10 CFR 50.90

Progress Energy

Serial: RNP-RA/03-0070

JUN 1 1 2003

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

REQUEST FOR TECHNICAL SPECIFICATIONS CHANGE REGARDING
ONE-TIME EXTENSION OF CONTAINMENT TYPE A TEST INTERVAL

Ladies and Gentlemen:

In accordance with the provisions of the Code of Federal Regulations, Title 10, Part 50.90, Progress Energy Carolinas, Inc., also known as Carolina Power & Light (CP&L) Company, is submitting a request for an amendment to the Technical Specifications (TS) for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. The proposed amendment would modify the TS to allow for a one-time extension of the containment Type A test interval from once in 10 years to once in 15 years.

By a letter dated March 26, 2002, as supplemented by letter dated June 19, 2002, CP&L requested a one-time extension of the containment Type A test interval to a period of 15 years. In a subsequent letter dated August 8, 2002, the requested test interval extension was reduced to a period of 12.1 years based on additional considerations that were required to be included within the plant-specific risk assessment. In a letter dated September 16, 2002, the NRC issued Amendment No. 193 to the HBRSEP, Unit No. 2, Operating Licensing and TS, extending the containment Type A test interval to 12.1 years.

Progress Energy Carolinas, Inc., has re-evaluated the risk basis for the previously approved TS change and has determined that a one-time interval extension of 15 years is justified. The extension of the Type A test from once in 10 years to once in 15 years is consistent with extensions recently granted to other licensees.

Attachment I provides an Affirmation as required by 10 CFR 50.30(b).

Attachment II provides a description of the current condition, a description of the proposed change, a technical justification of the proposed change, a No Significant Hazards Consideration Determination, and an Environmental Impact Consideration.

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville, SC 29550

A017
A047

Attachment III provides a markup of the proposed TS page.

Attachment IV provides a retyped version of the proposed TS page.

Attachment V provides a copy of calculation RNP-F/PSA-0051, "Evaluation of Risk Significance of ILRT Extension," without the calculation attachments.

In accordance with 10 CFR 50.91(b), Progress Energy Carolinas, Inc., is providing the State of South Carolina with a copy of this license amendment request.

Progress Energy Carolinas, Inc., requests approval of this license amendment request by December 12, 2003, with the amendment being implemented within 30 days of approval. The approval date was selected to allow for effective planning for the refueling outage that is currently scheduled for April 2004.

If you have any questions concerning this matter, please contact me.

Sincerely,

C. T. Baucom
Supervisor - Licensing/Regulatory Programs

Attachments:

I. Affirmation
II. Request for Technical Specifications Change Regarding One-Time Extension of Containment Type A Test Interval
III. Markup of Technical Specifications Page
IV. Retyped Technical Specifications Page
V. Calculation RNP-F/PSA-0051, "Evaluation of Risk Significance of ILRT Extension" (Without Calculation Attachments)

RAC/rac

c: Mr. T. P. O'Kelley, Director, Bureau of Radiological Health (SC)
Mr. L. A. Reyes, NRC, Region II
Mr. C. P. Patel, NRC, NRR
NRC Resident Inspector, HBRSEP
Attorney General (SC)

AFFIRMATION

The information contained in letter RNP-RA/03-0070 is true and correct to the best of my information, knowledge, and belief; and the sources of my information are officers, employees, contractors, and agents of Progress Energy Carolinas, Inc., also known as Carolina Power & Light Company. I declare under penalty of perjury that the foregoing is true and correct.

Executed On: 11 June 2003

J. W. Moyer
Vice President, HBRSEP, Unit No. 2

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR TECHNICAL SPECIFICATIONS CHANGE REGARDING ONE-TIME EXTENSION OF CONTAINMENT TYPE A TEST INTERVAL

Description of Current Condition

Containment structure testing is intended to assure the leak-tight integrity of the containment structure under all design basis conditions. Conservative design and construction have led to very few containment Type A tests exceeding the leak test acceptance criteria. The NRC has extended the allowable Type A test period from three times in 10 years to once in 10 years based on past successful tests. NUREG-1493, "Performance-Based Containment Leak-Test Program," which supported that change, also states that test periods of up to 20 years would lead to an imperceptible increase in risk.

