The light company

Houston Lighting & Power South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498; STN 50-499
Additional Information Regarding Proposed Special Test Exception 3.10.8
(TAC No. M92169/M92170)

References:

1. Letter from D. A. Leazar to the Nuclear Regulatory Commission Document Control Desk dated January 4, 1996 (ST-HL-AE-5261)

2. Letter from D. A. Leazar to the Nuclear Regulatory Commission Document Control Desk dated January 8, 1996 (ST-HL-AE-5272)

As a result of conversations with the NRC Staff, the South Texas Project has revised the table attached to Reference 1 to delete the item for Hydrogen Analyzers and the table attached to Reference 2 to revise a column heading. The revised tables are attached. Also attached is South Texas Project Probabilistic Safety Assessment information regarding containment isolation that was previously provided to the NRC Staff informally.

Should you have any questions, please contact Mr. A. W. Harrison at (512) 972-7298 or me at (512) 972-7795.

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TCK/
Attachments:

1. Replacement Table for ST-HL-AE-5261
2. Replacement Table for ST-HL-AE-5272
3. PSA Information re Containment Isolation

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Systems with Reduced Design Basics Capability in Single Train Operation

SYSTEM	FUNCTION AFFECTED	ALTERNATIVE ACTION	EVENT PROBABILITY †	COMMENTS
Safety Injection (LHSI and HHSI)	Cannot mitigate LBLOCA if the SI train is injecting into the broken RCS loop	None (minimal cooling from using hot leg recirculation)	1.91E-10 Note: Accounts for a 25% chance of injecting in broken loop Leak before break not credited	One train in the STE One train inoperable One train injects into the broken loop
Safety Injection (HHSI)	Steam line break mitigation capability reduced	None required	2.25E-8 Note: Accounts for a rupture either inside or outside containment.	DNB not expected to occur
Safety Injection (LHSI and HHSI)	Cannot mitigate SBLOCA without operator action if the SI train is injecting into the broken RCS loop	Operator action per EOPs to depressurize	1.75E-9 Note: No credit taken for operator action to depressurize	One train in the STE One train inoperable One train of HHSI not enough to match break flow Operator action is expected to be effective
Residual Heat Removal	Cannot provide long term cooling if only a single ESF bus is energized or if RHR is injecting into broken loop	Continue to inject using LHSI until RHR is restored.	See Comments	RHR is required approximately 14 hours after event. Recovery of power to ESF bus is expected within 8 hours

SYSTEM	FUNCTION AFFECTED	ALTERNATIVE ACTION	EVENT PROBABILITY †	COMMENTS
Containment Spray	Iodine removal during a LBLOCA or SBLOCA	Monitor TSC doses and relocate to lower dose area	1.97E-8 Note: Assuming most probable event of SBLOCA	
Control Room Envelope HVAC	Cannot maintain 1/8" positive pressure	Positive pressure is expected to be maintained, so system is expected to be functional	7.64E-10 Note: This is the probability of a LBLOCA, failure of DG and LOOP while in the STE	
Fuel Handling Building HVAC	Cannot provide filter path for recirculation phase leakage if C train is only operable train	Provide alternate power supply from operable diesel	6.37E-11 Note: Due to design dependencies probabilities are calculated based on trains A or B being operable	

SYSTEM	FUNCTION AFFECTED	ALTERNATIVE ACTION	EVENT PROBABILITY †	COMMENTS
Component Cooling Water	CCW flow to RCFC's and RHR Heat Exchanger less than design	Manually isolate non-safety header to restore design flow.	5.75E-5 Note: Accounts for the probability of train C isolating non-safety flows	If train C is the operable train, CCW flow approximates design flow. Effect of reduced CCW flow is slight even without manual action.
Hydrogen Recombiners	Cannot use Hydrogen Recombiners if A is only operable train		See Comments	Not required until approximately 11 days after accident Recovery of power to ESF bus is expected within 8 hours

† The event probability is the likelihood of an initiating event (i.e., Large Break LOCA) with a loss of offsite power and failure of a standby diesel generator given a diesel generator is unavailable for the whole 21 days of the STE. It conservatively does not include recovery factors or support system failures.

CONTAINMENT PRESSURE/TEMPERATURE ANALYSIS

LIST OF ASSUMPTIONS

	LOCA		MSLB	
	Single ESF-Train	**Multiple ESF-Trains**	**Single ESF-Train**	**Multiple ESF-Trains**
	Double Ended Pump Suction Guillotine with Minimum Safety Injection and Minimum Containment Heat Removal Systems in Operation	Double Ended Pump Suction Guillotine with Maximum Safety Injection and Minimum Containment Heat Removal Systems in Operation	102% Power, MSIV Failure with Minimum Containment Heat Removal Systems in Operation	1025 Power, MSIV Failure with Maximum Containment Heat Removal Systems in Operation
Number of Spray train operating	1	2	1	3
Spray flowrate	1885 gpm	3800 gpm	1885 gpm	4700 gpm
Spray initiation time	140 sec	82.6 sec	140 sec	90.6 sec
Number of RCFC trains operating	1	2	1	3
Number of RCFCs	1	3	1	5
RCFC initiation time	66.1 sec	38 sec	67.7 sec	67.7 sec
CCW temperature	125°F	110°F	125°F	110°F
CCW flow to each RCFC	1600 gpm	1800 gpm	1600 gpm	1800 gpm
Total CCW flow to all RCFCs used in the analysis	1600 gpm	5400 gpm	1600 gpm	9000 gpm

