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10 CFR 50.55a(a)(3)(i)

SERIAL: BSEP 01-0093

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

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 – THIRD 10-YEAR
INSERVICE INSPECTION PROGRAM – REQUEST FOR APPROVAL OF RISK-
INFORMED INSERVICE INSPECTION PROGRAM
(NRC TAC NOS. MB1760 AND MB1761)

Ladies and Gentlemen:

In a letter dated April 20, 2001 (Serial: BSEP 01-0013), Carolina Power & Light (CP&L) Company requested approval of an alternative to the requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The alternative is needed to implement a Risk-Informed Inservice Inspection (RI-ISI) Program for Class 1 Code Category B-J and B-F piping welds at BSEP, Units 1 and 2. Enclosed is additional information requested by the NRC in support of the BSEP RI-ISI Program review.

Please refer any questions regarding this submittal to Mr. Leonard R. Beller, Supervisor - Licensing/Regulatory Programs, at (910) 457-2073.

Sincerely,

David C. DiCello
Manager - Regulatory Affairs
Brunswick Steam Electric Plant

WRM/wrm

Enclosure: Additional Information Regarding Brunswick Risk-Informed Inservice
Inspection Program

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ENCLOSURE

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
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Additional Information Regarding Brunswick
Risk-Informed Inservice Inspection Program

NRC Request Number 1

Will the licensee submit upgrades and changes to their risk-informed inservice inspection (RI-ISI) plan to NRC for review and approval during the current inspection interval and in future intervals?

CP&L Response

The RI-ISI Program is an alternative to the requirements of the American Society of Mechanical Engineers (ASME), Section XI requirements for Class 1 Code Category B-J and B-F piping welds. This alternative is being implemented through the use of a relief request in accordance with 10 CFR 50.55a(a)(3)(i). In order to implement a RI-ISI Program during a subsequent 10-year inservice inspection interval, a relief request will be submitted concurrent with the update to the latest edition and addenda of the ASME Code, Section XI, in accordance with 10 CFR 50.55a(g)(4)(ii).

It is not Carolina Power & Light (CP&L) Company's intention to resubmit the RI-ISI Program to the NRC before the end of the current 10-year inservice inspection interval. The RI-ISI Program will be maintained as a living program and updated consistent with Electric Power Research Institute (EPRI) Topical Report TR-112657, "Revised Risk-Informed Inservice Inspection Evaluation Procedure." Changes that could impact the RI-ISI Program include major changes to the Probabilistic Safety Assessment (PSA) for the Brunswick Steam Electric Plant (BSEP) or changes to weld selection. PSA updates will be reviewed for application to the RI-ISI Program. If this review determines that a change to the RI-ISI Program is required, the change would be performed consistent with the EPRI methodology. Likewise, a change to the welds selected would cause a revision to the RI-ISI Program consistent with the EPRI methodology. These changes to the RI-ISI Program would not be resubmitted to the NRC.

Requirements for RI-ISI Program maintenance are being developed by EPRI. The EPRI "Living Program Criteria" document is expected to be published by the end of 2001. Once these guidelines are available, CP&L will review them and implement applicable criteria for BSEP.

NRC Request Number 2

Section 1.2 indicates that the large early release frequency (LERF) value is assumed to be about 12% of the core damage frequency (CDF) based on the IPE results and also indicates that the Level 2 model is in the process of being updated.

- a. How were the LERF impact values calculated in Tables 3.6-1 and 3.6-2? Were the values derived based on the IPE Level 2 model or a more recent version or by some other means? Please describe the method used in calculating the LERF impact values in Tables 3.6-1 and 3.6-2.
- b. Please describe the impact of the plant modifications or operational changes that have occurred since the development of the Level 2 model used in support of this risk-informed licensing action that might impact the Level 2 analyses.
- c. The Individual Plant Evaluation (IPE) Safety Evaluation Report indicates that about 12.4% of the CDF was related to early releases, but also indicates that another 1.1% was related to early containment venting and less than 1% was attributed to containment bypass. Do the cited LERF impact values in Tables 3.6-1 and 3.6-2 include the contribution from early containment venting and containment bypass scenarios? If not, please provide the LERF impact values including these contributions or explain why these early release contributors are not considered large early releases.

CP&L Response

Part 2a

The Conditional Large Early Release Probability (CLERP) values used in Tables 3.6-1 and 3.6-2 are as follows:

- "HIGH" consequence category (Risk Categories 1, 2, and 4): The highest calculated CLERP value of $3E-3$ was used in the risk evaluation. This value represents isolable medium loss-of-coolant accidents (LOCAs) in the Reactor Building and corresponds to the failure probability of a motor-operated valve (MOV) to close on demand (i.e., $3E-3$). These LOCA events in the Reactor Building were conservatively assumed to lead to core damage and a containment bypass. This value did not change in the IPE update.
- "MEDIUM" consequence category (Risk Categories 3, 5, and 6): The highest CLERP value in the "medium" category of $1E-5$ was conservatively used in the risk evaluation. This value is independent of the PSA/IPE results.
- "LOW" consequence category (Risk Category 7): The highest CLERP value in the "low" category of $1E-7$ was conservatively used in the risk evaluation. This value is independent of the PSA/IPE results.