The current 10 year interval for performance of the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, Type A test ended on April 9, 2002. By letter dated September 16, 2002, the NRC issued Amendment No. 193 to the HBRSEP, Unit No. 2, Operating License (OL) and Technical Specifications (TS) that authorized an extension of the Type A test interval of 12.1 years based on a plant-specific risk assessment. As a result, a one-cycle deferral was implemented, such that the next Type A test is currently scheduled to be performed during Refueling Outage (RO)-22 in April 2004. This one-cycle deferral is currently reflected by TS 5.5.16, which requires that the next Type A test be performed "no later than May 9, 2004."

In order to take full advantage of the available one-time extension of the Type A test from once in 10 years to once in 15 years, HBRSEP, Unit No. 2, has re-evaluated the risk basis for the previously approved TS change. This re-evaluated risk basis, when combined with the satisfactory results from previous tests and inspections, supports the proposed revision to TS 5.5.16 that would allow the next Type A test to be performed no later than April 9, 2007.

Description of the Proposed Change

The current HBRSEP, Unit No. 2, TS 5.5.16 requires that the next Type A test be performed "no later than May 9, 2004." The proposed change would revise TS 5.5.16 to allow the next Type A test for HBRSEP, Unit No. 2, to be performed "no later than April 9, 2007." This proposed change is intended to take full advantage of the available one-time extension of the Type A test from once in 10 years to once in 15 years. As described within the Technical Justification below, the bases for the proposed change are the satisfactory results from previous tests and inspections, combined with the re-evaluation of the risk basis for the previously approved TS change.

Technical Justification

Summary of Test and Inspection Programs

Satisfactory results from previous Type A tests at HBRSEP, Unit No. 2, as well as continued satisfactory results from local leak rate tests and containment inspections, support the proposed one-time extension of the containment Type A test interval. The HBRSEP, Unit No. 2, reactor containment vessel (CV) will continue to be inspected under the requirements of the HBRSEP, Unit No. 2, programs for Subsections IWE and IWL of the American Society of Mechanical Engineers (ASME) Code, Section XI. The existing Type B and C containment penetration testing program will continue to be performed in accordance with previous regulatory approvals.

Previous Type A Test Results

As shown within Table 1 below, HBRSEP, Unit No. 2, has performed six operational Type A tests, with each test passing the as-found acceptance criteria. The design basis containment leak rate limit (L_a) is 0.1% weight per day.

Table 1
Type A Test Results

Test Date	Test Results [% weight per day]	Results Adjusted to P_a [% weight per day]
May 1974	0.013	0.013
Feb. 1978	0.035*	0.049
Mar. 1982	0.026*	0.037
Nov. 1984	0.011*	0.016
April 1987	0.041*	0.058
April 1992	0.0644	0.0644

* Test performed at ½ P_a and results are as calculated at ½ P_a

Subsection IWE and IWL Program Results

Detailed information regarding the Subsection IWE and IWL programs for containment inspections was provided by the HBRSEP, Unit No. 2, letter dated March 26, 2002 (Serial: RNP-RA/02-0028). Certain portions of that information are repeated herein for clarity and completeness.

The HBRSEP, Unit No. 2, Subsection IWE and IWL programs are fully implemented, and expedited examinations for the first period of the program interval have been completed. Visual examinations of 100% of the accessible surfaces of the CV liner were conducted between 1998 and 2001 in accordance with the 1992 Edition (with 1992 Addenda) of the ASME Code for Subsections IWE and IWL. Those examinations are summarized within Table 2 below:

Table 2
Subsection IWE and IWL Program Examinations

Examination Date	Examination Summary
1998 (RO-18)	Examination of portions of the CV liner behind the insulation.
1999 (RO-19)	Examination of portions of the CV liner behind the insulation, electrical penetrations, the personnel airlock, and portions of the reinforced concrete exterior.
2001 (RO-20)	Examination of portions of the CV liner behind the insulation, the dome interior, mechanical penetrations, equipment hatch, and the remaining portions of the reinforced concrete exterior, including the dome exterior.

Examinations consisted of a general visual examination of accessible areas of the CV liner (pressure boundary) and the reinforced concrete exterior (structural integrity). Although the CV liner between the floor and the CV dome is insulated and not typically accessible, numerous sections of insulation were removed over the last four refueling outages to allow VT-3 examinations of portions of the CV liner. HBRSEP, Unit No. 2, Relief Request IWE/IWL-01 was obtained to allow inspection of a portion of the CV liner.

