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

July 5, 2012

LICENSEE: Tennessee Valley Authority (TVA)

FACILITY: Sequoyah Nuclear Plant, Unit 1

SUBJECT: SUMMARY OF MAY 14, 2012, PUBLIC TELEPHONE CALL WITH TVA REGARDING HEAVY LOAD LIFTS LICENSE AMENDMENT REQUEST - (REQUEST FOR ADDITIONAL INFORMATION ASSOCIATED WITH RISK) (TAC NO. ME7225)

On May 14, 2012, a Category 1 public telephone call was held between Nuclear Regulatory Commission (NRC) staff and representatives of TVA (the licensee). The purpose of the meeting was to discuss the NRC staff requests for additional information (RAIs) regarding the risk-informed portion of the licensee's request to establish special provisions and requirements for the safe operation of Sequoyah Nuclear plant, Unit 1, while large heavy load lifts are performed on Unit 2. Enclosure 1 contains a list of attendees.

Enclosure 2 lists the discussed RAIs:

DISCUSSION:

In response to NRC Question 3, the licensee indicated the intent to revise the risk metric from "CDF" (core damage frequency) and "LERF" (large early release frequency) to "CCDP"(conditional core damage probability) and "CLERP" (conditional large early release probability) in the Tables.

In response to NRC Question 5, the licensee indicated the intent to add the time for the operator to act and include a confirmatory statement that the operator can perform the action.

No commitments or regulatory decisions were made by the NRC staff during the telephone call.

Members of the public did not participate.

Please direct any inquiries to me at 301-415-1564, or by email to siva.lingam@nrc.gov.

Siva P. Lingam

Siva P. Lingam, Project Manager
Plant Licensing Branch 2-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-327

Enclosures:
1. List of Participants
2. Discussion Items

cc w/encl: Distribution via Listserv

LIST OF PARTICIPANTS

U. S. NUCLEAR REGULATORY COMMISSION (NRC)

PUBLIC TELEPHONE CALL WITH TENNESSEE VALLEY AUTHORITY (TVA),

REGARDING THE HEAVY LOAD LIFTS LICENSE AMENDMENT REQUEST

FOR SEQUOYAH NUCLEAR PLANT

MAY 14, 2012

NRC
Doug Broaddus
Stephen Dinsmore
Siva P. Lingam

TVA
Gordon Arent
Scott Carter
Kevin Casey
Marie Gillman
Roger Gish
Monica Kalal
Clyde Mackaman
Don Sutton
Mike Walker

TVA Contractors
Mark Ceraldi
Bill Fox
Steve McBee
Stan McDowell

Enclosure 1

DISSCUSSION ITEMS

U. S. NUCLEAR REGULATORY COMMISSION (NRC)

PUBLIC TELEPHONE CALL WITH TENNESSEE VALLEY AUTHORITY (TVA),

REGARDING THE HEAVY LOAD LIFTS LICENSE AMENDMENT REQUEST

FOR SEQUOYAH NUCLEAR PLANT

MAY 14, 2012

Requests for Additional Information Discussed

NRC Question 1

Page 31 of the submittal dated September 29, 2011 [Agency-wide Documents Access and Management System (ADAMS) Accession No. ML11273A169] (submittal), states that, "the OLS [outside lift system] will not collapse or drop a load while loaded or unloaded during the SSE." What is the probability of a seismic event exceeding the SSE [safe shutdown earthquake] (or, alternatively, the strength of the OLS) while the OLS is loaded? If the risk from a seismic event could be significant compared to the random lift drop, please include this risk in your change in core damage frequency [CDF], and large early release frequency [LERF] estimates.

TVA Response

The Sequoyah Nuclear Plant Updated Final Safety Analysis Report, Section 2.5.2.4, defines the Safe Shutdown Earthquake (SSE) maximum ground acceleration of 0.18 g [acceleration due to gravity] or 176.5 centimeters/second^2. Using the following figure from the EPRI [Electric Power Research Institute] report NP-6995-D, "Probabilistic Seismic Hazard Evaluations at Nuclear Plant Sites in the Central and Eastern United States: Resolution of the Charleston Earthquake Issue," the frequency of a seismic event exceeding the SSE is 3.0E-04 per year.

