cooling loops, including the ADHRS.

3. An additional concern was identified by the NRC Staff during review of the amendment requesting TS 3.0.4 one-time exceptions for RF03 submitted in AECM-89/0038 dated February 20, 1989. TS 3.5.2 provides the ECCS operability requirements for OCs 4 and 5. The Limiting Condition for Operation (LCO) for TS 3.5.2 contains a provision allowing the Low Pressure Coolant Injection (LPCI) "A", "B" and "C" subsystems of the RHR system to be considered operable with a flow path capable of taking suction from the suppression pool upon being manually realigned. This allows, for example, an RHR subsystem to be aligned and operated as a shutdown cooling loop and, provided a suppression pool suction flow path exists, still be considered an operable LPCI subsystem satisfying the LCO requirements of TS 3.5.2. The NRC was concerned that, if two manually initiated ECCS subsystems were required to be operable, an inadvertent drainage event may result in uncovering a portion of the reactor core.

   For RF03, the NRC Staff requested that SERI require at least one of the two required operable ECCS in OCs 4 and 5 to be capable of automatic initiation and injection upon receipt of a low reactor water level signal.

   SERI reviewed the licensing and safety basis for TS 3.5.2; and, as the NRC Staff requested, committed in letter AECM-89/0052 dated March 6, 1989 to implement administrative controls in the form of a Technical Specification Position Statement (TSPS) to require, for RF03, that:

   a. at least one of the two ECCS required operable by TS 3.5.2 be capable of automatic initiation and injection to the reactor vessel; and

b. if TS 3.5.2 requires operable ECCS subsystems and no automatic initiation/injection ECCS is operable then operations with the potential for draining the reactor vessel be suspended immediately.

The above administrative controls were proposed by SERI for the short term until the necessary evaluation to determine adequate long term TS controls could be completed. As documented in the OL Amendment 58 Safety Evaluation dated March 16, 1989, the NRC found the short term administrative controls acceptable.

4. Therefore, in order to permit long term use of the ADHRS during future outages and to resolve the issue of LPCI manual realignment during OCs 4 and 5, the following TS changes are proposed:

a. The reactor vessel water level-low, level 3 RHR system isolation trip function of Table 3.3.2-1 is revised to require the operability of the trip function during OCs 4 and 5. A note (p) is added specifying only one trip system of the trip function is required operable. The purpose of the operable trip system will be to isolate the associated division RHR system isolation valve, E12-F008 or E12-F009, exclusively. In addition, Action 31 is added to specify the measures to be taken if the trip function becomes inoperable during OCs 4 and 5.

b. Table 4.3.2.1-1 is revised to require surveillance testing of the reactor vessel water level-low, level 3 RHR system isolation trip function in OCs 4 and 5.

c. The LCO and Surveillance Requirements of TS 3/4.4.9.2 are revised to recognize the ADHRS as an acceptable substitute for one of the two required RHR shutdown cooling mode loops provided the remaining RHR shutdown cooling mode loop and the associated diesel generator are operable. In addition, previous TS changes granted applicable only for RF03 are deleted.

d. TS 3.5.2 is revised by removing the manual realignment provisions for the LPCI subsystems and adding a note to the LCO requiring at least one of the two required ECCS subsystems/systems be capable of automatic initiation and injection. The added note also allows the other of the two required ECCS subsystems/systems to be manually realigned prior to injection to the reactor vessel. Action a is modified to specify that operations that have a potential for draining the reactor vessel be suspended immediately if the automatic ECCS subsystem/system required by the LCO is inoperable. Also, previous TS changes granted applicable only for RF03 are deleted.

e. The ACTION of TS 3.6.4 is revised to provide remedial measures if the required automatic isolation valve, E12-F008 or E12-F009, becomes inoperable in OCs 4 and 5. Previous TS changes granted applicable only for RF03 are deleted.

f. The LCO and Surveillance Requirements of TS 3/4.9.11.1 are revised to recognize the ADHRS as an acceptable substitute for the required RHR shutdown cooling mode train provided one alternate method capable of decay heat removal and its associated diesel generator are operable. In addition, previous TS changes approved applicable only for RF03 are deleted.

g. The LCO and Surveillance Requirements of TS 3/4.9.11.2 are revised to recognize the ADHRS as an acceptable substitute for one of the two required RHR shutdown cooling mode trains provided the remaining RHR shutdown cooling mode train and its associated diesel generator are operable. Action a is revised to require water level to be raised if no RHR shutdown cooling mode trains or alternates are operable. Also, previously approved TS changes applicable only for RF03 are deleted.

h. The Bases associated with TS 3/4.4.9.2, 3/4.5.2, 3/4.9.11.1 and 3/4.9.11.2 are revised to reflect the changes to the TS described above.

