CP&L
A Progress Energy Company

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SERIAL: BSEP 02-0010
TSC-2001-06

U. S. Nuclear Regulatory Commission
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BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING REQUEST FOR LICENSE AMENDMENTS - FREQUENCY OF PERFORMANCE-BASED LEAKAGE RATE TESTING
(NRC TAC NOS. MB3470 AND MB3471)

Ladies and Gentlemen:

On November 26, 2001 (Serial: BSEP 01-0070), Carolina Power & Light (CP&L) Company submitted a license amendment application for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed license amendments revise Technical Specification 5.5.12, "Primary Containment Leakage Rate Testing Program," to incorporate a one-time exception to the 10-year frequency for performance-based Type A leakage rate tests. During a telephone conference call conducted with the NRC on December 20, 2001, the NRC provided a verbal request for additional information (RAI) regarding this license amendment application. The response to this RAI is enclosed.

Please refer any questions regarding this submittal to Mr. Leonard R. Beller, Manager - Regulatory Affairs, at (910) 457-2073.

Sincerely,

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Enclosure: Response to Request for Additional Information (RAI)

John S. Keenan, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, and agents of Carolina Power & Light Company.

M. A. Turnbull
Notary (Seal)

My commission expires: May 18, 2003

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Response to Request for Additional Information (RAI)

On November 26, 2001 (Serial: BSEP 01-0070), Carolina Power & Light (CP&L) Company submitted a license amendment application for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed license amendment revises Technical Specification 5.5.12, "Primary Containment Leakage Rate Testing Program," to incorporate a one-time exception to the 10-year frequency for performance-based Type A leakage rate tests. During a telephone conference call conducted with the NRC on December 20, 2001, the NRC provided a verbal RAI regarding this license amendment application. The responses to this RAI follow.

NRC Question 1

Provide the Large Early Release Frequency (LERF) contribution to Electric Power Research Institute (EPRI) class 7 and class 6 to demonstrate that the total LERF can reasonably be shown to remain below 1E-5.

CP&L Response

The NRC review for the BSEP integrated leak rate test (ILRT) extension submittal indicates that the increase in LERF of 1.54E-7, provided in Table 9 of Reference 1, for the ILRT 3-to-15 year interval, exceeds the guidelines specified in Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," for a very small change in LERF of less than 1E-7 per reactor year, and additional information is requested to reasonably show that total LERF remains below 1E-5 per year.

The total LERF for internal events plus the ILRT extension has been estimated using the available probabilistic risk assessment (PRA) data for high/early release frequencies (i.e., Table 8 of Reference 1 and Table 6-1 of Reference 2, Attachment 1) supporting the BSEP ILRT extension. The results are summarized in Table 1 below for the applicable ILRT LERF classes and frequency data. These results confirm the total LERF in this case is 5.96E-6 per reactor year, which is significantly below the guideline value of 1E-5 per reactor year. Therefore, the LERF results for internal events plus the ILRT extension addressed in the November 26, 2001, submittal continue to support the conclusion that the ILRT extension represents a reasonably small contribution to overall risk.

Table 1

Class	Description	Frequency (Per Year)
2	Large Containment Isolation Failures	8.69E-9
3b	Large Isolation Failures (Liner Breach)	1.18E-6
6	Containment Isolation Failures (High/Early)	1.04E-7
7	Severe Accident Phenomena Induced Failure (High/Early)	4.32E-6
8	Containment Bypass	3.49E-7
Total LERF		**5.96E-6**

NRC Question 2

Provide an evaluation/disposition of "external" events contribution to LERF (i.e., seismic, fire, wind, etc.); this may be a qualitative evaluation due to a lack of detailed external events PRA.

CP&L Response

The question regarding impact of the "external" events contribution on total LERF cannot be readily addressed through a quantitative solution since these events, as addressed in the Individual Plant Examination for External Events (IPEEE) (i.e., Reference 3), are not based exclusively on a systems analysis approach as has been used in the submitted ILRT analysis of core damage frequency (CDF) and LERF impact for internal events plus the ILRT extension. Thus, these results cannot be readily combined or manipulated to obtain a consistent assessment of CDF and LERF impact due to "external" events.

Even though a full PRA is unavailable for external events, the impact on total LERF has been conservatively estimated using the available information. The results, as summarized in Table 2, estimate the total LERF to be about 1.03E-5/year.

In the tabulated summary, the base CDF of 4.95E-5 per year is taken from Reference 1. The base LERF of 5.96E-5 per year, determined in the response to NRC Question 1, is the total LERF for the internal events plus the ILRT extension. The base LERF includes the increase in LERF due to the 3-to-15 year ILRT contribution. The total external events CDF of 3.8E-5 per

year is based on the combination of the CDF results for fire-initiated events, 3.4E-5 per year, and for other external events, 4E-6 per year. In order to obtain the LERF contribution for external events, the conditional probability of a large early release, given the external events CDF, is estimated. For this purpose, the contribution of the containment bypass scenarios has been excluded from the base CDF and LERF, since neither fire nor weather-related events lead directly to a containment bypass. To obtain the conditional probability, the ratio of LERF to CDF is used, as follows:

$$\frac{5.61E-6}{4.92E-5} = 0.114$$

The resulting LERF contribution is thus estimated to be 4.37E-6 per year.