Attachment 3: PSA Information re Containment Isolation

PSA response to questions from the phone conference between HL&P and the NRC on 1/3/96 with respect to the November 22nd supplemental response regarding the proposed Special Test Exception (ST-HL-AE-5208):

Question Concerning answer to question #7a, please explain why the values cited don't agree with values in table 3.1-4 of May 1st submittal (ST-HL-AE-5076)? What are large and small early release values without the Special Test Exception, based on 1995 PSA?

Response The values presented in the response to question #7a are an input into calculating the Large and Small Early Release frequencies. Question #7a requested a comparison of the *containment isolation failure frequency* with and without the requested technical specification change. The frequencies associated with Table 3.1-4 represent the release frequencies in the STP PSA for LERF and SERF and were not intended to reflect the contribution of containment isolation failures to LERF/SERF. The containment isolation failure frequency, as modeled in the STP PSA, is based on the failure of top events CI and CP. The quantified values used for these top events are based on a Level 1 PSA analysis which calculates the frequencies of plant damage states that are linked to the Containment Event Tree (CET) for the Level 2 evaluation. The CET defines and quantifies accident progression from the Level 1 plant damage states to the Level 2 end states which are referred to as release categories. The quantified release categories define the frequency, characteristics, timing and magnitude of radiological releases (e.g., LERF or SERF) from the plant depending on the plant response of severe accident phenomena and containment performance.

The table faxed on 1/3/96 for the phone conference was in error. This faxed table provided an update to Table 3.1-4 of the May 1st submittal that includes the Rebaslined (1995 PSA) release categories. The correct results are presented in the attached Table 1, which provides frequency values for the release categories of the Rebaseline model (i.e., 1995 PSA) along with the frequency values for the release categories for the proposed Special Test Exception.

Table 1 : Update for Table 3.1-4 of the May 21, 1995 submittal to include Level 2 results for the Rebaseline Model

Major Release Group	Accident Frequency (per year)				
	1992 Level 2 PSA/IPE Submittal	1993 Risk Based Evaluation (STPPMT)	1995 Rebaseline PSA (STPBASE)	1995 PSA With Proposed Changes (STPPSA495)	Fraction of 1992 Risk Based Evaluation
I - Large Early Containment Failure or Bypass	9.89E-7	1.3E-6	3.49E-7	5.07E-7	0.51
II - Small Early Containment Failure or Bypass	6.67E-6	7.9E-6	4.14E-6	5.56E-6	0.83
III - Late Containment Failure	1.08E-5	1.1E-5	1.34E-6	1.39E-6	0.54
IV - Intact Containment	2.56E-5	2.7E-5	1.35E-5	1.35E-5	0.52
Total Core Damage	4.41E-5	4.7E-5	1.93E-5	2.10E-5	0.48

Question Concerning answer to question #7b of ST-HL-AE-5208: The response implies LERF is 5 times as large as SERF. However, this doesn't seem to be the case, based on the answer to question #7a. Please explain why not?

Response The table provided in the response for question #7b provided the percentage contributions for each modeled penetration to the total sum of the containment isolation failure frequency. This was done by summing the fault tree cutsets containing those basic events associated with each modeled penetration over the sum of all cutsets for all modeled penetrations. This table was not intended to reflect the contribution of a particular penetration to a release category (i.e., LERF/SERF) but was only intended to reflect the contribution of each penetration to containment isolation failure frequencies.

Based on the conference call on 1/3/96 additional information relative to penetration contributions to containment isolation failure frequencies is provided as follows:

The question proposed from the phone conference on 1/3/96 was "What are the values for the percentage contributions to the response for question #7b? How do these values relate to the containment isolation failure frequency?"

Table 2 below presents the probabilistic importance value for each of the modeled containment penetrations in the PSA. As stated in the response for question #7a, the containment failures are modeled in the PSA as Top Events CI (<3") and CP (>3"), which are defined as failure to close at least one valve in each modeled penetration. The values presented in Table 2 below do not directly correlate to the percentages presented in the response to question #7b of the November 22nd supplemental response. Question #7b of the November 22nd supplemental response requested "a list of the penetrations with greatest contribution to containment isolation failure frequency and their respective contributions." To further enhance the respond to question #7b of the November 22nd supplemental response, two approaches have been used to correlate penetration contributions to those plant damage states where containment isolation has failed. The approach reflected in the November 22nd supplemental response was to provide a weighted average contribution of each PSA-modeled penetration to the total containment isolation failure frequency. This was done by multiplying the fractional importance of split fractions associated with containment isolation failure times their respective fault tree cutset values. The second approach differs from the first approach in that the second approach calculates the probabilistic importance of a penetration by multiplying fractional importance of split fractions associated with containment isolation failures and their respective cutset importance. Again, it should be noted that these values are based on a Level 1 analysis and do not progress through the Containment Event Tree. Therefore, the values are not intended to be compared to radiological release frequencies (i.e., LERF, SERF).