Attached are the affected TS and Bases pages marked to show the proposed revisions. The TS changes due to the ADHRS installation approved by the NRC in OL Amendment 59 dated March 27, 1989 which added a plant service water radiation monitor to TS 3/4.3.7.1 and added two valves to TS 3/4.8.4.2 are also attached for information. Changes to TS 3/4.3.7.1 and TS 3/4.8.4.2 are not being proposed as part of this amendment request since the TS changes approved in OL Amendment 59 to these two TS are still valid and applicable.

C. JUSTIFICATION

1. As discussed in Section B above, the ADHRS was previously licensed in OL Amendment 59 for use during RF03 only. For RF03, SERI committed in the various letters referenced in Section B to implement administrative controls to clarify the operability requirements of systems which provide decay heat removal (including ADHRS), and for the automatic isolation of the reactor vessel in the event of inadvertent drainage of reactor coolant from the vessel and automatic injection of water into the reactor vessel by ECCS pumps. The NRC found these administrative controls acceptable for one time licensing of the ADHRS. However, for long term licensing of the ADHRS, the NRC determined, as documented in the OL Amendment 59 Safety Evaluation dated March 27, 1989, that SERI must evaluate TS changes needed to implement the above administrative controls. In addition SERI identified, in AECM-89/0051 dated March 3, 1989, two potential adverse system interactions created by the operation of the ADHRS. In the OL Amendment 59 Safety Evaluation, the NRC required resolution of these potential adverse system interactions prior to long term licensing of the ADHRS. The resolution of each condition the NRC placed on long term ADHRS use is addressed below.

Decay Heat Removal System Requirements (TS 3/4.4.9.2, 3/4.9.11.1 and 3/4.9.11.2)

2. The first condition related to long term ADHRS use the NRC identified was the TS needed to clarify the operability requirements of systems which provide decay heat removal. During NRC review of the ADHRS, as summarized in the OL Amendment 59 Safety Evaluation, the Staff expressed concern that the TS present at the time did not adequately limit the conditions for long term use of the ADHRS as a supplemental decay heat removal system. Unlike the RHR loops, the ADHRS is not a safety-related system, cannot be powered by an onsite diesel generator, and uses PSW as the cooling water for the heat exchangers; therefore, the NRC concluded that additional TS limits were needed for long term ADHRS use.

3. In response to the NRC Staff concern, SERI committed for the short term to limit the use of ADHRS to RF03 and to provide administrative controls on requirements for its use. SERI also committed to evaluate TS changes needed to implement these requirements for the long term use of the ADHRS. Thus, for RF03, a note was added to TS 3.4.9.2, TS 3.9.11.1 and TS 3.9.11.2 which limited use of the ADHRS to RF03.

   TS 3.4.9.2, 3.9.11.1, and 3.9.11.2 establish the RHR shutdown cooling requirements while in OCs 4 and 5. In accordance with these requirements, SERI must maintain operable either one or two loops of RHR shutdown cooling while in OCs 4 and 5. With less than the required number of RHR shutdown cooling loops, appropriate action in accordance with the TS action statements must be taken. Each of these TS recognizes the use of an alternate decay heat removal method as an acceptable approach in complying with the action statements.