Therefore, the total LERF obtained by conservatively summing the base LERF and the external event LERF contribution is 1.03E-5 per year. Table 2 below summarizes the results.

Table 2

Description	Frequency (Per Year)
Base CDF	4.95E-5
Base LERF (includes 3-to-15 year ILRT increase in LERF)	5.96E-6
Containment Bypass Contribution	3.49E-7
Base CDF (no bypass)	4.92E-5
Base LERF (no bypass)	5.61E-6
LERF/CDF (no bypass)	0.114
External Events CDF	3.80E-5
External Events LERF	4.37E-6
Total LERF (considering external events)	**1.03E-5**

These results confirm that the total LERF, inclusive of the estimated external events impact, is only slightly above the guideline value of 1E-5 per reactor year. Given the conservatism in the external events assessment, this calculation has reasonably shown that the total LERF results are

expected to be below 1E-5 per year guideline value in Regulatory Guide 1.174 and, therefore, continue to support the conclusion that the ILRT extension represents an acceptable increase in the overall risk.

Analysis Conservatisms

The following summarizes the external events analysis from the BSEP IPEEE and identifies significant conservatisms that exist in this analysis.

The results available for external events from the BSEP IPEEE encompass three major areas of evaluation: (1) seismic events, (2) fire-initiated events, and (3) other external events, including wind and external flooding. The methods that have been developed to analyze the impact of external initiating events are essentially qualitative and quantitative screening analyses, designed to either identify the most significant risk contributors, while minimizing the need for detailed analyses, or to identify specific weaknesses without explicitly estimating risk.

Seismic Events

The method chosen to analyze the impact of seismic events is the Seismic Margin method that is typical of the latter type of analyses indicated above. There is no estimation of CDF. Instead, the analysis is an assessment of whether the plant has sufficient margin over and above what is known as the Review Level Earthquake (RLE).

Fire Events

The fire analysis results in the evaluation of CDFs for a set of fire initiated scenarios. However, the CDF is not evaluated in the same way internal initiating events are normally evaluated. In the fire analysis, the event sequences are not grouped by functional type, but by fire location, because these are the vulnerable locations of interest. The fire analysis is based on a successive screening approach, at each stage of which fire scenarios are screened from further consideration on the basis that a conservative analysis shows the CDF is less than 1E-6 per year. For scenarios that are screened, the analysis is not further refined, the degree of conservatism is not estimated, and therefore it is inaccurate to sum the screening CDFs to obtain the overall CDF. Rather, the analysis is used to identify the scenarios that have the highest likelihood of leading to core damage.

The fire analysis is based on a combination of the EPRI Fire Induced Vulnerability Evaluation (FIVE) and the traditional fire PRA. FIVE is a screening technique based on conservative assumptions using industrial and plant-specific databases for evaluating fire event sequences. The fire analysis addresses transient and transient-induced loss-of-coolant accident (LOCA) type sequences, but does not address interfacing system LOCA events. Some notable conservatisms in the current fire analysis include:

a. Screening and bounding calculations are used as a substitute for a more detailed PRA analysis.

b. CDF is estimated based on limiting fire-initiating scenarios that have been identified using a systematic screening approach.

c. The initial screening assumes the loss of functions located in a fire area/zone that may be damaged by fire.

d. A screening value of 0.1 is assumed for human failure to provide shutdown outside the control room when required.

e. For combustible types and fire locations where large-scale damage to cables is not possible or COMPBRN results predict no fire propagation from target to target, a propagation probability of 0.1 is assumed.

f. No credit is assumed for manual fire suppression in calculating CDF.

g. Self-extinguishment is not postulated except for rooms where generic COMPBRN has been applied.

h. For enclosed cabinet fires, all critical functions supported by a cabinet or combination of connected cabinets are failed.

The available analysis of fire scenarios indicates that the total CDF due to fires is 3.4E-5 per year. The predominant contributors to this result are control room fires, with a combined frequency of about 1.93E-5 per year.

Other External Events

The analysis of other external events, including wind and external flooding, is also available in Reference 3. These events are evaluated using a screening methodology for which unscreened external events were quantitatively analyzed. The other external events contribute a CDF of about 4E-6 per year.

References

1. Report RSC 01-24, "Evaluation of Risk Significance of ILRT Extension," Revision 0, November 2001.

2. Brunswick Calculation BNP-PSA-055, "Brunswick Level 2 PRA Input to ILRT Evaluation," Revision 0, November 2001.

3. "Brunswick Nuclear Plant Individual Plant Examination for External Events Submittal," June 1995.