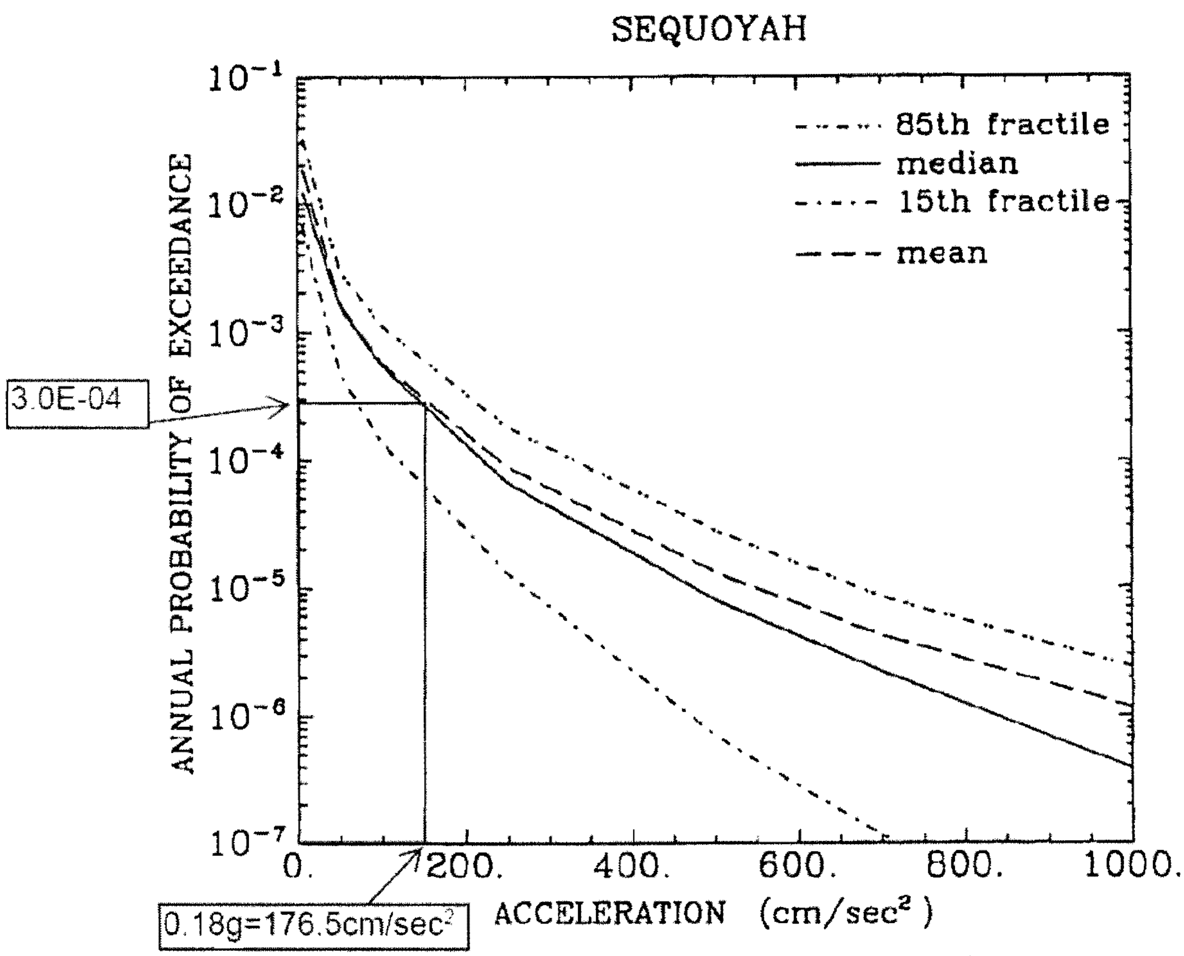

Figure 3-259. Annual probability of exceedance of peak ground acceleration: Sequoyah site.

Each load lift is estimated [to] take one hour to complete. Since there are eighteen load lifts, the total time during which the OLS will be loaded is eighteen hours. To calculate the probability of having a beyond SSE event while the OLS is loaded, the frequency of the seismic event exceeding the SSE (3.0E-4) was multiplied by the duration, in years, of the OLS being loaded (18 hrs / 8760 hrs per yr). The calculated probability of this event is 6.16E-07. This probability is well below the annual probability of having a random lift load drop, which is 1.017E-03, and is therefore not included in the Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) analysis.

<u>NRC Question 2</u>

Page 80 of the submittal states that an industry average <u>per-lift</u> drop frequency of 5.6E-5 was used. Page 91 discusses upper and lower drop frequencies on a <u>per-year</u> basis. Page EA-1 of the supplement dated February 10, 2012 [ADAMS Accession No. ML12046A646] (Request for Additional Information response) states that industry average load drop value of 5.6E-05 <u>per-year</u> was used.

a) *Clearly define the values and the units of the lift drop failure parameter from the Boiling Water Reactor Owners Group (BWROG-TP-10-0XX) topical report that is used in your analysis.*

b) *If the value is a per-year value, address whether that value is applicable under these conditions (limited number of special lifts).*

c) *If the value is a per-lift [value], address why the 18 hour exposure time is used to calculate the Conditional Risk in Table 9-7 of the submittal.*

TVA Response

a) The load drop frequency is calculated based on a per lift basis, the value in the BWROG topical report is 5.65E-05 per lift. With eighteen lifts being performed in the year, the frequency of having a load drop is 1.017E-03 per year.