   With regard to RHR requirements, and in order to consider ADHRS as part of the shutdown cooling means during RF03, SERI implemented administrative controls in the form of a Technical Specification Position Statement (TSPS) that provided requirements as follows:

   a. For TS 3.9.11.2 (OC 5 with a low water level) and TS 3.4.9.2 (OC 4), one operable and one operating shutdown cooling system:

      i. In the event that a loss of offsite power occurs, one of the systems shall be capable of removing decay heat (i.e., powered by an onsite power source). No additional failure (beyond the loss of offsite power) is assumed in this case.

      ii. In the event of the loss of one of the operating systems, the operable system shall be placed in service for decay heat removal. Relevant action statements of the TS shall also be used.

iii. In the event of a loss of offsite power and the loss of the operating shutdown cooling system (either ADHRS or RHR), an ECCS system shall be operable and capable of being powered with its associated onsite power supply.

b. For TS 3.9.11.1 (OC 5 with a high water level), only one operating shutdown system is required. When the ADHRS is being used to fulfill the requirements of an alternate, as described in TS 3.9.11.1, Action a, an RHR system shall be available as a backup and capable of accommodating a loss of offsite power (i.e., can be powered by an onsite power supply).

SERI committed to evaluate incorporation of the TSPS requirements into the TS for the long term licensing of the ADHRS.

The NRC evaluated the above TSPS requirements and found that the existing safety margin of the TS for the RHR systems did not significantly decrease with implementation of the TSPS requirements. Therefore, for the short term, the Staff concluded that addition of the ADHRS as one of the shutdown cooling systems was acceptable for RF03, using these requirements.

4. The proposed changes to TS 3/4.4.9.2, 3/4.9.11.1 and 3/4.9.11.2 contained in this submittal reflect the results of the evaluation conducted.

The LCO of each of the affected TS has been changed to allow the use of the ADHRS in lieu of an RHR shutdown cooling loop. The modification of the LCOs will permit ADHRS use without requiring voluntary entry into the Action statements of the applicable TS. This is a departure from the TSPS used for RF03 but is consistent with the NRC position in the OL Amendment 58 and OL Amendment 59 Safety Evaluations regarding minimizing the use of TS Action statements.

When the plant is in OC 4 or OC 5 with a low reactor cavity water level, the current TS require two operable ECCS subsystems/systems, two operable RHR shutdown cooling loops and one operable diesel generator (DG) (the Division III DG is also required when the high pressure core spray system (HPCS) is operable). The required DG is capable of powering one of the two required RHR shutdown cooling loops and either the Division I or the Division II ECCS subsystems. Division I DG can power low pressure core spray (LPCS), LPCI "A" and RHR "A". Division II DG can power LPCI "B", LPCI "C" and RHR "B". ADHRS will also be used as a method capable of decay heat removal in accordance with the proposed TS. Since the ADHRS cannot be powered by a DG its use as a shutdown cooling system either (a) will be limited to replacement of an RHR loop also powered by offsite power or (b) will be backed up by an RHR loop capable of being powered by its associated DG.

When the plant is in OC 5 with a high reactor cavity water level, the current TS require one operable RHR shutdown cooling loop. The proposed TS will permit the use of ADHRS in lieu of an RHR shutdown cooling loop provided one alternate method capable of decay heat removal and its associated DG are operable (e.g., an RHR shutdown cooling loop which is inoperable but is capable of decay heat removal).

5. The proposed changes to TS 3/4.4.9.2, 3/4.9.11.1 and 3/4.9.11.2 are more restrictive than the current TS with respect to the requirements governing the use of alternate methods of decay heat removal. In order to use ADHRS, the proposed TS will require an operable backup method of decay heat removal with an operable associated DG.

   When the plant is in OCs 4 or 5 with the requirements of TS 3.4.9.2 or TS 3.9.11.2 applicable (i.e., two RHR shutdown cooling loops and one DG operable) only one of the two required operable RHR shutdown cooling loops will be associated with an operable DG. If a failure in one RHR shutdown cooling loop or a loss of offsite power were to occur, only one RHR shutdown cooling loop would be left operable. If ADHRS and one RHR shutdown cooling loop along with its associated DG were operable and a loss of one decay heat removal method or a loss of offsite power were to occur a method of removing reactor decay heat would still exist, either the ADHRS or RHR shutdown cooling loop depending on the loss assumed. The proposed TS changes to TS 3/4.4.9.2 and TS 3/4.9.11.2 maintain the same level of safety as the current TS.

