From: Kalyanam, Kaly
Sent: Thursday, January 27, 2011 12:52 PM
To: BICE, DAVID B; CLARK, ROBERT W
Cc: Lent, Susan; Burkhardt, Janet
Subject: Request for Additional Information on License Amendment Request (LAR) Re.: Extension of Completion Times for One inoperable RCS Cooling Loop (Revision 1)

The SUNSI information as follows:

Plant: Arkansas Nuclear One, Unit 1
Docket No.: 50-313
Subject: Request for Additional Information on License Amendment Request (LAR) Re.: Extension of Completion Times for One inoperable RCS Cooling Loop (Question number 2 in RAI email dated December 29, 2010 is revised in this RAI)
TAC Nos.: ME4563
SUNSI Review Done: Yes. Publicly Available, Normal Release, Non-sensitive,
From: N. Kalyanam
To: David Bice/Robert Clark

DBice/RClark,

By email dated December 29, 2010, the NRC staff had sent a follow-up RAI on your LAR mentioned above. Please note that question number 2 in that RAI is revised in this RAI)

The NRC staff has reviewed Entergy's response dated November 12, 2010, to the staff RAI and had the following follow-up questions. Your response to these questions are requested in 60 days from the receipt of this e-mail. Please call me if you have any questions.

Kalyanam

<u>FOLLOW UP RAI for the REVIEW of an ANO-1 LAR Regarding Extension of Completion Times for One Inoperable RCS Cooling Loop (ME4563)</u>

1. Follow-up to RAI 1

1) Identify cases when the reactor coolant system (RCS) cooling loop or decay heat removal (DHR) loop is not operable on demand, and events of a loss of the RCS cooling loops or DHR systems in Modes 4, 5, and 6 at SL-1. Discuss the causes of the

identified cases and events to show that corrective actions taken will prevent the similar cases or events from occurring.

2) A discussion of OP 1015.002 indicated that the steam generator nozzle dams are used during reduced inventory operations. The nozzle dams will fail if the RCS pressure (resulting from a loss of DHR) exceeds the nozzle dam design pressure without a pressure vent/release path, thus creating a LOCA event. Provide a discussion of plant procedures to show that appropriate instruction is available to prevent RCS pressurization from exceeding the nozzle dam design pressure, thus insure that reactor water is not lost as a result of DHR.

2. Follow-up to RAI 2 (*Changed from the RAI dated December 29, 2010)*

Specify the 'mission times' and the associated bases to restore the RCS cooling loop, or decay heat removal (DHR) loop for each of the worst cases in Modes 4, 5, and 6 for ANO-1 in the case of a total loss of the DHR systems and RCS cooling loops (hereinafter referred to as the "subject systems"). Provide a discussion of plant procedures and analysis to show that operators can restore the decay heat removal capability of the "subject systems" or alternate core cooling systems within the specified mission times.

3. Follow-up to RAI 3

RAI response stated that "not all available RCS volume is credited." The license should expand this statement by including the specific values of RCS water inventory used for applicable conditions in each of Modes 4 through 6 operations and show that the TTB calculation has considered the effect of incomplete mixing of RCS water and the values of RCS water used are conservative, resulting in minimum TTBs.

RAI 3 also requested the licensee to discuss the initial RCS water inventory used in the TTB calculation for TS 3.9.5 - Mode 6 conditions. The response does not provide adequate information to this part of the RAI. Since the refueling cavity water above the reactor vessel may not be completely mixed, the licensee should address the incomplete mixing effect of the RCS water on the TTB calculations.

4. Instrumentation and Control during Modes 4 through 6 Operations

The NRC staff stated in NUREG-1449 that inadequate instrumentation and incomplete operating procedures, especially during periods of reduced inventory operations, have contributed to several loss-of-DHR cooling events at operating plants. In addressing the NUREG concerns, the licensee is requested to discuss its instrumentation capabilities during Modes 4 through 6 operations to show that the instrumentation will be available to provide visible and audible indications of abnormal conditions in (a) reactor vessel water level, (b) temperature, and (c) DHR heat-removal performance, and that it will enable operators to (1) continuously monitor key parameters during reduced inventory

operations, and (2) detect the onset of a loss of DHR early enough that mitigating actions can be taken to restore DHR capability.

5. Effects of PWR Upper Internals

In NUREG/CR-5820, the NRC staff analyzed the assumed lass of DHR with the vessel upper internals in place to examine the possibility of core uncover from a lack of coolant circulation flow. Such conditions could occur during the reflooding of the refueling pool cavity while preparing for fuel shuffling operations. Under these conditions, the vessel upper resistance to natural circulation flow between the refueling pool and the reactor, and may prevent the refueling water from cooling the core if the DHR cooling is lost.

Provide a discussion of the operating strategy or analysis addressing the NUREG-5829 concerns relating to a loss of DHR during Mode 6 with the upper internal in place for SL-1.