b) The average load drop value in the BWROG topical report is per lift, not per year. The analysis is based on utilizing the load drop value on a per lift basis.

c) As discussed in the original submittal it is expected that each load lift will take one hour, and with eighteen lifts being performed, the expected total duration that a heavy load will be suspended is eighteen hours. Eighteen hours were used to be consistent with the evaluation of risk impact as discussed in Regulatory Guide 1.177, "An Approach For Plant-Specific, Risk Informed Decision Making: Technical Specifications," and to demonstrate that this one time Technical Specification change is less than the ICCDP [incremental conditional core damage probability] and ICLERP [incremental conditional large early release probability] thresholds of 1E-06 and 1E-07,which is considered small per the Regulatory Guide.

   Based on the initiating event frequency discussed earlier the results presented in Table 9-7 of the original submittal were updated to:

Risk Metric	*Steam Generator Load Drop Value*	*Alignment Change Value*	*Exposure*	*Conditional Risk*
CDF	3.0643E-05	3.0591E-05	18 hours	1.0685E-10
LERF	4.4212E-06	4.4126E-06	18 hours	1.7671E-11

NRC Question 3

Provide the conditional core damage probability (CCDP) and the conditional large early release probability (CLERP) following a load drop with the essential raw cooling water (ERCW) realigned systems (e.g. used in the submittal estimates).

TVA Response

To calculate the conditional probability of the load drop initiating event with the Essential Raw Cooling Water (ERCW) system realigned, the load drop initiating event was set to a frequency of 1.0 and all the other initiating events were set to a frequency of 0 in the SQN [Sequoyah Nuclear Plant] Revision 0 CAFTA model. The model was then quantified for CDF and LERF. A summary of those results are presented below.

Risk Metric	*Conditional Probability for the Load Drop Initiating Event*
CDF	1.2463E-04
LERF	9.0312E-06

Assumption 5 from Enclosure 2 of the original submittal states that the dam being constructed in the pipe tunnel has an assumed failure probability of 1.0. A sensitivity analysis was performed on this failure rate, with a dam failure rate of 0.1. The results of the sensitivity analysis are presented in the table below.

Risk Metric	*Sensitivity Conditional Probability with Dam Installed*
CDF	1.4938E-05
LERF	1.3045E-06

NRC Question 4

The submittal discusses many flooding events. The licensee appears to have presented two types of flooding events, (1) flooding due to the heavy load drop modeled in Figure 9-7, and (2) flooding caused by random failure unrelated to the heavy load movement represented by the 60 odd flooding initiating events in Tables 9-2 and 9-3.

Assuming random internal floods are modeled, summarize the initiating event frequencies in Tables 9-2 and 9-3, how the frequencies are developed, and whether all the floods are the same size. If random internal flooding events are not modeled, please explain what the initiating events in Tables 9-2 and 9-3 are, and how they are used in the risk analysis.

TVA Response

The table below provides the initiating even frequency for those initiating events presented in Tables 9-2 and 9-3 of Enclosure 2 of the original submittal (Reference 1 of the cover letter).

Initiating Event	*Frequency*
%690.0-A01-1_067_M_2A	1.390E-04
%690.0-A01-2_067_F_2A	1.120E-05
%690.0-A01-2_067_M_2A	1.770E-06
%690.0-A01-4_067_F_2A	1.566E-05
%690.0-A01-4_067_M_2A	1.390E-04
%690.0-A19_067_F_2A	3.000E-04
%690.0-A19_067_M_2A	4.750E-05
%690.0-A29_067_F_2A	6.690E-05
%690.0-A29_067_M_2A	1.660E-06
%714.0-A01-1_067_F_2A	1.027E-05
%714.0-A01-1_067_M_2A	1.970E-04
%714.0-A01-2_067_F_2A	3.653E-06
%714.0-A01-2_067_M_2A	1.970E-04
%714.0-A09_067_F_2A	1.160E-04
%714.0-A09_067_M_2A	1.830E-05
%734.0-A13-1_067_F_2A	1.240E-05
%734.0-A13-1_067_M_2A	1.970E-06
%734.0-A13-2_067_F_2A	1.240E-05
%734.0-A13-2_067_M_2A	1.970E-06
%653.0-A01_067_F_2B	2.678E-04
%653.0-A13_067_F_2B	1.310E-05
%653.0-A15_067_F_2B	1.440E-05
%669.0-A01_067_F_2B	5.256E-06
%669.0-A01_067_M_2B	8.337E-07
%669.0-A24_067_F_2B	1.761E-05
%669.0-A24_067_M_2B	2.961E-06