   TS 3.9.11.2 Action a is revised to require water level to be raised greater than or equal to 22 feet 8 inches above the top of the reactor pressure vessel flange within 12 hours when it is discovered the system or alternate being used to meet the LCO or Action requirements is inoperable. Raising the water level will make TS 3.9.11.1 applicable instead of TS 3.9.11.2. If no methods of decay heat removal have been made operable within 4 hours of TS 3.9.11.1 becoming applicable then TS 3.9.11.1 Action a must be satisfied. TS 3.9.11.1 Action a requires suspension of all operations involving an increase in the reactor decay heat load and establishment of Secondary Containment Integrity. The proposed change to TS 3.9.11.2 Action a therefore will result in the plant being placed in a safer condition.

6. The operation of the ADHRS can only affect plant safety during OCs 4 or 5 since in all other OCs the ADHRS is required to be physically isolated from other systems. The type of events during OCs 4 and 5 that ADHRS can affect are a loss of decay heat removal and an inadvertent drainage of reactor coolant.

   SERI has analyzed, for the worst plant conditions, an event in which ADHRS is in operation and fails and the backup RHR shutdown cooling loop would have to be placed in service. The ADHRS has sufficient heat removal capability to maintain a reactor coolant temperature of 185°F twenty-four hours following reactor shutdown with a decay heat load of approximately 79 million Btu/hr. This conservative decay

heat load is calculated in accordance with ASB BTP 9-2 assuming 800 fuel assemblies from an equilibrium core. Assuming the vessel is flooded to one foot below the top of the vessel flange and considering the volume of water in the recirculation loops and main steam lines out to the inboard main steam isolation valves, a mass of about 1.5 million pounds is available to absorb energy from an uncooled core. Further, assuming no credit for metal mass associated with the vessel, fuel, core structures, or piping and taking no credit for any conductive, convective, evaporative, or radiative heat losses, the temperature of the water mass would increase at a maximum rate of about 53°F/hr (i.e., constant decay heat load during the 24-hour period), assuming a complete loss of all cooling. Consequently, if the initial water temperature was 185°F, the water would reach 212°F in just over 30 minutes. In order to minimize the potential to boil following the loss of decay heat removal capability, TS 3/4.4.9.2, 3/4.9.11.1 and 3/4.9.11.2 are proposed to be changed to require either an operable RHR shutdown cooling system (TS 3/4.4.9.2 and TS 3/4.9.11.2) or an operable alternate decay heat removal method (TS 3/4.9.11.1) serve as a backup to the ADHRS whenever the ADHRS is used to satisfy a TS LCO. Therefore for a loss of decay heat removal type event, boiling in the reactor core will be prevented even if the ADHRS were being used to satisfy a TS LCO for shutdown cooling.

In addition, GGNS Off-Normal Event Procedure (ONEP) 05-1-01-III-1, "Inadequate Decay Heat Removal," addresses loss of decay heat removal capability in OCs 4 and 5. This procedure provides the operator with specific directions for maintaining or re-establishing adequate core cooling, including references to the appropriate system operating instructions for placing RHR shutdown cooling or alternate methods into service. The procedure also includes provisions for the loss of electrical power, including loss of the DG.

Relative to a loss of reactor coolant caused by inadvertent drainage of the reactor vessel (i.e., a system alignment that allows either gravity or pumped flow from the vessel via an existing isolation point), the ADHRS design, interlocks and accompanying procedural requirements do not increase the probability of this type of event beyond that associated with existing plant systems. In addition, the proposed changes to TS 3/4.3.2 and TS 3.5.2 will lessen the consequences of an inadvertent drainage event even more so than the current TS.

TS for ADHRS Operation During OCs 1, 2 and 3

7. During the NRC review of the ADHRS, the NRC Staff expressed a concern regarding certain TS (e.g., TS 3.7.1.1, Action a.2) applicable to OC 3 and the meaning of footnotes associated with those TS. For example, TS 3.7.1.1 governs the operability requirements of the Standby Service Water (SSW) system. In OCs 1, 2 or 3, TS 3.7.1.1 Action a.2 requires the plant condition to be cold shutdown (OC 4) if both SSW subsystems are inoperable. The ** footnote allows the use of alternate heat removal methods to maintain the reactor coolant temperature as low as practical if