The probabilistic importance values in Table 2 reflect the importance of the modeled penetrations to those plant damage states where containment isolation failure has independently occurred.

Table 2: Penetration Importance

Penetration	Probabilistic Importance
Containment Normal Sump Drain Line (Top Event CI)	1.42E-5
Supplementary Containment Purge Supply and Exhaust (Top Event CP)	7.09E-3
Letdown and Seal Return Lines (Top Event CI)	3.53E-5
Radiation Monitoring (Top Event CI)	3.81E-5
RCDT to LWPS Hold Tank (Top Event CI)	2.42E-5
RCS Pressuriser Relief Tank Vent (Top Event CI)	2.24E-5
Reactor Coolant Drain Tank Vent (Top Event CI)	1.27E-5
Pre-existing Small Leak (Top Event CI)	1.74E-3

As can be seen from the table, the supplementary containment purge supply and exhaust line represents the only contribution for Top Event CP. Failure of Top Event CP represents a special case were the failure mode occurs during a required purging of the containment; otherwise, the valves are in their fail safe position (i.e., closed). The dominate contributor for the supplementary purge line is the fraction of time the purge valve is modeled to be open. This is very conservatively modeled in the STP PSA as 2.3E-1. The assumption behind this value is based on an October 1988 letter that utilized some early plant specific operating history.

More recent data indicates that Unit 1 purges the containment on a regular basis every 3 days for 25 - 30 minutes (i.e., 5 to 7 hours per month). If the average is assumed to be 6 hours per month, the yearly total would be 72 hours or 3 days which translates into a fraction of time of 8.2E-3 (i.e., 3/365). Note, Unit 2 does not purge as often as Unit 1. The purges are required in order to satisfy Technical Specifications.

From this analysis it is shown that the current PSA model is very conservative with respect to containment purges. This conservatism impacts the Large Early Release Frequency (LERF). It is STP's intention to update the fraction of time the supplementary valve is open during the next plant specific data update.

The containment isolation failure frequency represented by Top Event CI includes all the other penetrations and the small pre-existing leak term. The probabilistic importance of the pre-existing small leak term was obtained by multiplying the fractional importance of all the split fractions that contain the pre-existing small leak term times the probability of having a pre-existing small leak. As can be seen in Table 2, it is more probable to have a small pre-existing leak than an independent failure of any penetrations modeled in Top Event CI.

The following analysis is presented in order to relate the probabilistic importance of the individual penetrations to the their respective containment isolation failure frequencies. Note, the containment isolation failure frequency (i.e., Top Event frequency) is obtained by multiplying the group frequency by the total importance of the containment isolation failure. The group frequency is obtained from the sequence database and is the sum of all the sequence frequencies mapped to core damage. The total importance is the sum of the probabilistic importance and the guaranteed failure importance. The probabilistic importance is the independent occurrence of a containment isolation failure and is obtained by summing the penetration importance values presented in Table 2. The guaranteed failure importance is based upon a containment isolation failure due to a support system. (e.g., no signal to isolate the valve) and is obtained from the sequence database. The calculated Containment Isolation Failure Frequencies are presented in the sixth column of Table 3. The values in the last column represent the containment isolation failure frequency obtained from the STP PSA model. Table 3 represents the mathematical process for calculating the Containment Isolation Failure Frequency from the penetration probabilistic importance value.

Table 3: Values for comparing Penetration Contributions to the Containment Isolation Failure Frequency

Top Event	Probabilistic Importance (A)	Guaranteed Importance (B)	Probabilistic plus Guaranteed (A + B)	Group Frequency (C)	Calculated Containment Isolation Failure Frequency (A+B)*C	Containment Isolation Failure Frequency
CI	1.89E-3	0.33	0.33	1.82E-5	6.04E-6	6.12E-6
CP	7.09E-3	0.0	7.09E-3	1.82E-5	1.29E-7	1.27E-7

The differences in the last two columns of Table 3 between the calculated values and the Containment Isolation Failure Frequencies obtained from the STP PSA is attributed to the simplicity used in calculating the probabilistic importance for the individual penetrations.

As a final note, the group frequency is a subset of the Core Damage Frequency (CDF). The group frequency represents the portion of the total frequency (i.e., CDF) saved to the sequence database. This is referred to as the 'accounted for' frequency. The other portion of the CDF is the 'unaccounted for' frequency that represents the portion of the CDF truncated from the sequence database. Therefore by definition, the CDF is equal to the sum of the 'accounted for' and 'unaccounted for' sequence frequencies mapped to core damage.