The above CLERP values are combined with the pipe failure frequency values to produce the large early release frequency (LERF) values, given in the risk impact tables.

Part 2b

A new Level 2 PSA model is currently being finalized. This new model is not an update of the Level 2 PSA submitted for the IPE that is used in the development of the RI-ISI Program, but represents a completely new model which incorporates modifications and operational changes since the IPE. Using the data from this preliminary Level 2 PSA model, a review determined that no pipe segments would change in risk rankings. This result is consistent with the robustness of the EPRI model and the relatively broad ranges of the consequence categories. Upon review and approval of the new Level 2 PSA model by CP&L, these preliminary conclusions will be confirmed.

Part 2c

The containment venting and containment bypass contributions have no impact on the LERF impact calculations due to the following:

- The criterion for increasing the consequence category based on conditional core damage probability (CCDP) value, is a conditional LERF value higher than 0.1, which is an order of magnitude higher.
- The 12.4 percent CDF value was used in the consequence evaluation (i.e., except for transient initiators, where anticipated transient without scram (ATWS) mitigation is affected). The IPE Level 2 key Plant Damage States were evaluated and the highest contribution to early containment failure was identified (i.e., 0.1246). It was conservatively assumed that this value also corresponds to a large release.
- The 0.5 conditional LERF value was used for the transient initiators where ATWS mitigation was affected.
- The consequence evaluation explicitly considered containment bypass scenarios and sets LERF equal to CDF for these scenarios.

The above conservatism, along with the fact that the Brunswick Mark I containment is somewhat unique (i.e., the drywell is a reinforced concrete design) provides confidence that the LERF values used in the analysis are reasonable or conservative even though the Level 2 portion of the PSA had not been updated.

Also, based on Response 2a above, given that the highest conditional LERF value used in Tables 3.6-1 and 3.6-2 is equal to 1 (i.e., a containment bypass), any future Level 2 updates are not likely to have an impact on the delta risk evaluation.

NRC Request Number 3

Footnote 3 of Tables 3.6-1 and 3.6-2 states that risk category 4 (2) inspection locations selected for examination by both the Intergranular Stress Corrosion Cracking (IGSCC) Program and the RI-ISI Program should be included in both counts, but only those locations that were previously credited in the Section XI Program and are now being credited in the RI-ISI Program. The staff is not completely certain regarding the intent and application of this statement. Please clarify the intent of this statement and provide a couple of examples (e.g., an element that was selected for the IGSCC Program and the RI-ISI Program that was previously credited in the Section XI Program and one that was not previously credited in the Section XI Program) to demonstrate how it affects the inspection counts and the risk impact entries.

CP&L Response

This submittal provides new Tables 4.2-1 and 4.2-2 for BSEP, Unit 1 and 2, respectively, which address each case where risk category 4 (2) inspection locations exist. Footnote 1 of Tables 4.2-1 and 4.2-2 are intended to clarify the intent of Note 3 of template Tables 3.6-1 and 3.6-2. By addressing each case, it has been demonstrated how the application of Note 3 of template Tables 3.6-1 and 3.6-2 affects the inspection counts and risk impact entries.

NRC Request Number 4

Section 3.3 of EPRI TR-112657 Revision B-A requires the consideration of external events (e.g., seismic events) and operation modes outside the scope of the PRA (e.g., shutdown) in the categorization of segments. Were external events and operation modes outside the scope of the PRA systematically considered? Please describe how these areas were considered in the categorization process.

CP&L Response

Both external events and shutdown events were considered in the consequence evaluation.

The external events were determined to not affect the consequence evaluation due to the following:

- For Class 1 piping, most of the postulated pipe breaks already lead to an initiating event.
- Given that the initiating event frequency of external events is low in comparison with the internal events, it is unlikely that external events will present a significant demand configuration for Class 1 piping.
- The likelihood of seismic-induced pressure boundary failures is not expected to depend on the inservice inspection program.

For shutdown events, a qualitative evaluation was conducted, consistent with the EPRI topical report and the pilot applications. The Residual Heat Removal (RHR) system, in standby during power operation, was further evaluated to estimate possible shutdown operation impacts on the consequence rank. The following summarizes the review of the RHR pipe segments and their consequence rank based on the "at-power" operation:

- The RHR suction line upstream of the first isolation valve is already ranked as "High" due to a large or medium LOCA. No further evaluation is necessary.
- The RHR suction line inside the drywell between the first and second isolation valve is ranked as "Low" because a passive failure of a normally closed MOV is necessary in order to have a LOCA. This piping was evaluated further for shutdown operation and the low consequence was judged to be reasonable. The inside isolation valve automatically isolates on low reactor pressure vessel level and, even for the isolation failure case (i.e., LOCA inside the drywell), there are redundant makeup capabilities per plant outage risk management and procedures that assure loss of heat removal or a LOCA will be detected and mitigated.
- The RHR suction line outside the drywell is already a "High" consequence due to the importance of a LOCA in the Reactor Building. No further evaluation is necessary.