unable to attain cold shutdown. This footnote recognizes, with both SSW subsystems inoperable, that TS require the associated systems supported by the SSW subsystems be declared inoperable (i.e., both loops of RHR shutdown cooling). The Staff was concerned that because of the similar terminology utilized in the OC 3 TS an operator may be led to believe that the ADHRS is the appropriate system to be used in that situation. Because the ADHRS is not designed to be operable during OCs 1, 2 and 3, the Staff believed these TS could mislead an operator such that the plant could be placed in an unsafe condition. SERI modified several GGNS procedures to caution against the use of ADHRS in OCs 1, 2 and 3. The NRC concluded the use of a caution was acceptable for RF03. However, the Staff concluded that prior to subsequent use of ADHRS the TS should be changed to preclude the use of ADHRS in OCs 1, 2 and 3.

ONEP 05-1-01-III-1 is the procedure which the operator would use in a situation where both RHR shutdown cooling loops are inoperable and specifies the actions to be taken during such an event. This procedure specifically prohibits the use of the ADHRS in OCs 1, 2 and 3. In addition, the RHR System Operating Instruction (SOI), which includes the instructions for ADHRS use, also specifically prohibits use of the ADHRS in OCs 1, 2 and 3. Operators are trained on the use of TS, ONEPs, and SOIs as part of the licensed operator training and qualification program.

In OCs 1, 2 and 3, ADHRS is isolated mechanically and electrically from connected plant systems. Thus, during this time, the ADHRS is incapable of functioning without the performance of significant operator restoration activities. Operator actions would include such things as closing breakers, unlocking valves and manually realigning valves. These actions would also require the prior knowledge and approval of the on-shift Senior Reactor Operator before ADHRS could be aligned for service.

The ADHRS uses the same suction piping to remove reactor coolant from the vessel as the RHR shutdown cooling loops "A" and "B". This suction piping contains isolation valves E12-F008 and E12-F009 which are interlocked with reactor pressure to prohibit opening whenever reactor pressure is greater than 135 psig. The reactor pressure interlock is governed by TS 3/4.3.2.

Based upon the above, SERI believes the procedures, plant design, current operator knowledge and training make a TS change unnecessary for these TS and footnotes associated with plant operations in OC 1, 2 and 3.

Reactor Vessel Isolation Requirements (TS 3/4.3.2 and 3.6.4)

8. The second condition the NRC identified related to long term ADHRS use was that the TS needed to require the equipment necessary for automatic isolation of the reactor vessel to be operable in the event of inadvertent drainage of reactor coolant from the vessel. During NRC review of the ADHRS, the NRC expressed a concern about

the adequacy of the operator response time to prevent core uncovery due to inadvertent reactor vessel drainage through the shutdown cooling suction line.

9. In response, SERI committed for RF03 to implement administrative controls in the form of a TSPS to require at least one of the valves (E12-F008 or E12-F009) which isolate the reactor vessel from the decay heat removal system to be automatically isolated on a Level 3 (L3) low reactor vessel water level signal during any operation with a potential for draining the reactor vessel. The NRC found these administrative controls acceptable for ADHRS use during RF03 but required the TS be evaluated for possible changes prior to approving long term use of the ADHRS.

10. SERI has evaluated the TS and determined TS 3/4.3.2 and TS 3.6.4 should be revised to reflect the controls implemented in the TSPS. The automatic isolation valves associated with the ADHRS and the RHR shutdown cooling loops are valves E12-F008 and E12-F009. These valves provide a suction path for RHR "A" and "B" shutdown cooling loops and for the ADHRS. They also serve as containment isolation valves and are thus controlled by TS 3/4.6.4. In accordance with current TS 3/4.3.2 and 3/4.6.4, the automatic isolation function of valves E12-F008 and E12-F009 is required only during OCs 1, 2 and 3. The Bases for TS 3/4.6.4 states that the operability of containment isolation valves ensures the containment will be isolated from the outside environment in the event of release of radioactive materials to the containment atmosphere or pressurization of the containment. However, containment integrity is only required during OCs 1, 2 and 3 per TS 3.6.1.1.