Initiating Event	*Frequency*
%669.0-A25_067_F_2B	2.800E-04
%669.0-A25_067_M_2B	4.430E-05
%669.0-A26_067_F_2B	2.240E-05
%669.0-A26_067_M_2B	3.550E-06
%690.0-A01-1_067_F_2B	8.770E-04
%690.0-A01-1_067_M_2B	1.390E-04
%690.0-A01-2_067_F_2B	1.110E-03
%690.0-A01-2_067_M_2B	9.040E-06
%690.0-A01-3_067_F_2B	5.980E-05
%690.0-A01-3_067_M_2B	9.040E-06
%690.0-A01-4_067_F_2B	1.158E-04
%690.0-A01-4_067_M_2B	1.390E-04
%690.0-A19_067_F_2B	3.000E-04
%690.0-A19_067_M_2B	4.750E-05
%690.0-A29_067_F_2B	6.690E-05
%690.0-A29_067_M_2B	1.660E-06
%714.0-A01-1_067_F_2B	1.027E-05
%714.0-A01-1_067_M_2B	1.970E-04
%714.0-A01-2_067_F_2B	1.040E-03
%714.0-A01-2_067_M_2B	1.970E-04
%714.0-A09_067_F_2B	1.160E-04
%714.0-A09_067_M_2B	1.830E-05
%734.0-A13-1_067_F_2B	1.240E-05
%734.0-A13-1_067_M_2B	1.970E-06
%734.0-A13-2_067_F_2B	1.600E-05
%734.0-A13-2_067_M_2B	2.550E-06

These initiating event frequencies were calculated for the Internal Flooding analysis for SQN and as such are not new internal flooding scenarios. For each flood area defined in the analysis, the linear feet of piping within this area was collected, and this value was multiplied by the appropriate initiating event frequency as described in the EPRI Report on pipe rupture

break where the flow rate out of the break is greater than 100 gallons per minute but less than 2,000 gallons per minute. For a flood event with a "_M_" in the name, the initiating event is break where the flow rate is greater than 2,000 gallons per minute up to the maximum flow rate out of the break. Therefore, each of the initiating events represents a wide range of potential pipe break sizes, but the analysis in the Probabilistic Risk Assessment (PRA) uses the most limiting flow rates (i.e., 2,000 gallons per minute for floods "_F_", and the maximum flow rates for major floods "_M_").

NRC Question 5

Assumption 6 in section 9.3 in the submittal states that:

> *[t]here are no operator actions which could isolate the flooding event caused by the load drop prior to impacting the RHR [residual heat removal] and CS [containment spray] pumps on elevation 653.*

Address whether any operator actions are credited to isolate broken piping after a load drop. If operator actions are credited, provide a summary for each.

TVA Response

For the purpose of the analysis, operator actions are credited for being able to stop the flooding event. Assumption 6 was included to show that any operator actions to stop the flooding event will not be successful in preventing damage to the RHR and CS pumps. During a load drop event, the volume of water within the RWST is significant enough to cause the RHR and CS pumps to be unavailable for accident mitigation due to submergence.

After the load drop operators will be required to mitigate the flooding event by using the steps outlined in Abnormal Operating Procedure AOP-M.01, "Loss of Essential Raw Cooling Water." Specifically they will have to isolate the "A" discharge header of the ERCW system, which is an action modeled within the PRA. This action would need to be performed prior to the flood waters impacting the 669 foot elevation of the Auxiliary Building. The volume of water required to completely fill the passive sump and the rooms on the 653 foot elevation would be greater than 1.5 million gallons. Based on the large volume of water required to impact the components on the 669 foot elevation, there were no changes made to the internal flooding actions already.

Proposed Licensee Action Items

1. In response to NRC Question 3, revise the risk metric from "CDF" (core damage frequency) and "LERF" (large early release frequency) to "CCDP"(conditional core damage probability) and "CLERP" (conditional large early release probability) in the Tables.

2. In response to NRC Question 5, add the time for the operator to act and include a confirmatory statement that the operator can perform the action.

Please direct any inquiries to me at 301-415-1564, or by email to siva.lingam@nrc.gov.

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch 2-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-327

Enclosures:
1. List of Participants
2. Discussion Items

cc w/encl: Distribution via Listserv

DISTRIBUTION:

PUBLIC	LPL2-2 R/F	RidsNrrDorlLpl2-2
RidsNrrLABClayton	RidsNrrPMSequoyah	RidsOgcRp
RidsNrrDorl	RidsRgn2MailCenter	S. Dinsmore, NRR
RidsAcrsAcnw_MailCTR	G. Bowman, EDO	

ADAMS Accession Nos. Package ML12136A520 Notice ML12121A233 Summary ML12136A522

OFFICE	LPL2-2/PM	LPL2-2/LA	LPL2-2/BC
NAME	SLingam	BClayton	DBroaddus (EBrown for)
DATE	05/29/12	05/29/12	07/05/12

OFFICIAL RECORD COPY