Table 4.2-1 – Brunswick Unit 1 Summary

System	Category	Section XI Program Inspection Locations	RI-ISI Program Inspection Locations ⁽¹⁾		Discussion
			From Table 3.6-1	From Table 5-2-1	
RPV	4 (2)	2	1	1	Per Note 5 of Table 3.6-1, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was previously credited in the Section XI Program." As such, this single selected inspection location was included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
RCR	4 (2)	21	2	7	Per Note 6 of Table 3.6-1, "two of the seven Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection locations selected for examination were previously credited in the Section XI Program." As such, only these two of the seven selected inspection locations were included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
RWCU	4 (2)	0	0	1	Per Note 8 of Table 3.6-1, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was not previously credited in the Section XI Program." As such, this single selected inspection location was not included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
RHR	4 (2)	3	0	1	Per Note 9 of Table 3.6-1, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was not previously credited in the Section XI Program." As such, this single selected inspection location was not included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
FW	4 (2)	2	1	1	Per Note 11 of Table 3.6-1, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was previously credited in the Section XI Program." As such, this single selected inspection location was included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
JPI	4 (2)	0	0	1	Per Note 12 of Table 3.6-1, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was not previously credited in the Section XI Program." As such, this single selected inspection location was not included in the counts for the Section XI and RI-ISI Programs to assess risk impact.

Note

- The Risk Category 4 (2) RI-ISI Program inspection locations listed in Table 3.6-1 only account for those IGSCC Program locations that were previously credited in the Section XI Program and are now being credited in the RI-ISI Program. When assessing the change in risk, it would not be appropriate to include IGSCC Program inspection locations credited by the RI-ISI Program that were not previously credited in the Section XI Program, since the inspection of these locations would not represent additional examinations. The Risk Category 4 (2) RI-ISI Program inspection locations listed in Table 5-2-1 includes those IGSCC Program locations that were not previously credited in the Section XI Program where applicable, in addition to those inspection locations that were credited as listed in Table 3.6-1. This was done strictly to provide an overall comparison of the inspection locations selected by the Section XI and RI-ISI Programs.

Table 4.2.2 – Brunswick Unit 2 Summary

System	Category	Section XI Program Inspection Locations	RI-ISI Program Inspection Locations ⁽¹⁾		Discussion
			From Table 3.6-2	From Table 5-2-2	
RPV	4 (2)	2	1	1	Per Note 5 of Table 3.6-2, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was previously credited in the Section XI Program." As such, this single selected inspection location was included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
RCR	4 (2)	16	2	7	Per Note 6 of Table 3.6-2, "two of the seven Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection locations selected for examination were previously credited in the Section XI Program." As such, only these two of the seven selected inspection locations were included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
RWCU	4 (2)	0	0	1	Per Note 7 of Table 3.6-2, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was not previously credited in the Section XI Program." As such, this single selected inspection location was not included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
RHR	4 (2)	4	1	1	Per Note 8 of Table 3.6-2, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was previously credited in the Section XI Program." As such, this single selected inspection location was included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
FW	4 (2)	2	1	1	Per Note 9 of Table 3.6-2, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was previously credited in the Section XI Program." As such, this single selected inspection location was included in the counts for the Section XI and RI-ISI Programs to assess risk impact.
JPI	4 (2)	0	0	1	Per Note 10 of Table 3.6-2, "the Generic Letter 88-01 IGSCC Program and RI-ISI Program inspection location selected for examination was not previously credited in the Section XI Program." As such, this single selected inspection location was not included in the counts for the Section XI and RI-ISI Programs to assess risk impact.

Note

1. The Risk Category 4 (2) RI-ISI Program inspection locations listed in Table 3.6-2 only account for those IGSCC Program locations that were previously credited in the Section XI Program and are now being credited in the RI-ISI Program. When assessing the change in risk, it would not be appropriate to include IGSCC Program inspection locations credited by the RI-ISI Program that were not previously credited in the Section XI Program, since the inspection of these locations would not represent additional examinations. The Risk Category 4 (2) RI-ISI Program inspection locations listed in Table 5-2-2 includes those IGSCC Program locations that were not previously credited in the Section XI Program where applicable, in addition to those inspection locations that were credited as listed in Table 3.6-2. This was done strictly to provide an overall comparison of the inspection locations selected by the Section XI and RI-ISI Programs.