    The ADHRS or RHR shutdown cooling loops can only be operated during OCs 4 and 5 (except that RHR shutdown cooling can be used in OC 3 when reactor pressure is less than 135 psig). Only when the ADHRS or RHR shutdown cooling loops are operating or not isolated is there a possibility for the shutdown cooling suction line to be involved in the inadvertent drainage of reactor coolant. Consistent with this configuration, SERI proposes the applicable TS conditions for operability and surveillance of the automatic isolation valves (E12-F008 and E12-F009) in the shutdown cooling suction line and associated L3 reactor water level isolation instrumentation be changed to include OCs 4 and 5.

    The TS 3/4.3.2 setpoint, allowable value, and surveillance frequencies for the L3 reactor water level isolation trip function are not affected by the proposed TS changes. Only the TS applicability is affected by the proposed change. The applicability is extended beyond OCs 1, 2 and 3 to include OCs 4 and 5.

    The required Action 31 for TS 3.3.2 and the modified Action statement of TS 3.6.4 being proposed in the event that the L3 trip function or one of the isolation valves (E12-F008 or E12-F009) become inoperable allows continued operation of ADHRS or RHR shutdown cooling provided that the TS requirements associated with an operation with the potential to drain the reactor vessel are

satisfied (TS 3.3.2, 3.6.6.1, 3.6.6.2 and 3.6.6.3). The proposed Action assures that both of the needs, to provide decay heat removal and to mitigate potential drainage events, are satisfied.

In addition, a note is added to TS Table 3.3.2-1 specifying only one trip system of the L3 isolation trip function is required operable in OCs 4 and 5. This proposed change is consistent with the fact that only one isolation valve is necessary to isolate the shutdown cooling suction path which would mitigate the consequences of an inadvertent drainage event (assuming the draindown was through this path). Also, the proposed changes to TS 3.5.2 will provide mitigation of a reactor vessel drainage event regardless of drainage path.

11. The proposed TS changes to TS 3/4.3.2 and TS 3.6.4 impose more restrictive requirements upon plant equipment than do the current TS. The affected equipment is not currently required operable in OCs 4 and 5 but will be required operable by the proposed TS changes.

12. The current TS do not require the L3 isolation trip function or isolation valves (E12-F008 or E12-F009) to be operable in OCs 4 and 5. If a drainage path from the vessel through the shutdown cooling suction line was established, no automatic means of isolating the drainage flow path and stopping the loss of reactor coolant would exist per TS requirements. SERI believes it is prudent to provide automatic isolation capability for the suction line. The proposed TS changes will require at least one isolation valve and its associated L3 isolation trip function trip system to be operable. However, it is SERI'S intention to keep both of the valves (E12-F008 and E12-F009) operable as much as possible during an outage. Therefore, an automatic method of isolating the reactor vessel and mitigating the consequences of a vessel drainage event will be required by the proposed TS changes.

ECCS Requirements (TS 3.5.2)

13. The third condition the NRC identified related to long term ADHRS use was that modifications to TS 3.5.2 should be evaluated by SERI and any necessary changes submitted for approval. During the NRC review of one-time TS 3.0.4 exceptions for RF03 it was noted that the TS 3.5.2 LCO lists three ECCS subsystems that can be manually or automatically initiated (LPCI "A", LPCI "B" and LPCI "C") and two systems (LPCS and HPCS) that are automatically initiated when the reactor pressure vessel water level is low. The NRC was concerned that if two manually initiated subsystems were required to be operable, the core may be uncovered by an inadvertent drain event.

In response to this concern, SERI committed to implement administrative controls in the form of a TSPS to require that at least one of the two ECCS required operable by TS 3.5.2 be capable of automatic initiation and injection to the reactor vessel. In

addition, the TSPS requires that if no ECCS subsystem/system capable of automatic initiation and injection is operable, then operations which have a potential for draining the reactor vessel will be suspended immediately. The TSPS is in effect for the short term during OCs 4 and 5, including RF03.

14. TS 3.5.2 provides the ECCS operability requirements for OCs 4 and 5. The LCO for TS 3.5.2 contains a provision allowing the LPCI "A", "B" and "C" subsystems of the RHR system to be considered operable with a flow path capable of taking suction from the suppression pool upon being manually realigned. This allows, for example, an RHR subsystem to be aligned and operating as a shutdown cooling loop and, provided a suppression pool suction flow path exists, still be considered an operable LPCI subsystem satisfying the LCO requirements of TS 3.5.2.

15. SERI evaluated the need for automatic LPCI injection capability in OCs 4 and 5. SERI is proposing that TS 3.5.2 be modified to include a requirement in OCs 4 and 5 for one of the two required operable ECCS to be capable of automatic initiation and injection to the reactor vessel. The other ECCS required operable may require manual realignment prior to initiation and injection. Action a of TS 3.5.2 provides requirements that must be met if only one ECCS is operable and ensures that water inventory requirements can be met. The LPCS and HPCS systems and the LPCI subsystems are required to be available to provide reactor vessel inventory makeup following an event which causes inadvertent draining of the reactor vessel when irradiated fuel is in the vessel. TS 3.5.2 Action a will be modified to require that, if the automatic initiation/ injection ECCS is inoperable and the other operable ECCS requires manual realignment, then operations which have the potential for draining the reactor vessel be suspended immediately. Immediately shall not be interpreted to preclude completion of actions to place the operation that has the potential to drain the vessel in a safe condition.

16. The proposed changes to TS 3.5.2 will place more restrictive requirements on the ECCS subsystems/systems required operable during OCs 4 and 5 than do the current TS. No longer will manual realignment of both required ECCS subsystems/systems be allowed; one must now be capable of automatic initiation and injection. The proposed change to Action a is also more restrictive than the current Action a. Currently, Action a would allow an additional four hours prior to suspending operations with the potential to drain the reactor vessel. The new Action a will require immediate suspension of these operations if there is no operable ECCS subsystem/system capable of automatic initiation and injection.

17. The proposed TS 3.5.2 changes are intended to reduce the potential consequences of a vessel drainage event. SERI performed an analysis of draindown events in OCs 4 and 5. The objective of the analysis was to demonstrate that the manual realignment provision of TS 3.5.2, as modified, is justified and acceptable in that the operator has sufficient time to recognize the draindown event (i.e., loss of

vessel inventory) and to initiate corrective action (i.e., manually realign LPCI). The analysis results support the proposed TS 3.5.2 changes showing that the operator has time to manually realign a LPCI subsystem from the control room without significantly increasing the potential consequences of a reactor vessel drainage event. Therefore, since the safety function of ECCS is maintained, a manually realigned ECCS is just as effective as an automatic initiated ECCS in mitigating a vessel drainage event in OCs 4 and 5.

Bases Changes

18. The Bases for TS 3/4.4.9.2, 3/4.5.2, 3/4.9.11.1 and 3/4.9.11.2 have been revised to reflect the proposed TS changes described above and are attached.

Adverse System Interactions

19. In addition to addressing and proposing resolution to the three conditions identified by the NRC during the Staff's previous review of ADHRS, SERI was to resolve two potential adverse system interactions created by the operation of ADHRS prior to long term ADHRS licensing. The potential adverse interactions involve the operability of the LPCI "A" and LPCI "B" subsystems and the operability of suppression pool water level instrumentation. Resolutions of these potential adverse system interactions are described in Attachment 3 since no TS changes are associated with their resolutions.

Associated Administrative TS Changes

20. Besides the technical changes proposed to the TS described above, administrative changes are also proposed. The administrative changes consist of deleting information from the TS related to ADHRS and TS 3.0.4 exceptions which were only applicable until startup from RF03 and which no longer apply. The proposed deletions have no safety impact since they are administrative changes.

Previously Approved TS Changes (TS 3/4.3.7.1 and 3/4.8.4.2)

21. Two auxiliary features involved in the implementation of ADHRS required changes to the GGNS TS. These two features were the addition of the PSW radiation monitor and the addition of the motor operator/thermal overload devices to valves E12-F066A and B. Justification and no significant hazards considerations for the PSW radiation monitor and thermal overload devices were submitted previously in AECM-83/0186 dated September 23, 1988 and approved by the NRC in OL Amendment 59 dated March 27, 1989. These two features are still necessary for the operation of ADHRS; and, since they are already approved by the NRC, no further justification is included with this submittal for their use.

Administrative Controls

22. During the short term licensing of ADHRS, SERI committed to implement various administrative controls for the operation of the ADHRS and RHR in shutdown cooling and water injection modes through the use of plant procedures. Some of the more significant controls were:

    a. ADHRS should be stopped and manually isolated if loss of shutdown cooling occurs during OC 4 when the reactor pressure vessel head is on.

    b. ADHRS should be isolated on the primary and secondary sides during OC 1, 2 or 3.

    c. Simultaneous operation of the ADHRS and RHR loops "A" and "B" for shutdown cooling should be precluded for certain alignments of these systems.

    d. Simultaneous operation of ADHRS and LPCI "C" water injection should be precluded.

    The same administrative controls committed to in the above letters for short term ADHRS licensing will also be maintained for long term licensing of ADHRS operation, except those superseded by the proposed TS changes.

Summary

23. Based upon the above justification and the proposal of TS changes which address the NRC conditions related to the ADHRS as a supplemental decay heat removal system, SERI believes sufficient TS and administrative controls will exist following NRC approval of the proposed TS amendment to warrant permanent licensing of the ADHRS.

D. NO SIGNIFICANT HAZARDS CONSIDERATIONS

The proposed amendment would revise the TS by adding requirements governing the operation and use of the ADHRS. Requirements related to the operability of decay heat removal system isolation valves during OCs 4 and 5 are added to the TS in order to mitigate the potential consequences of a reactor vessel drainage event. TS changes are also proposed that would restrict the number of ECCS subsystems permitted to be manually realigned prior to initiation and injection during OCs 4 and 5 from two to one and require instead that at least one of the two required operable ECCS subsystems be capable of automatic initiation and injection.

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 considerations 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. SERI has evaluated UFSAR events which are considered to be applicable during OCs 4 and 5. These events include a dropped fuel bundle and inadvertent criticality. The proposed TS changes do not affect the probability of occurrence of any of these events. The proposed changes would have no effect on fuel handling operations in the containment or in the spent fuel pool because fuel handling procedures and methods remain unchanged. The proposed changes have no effect on control rod interlocks or fuel loading errors and thus do not affect the probability of occurrence of an inadvertent criticality.

   b. SERI has also evaluated the proposed TS changes for impact upon reactor vessel drainage and loss of decay heat removal events. The probability of these events has not been significantly increased by the proposed TS changes. ADHRS when used will be backed up by an operable decay heat removal system with its associated DG so that if ADHRS were to fail a loss of decay heat removal event would not occur. The proposed changes for the isolation instrumentation and valves will reduce the likelihood of a reactor vessel drainage event since they will now be required operable. ECCS requirements with the proposed changes will not change the probability of either event since ECCS provides mitigation not prevention.

   c. The consequences of vessel drainage and loss of decay heat removal events are not significantly increased by the proposed TS changes. The proposed TS changes will place more restrictive controls upon plant operations in OCs 4 and 5 regarding the use of the ADHRS, operable ECCS subsystems/systems, and reactor vessel isolation valves and instrumentation. The proposed TS changes increase the mitigation of these events and reduce their consequences.

   d. Therefore, the probability or consequences of previously analyzed accidents are not significantly increased.

2. The change would not create the possibility of a new or different kind of accident from any previously analyzed.

   a. The proposed changes do not increase the amount of time ECCS or RHR shutdown cooling loops are unavailable nor do the changes reduce the containment isolation capability. The proposed changes do not increase the potential for draining the reactor vessel. Since the above safety systems are maintained, there is no possibility of a new or different kind of accident from any previously analyzed. The proposed changes are intended to maintain and will, in some cases, increase the level of plant safety.

   b. Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. This change would not involve a significant reduction in the margin of safety.

   a. The proposed changes will still ensure that core decay heat removal, ECCS makeup capabilities and isolation capability are available when required during OCs 4 and 5. Essential safety systems are operable as necessary during OCs 4 and 5. The proposed TS changes place more restrictions on plant operations during OCs 4 and 5 than do the current TS concerning the use of alternate methods of decay heat removal, ECCS subsystem/system operability, and isolation valve and instrumentation operability.

   b. Therefore, this change will not involve a significant reduction in the margin of safety.

Therefore, based on the above evaluation, operation in accordance with the proposed amendment involves no significant hazards considerations.