In accordance with IWE-1240, "Surface Areas Requiring Augmented Examination," an engineering evaluation has been developed to determine areas that might require augmented examinations. No areas exist that are currently categorized as Examination Category E-C for augmented examinations.

For seals, gaskets, and examination of bolting, HBRSEP, Unit No. 2, has been granted relief from certain Code requirements as follows:

- Relief Request IWE/IWL-04 provides relief from examination of the containment seals and gaskets for Class MC and Class CC components. The approved alternative is performance testing of Type B and C penetrations in accordance with Option A of 10 CFR 50, Appendix J. HBRSEP, Unit No. 2, performs these tests each refueling outage to verify the functionality and integrity of the containment seals and gaskets.

- Relief Request IWE/IWL-03 and IWE/IWL-07 provide relief from examination and testing of pressure-retaining bolting:
  - IWE/IWL-03 requires examination of pressure-retaining bolting for conditions that may cause the bolted connection to violate containment leak-tightness or structural integrity. Conditions identified during the visual examinations would be subsequently evaluated.
  - IWE/IWL-07 provides relief from torque or tension testing of bolted connections. As an alternative to this testing, local leak rate testing is conducted in accordance with 10 CFR 50, Appendix J, to confirm leak-tight integrity.

For potential degradation of the uninspectable (embedded) side of the CV liner, HBRSEP, Unit No. 2, has performed limited ultrasonic testing (UT) on CV liner panels. For those CV liner panels that have been visible after removal of insulation and sheathing, the practice has been to take UT measurements on approximately one foot centers for the approximate 3' 8" by 7' 8" panels. Approximately 100 panels have been examined in this manner. These measurements did not indicate degradation of the embedded side of the CV liner.

These Subsection IWE and IWL program examinations, which were completed during RO-20 in May 2001, demonstrated that the structural integrity and leak-tightness of the HBRSEP, Unit No. 2, containment have not been compromised.

An additional inspection of the entire uninsulated CV dome liner was conducted during RO-21 with no indications of through-wall corrosion. This provides continued assurance of the integrity of the CV dome liner.

The above-described surveillances and inspections provide a high degree of assurance that degradation of the containment structure will be detected and corrected before it can produce a containment leak path or impact structural integrity.

Re-Evaluation of Plant-Specific Risk Basis

A plant-specific risk assessment has been performed using guidance provided in WCAP-15691, "Joint Applications Report for Containment Integrated Leak Rate Test Interval Extension," Revisions 2 and 3. Other inputs considered include:

- Nuclear Energy Institute (NEI) 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J"

- Electric Power Research Institute (EPRI) Topical Report TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals"

- NRC Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessments in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and,

- Letters from NEI to NEI Administrative Points of Contact, dated November 13, 2001, and November 30, 2001, providing guidance on one-time extensions of the containment integrated leak rate test (Type A) interval.

Attachment V to this letter provides the HBRSEP, Unit No. 2, calculation RNP-F/PSA-0051, "Evaluation of Risk Significance of ILRT Extension," Revision 3, which evaluated the risk impact associated with the proposed change. Please note that the attachments to the calculation are not included, since the first three attachments are administrative forms, and Attachment 4 is WCAP-15691, which has already been provided to the NRC by the August 15, 2002 letter from the Combustion Engineering Owner's Group.

The plant-specific release category and person-rem information required by the evaluation are based on design basis leakage evaluations and extrapolation of the release category information. These values were developed using a modeling approach that is described in Appendix A of RSC 02-12, which was provided in the HBRSEP, Unit No. 2, letter dated March 26, 2002.

The following conclusions are summarized from the completed risk assessment:

- The one-time change in Type A test frequency from once in 10 years to once in 15 years increases the risk impact on the total integrated plant risk by only 0.04%. The risk increase attributable to a change in test frequency from three times in 10 years to one time in 15 years is 0.09%. Therefore, the risk impact of the proposed change is negligible when compared to other severe accident risks.

- The risk increase in Large Early Release Fraction (LERF) from the one-time extension of the Type A test interval from 10 years to 15 years is 5.49E-9. The increase attributable to a change in test frequency from three times in 10 years to one time in 15 years is 1.28E-8.

The primary difference between the HBRSEP, Unit No. 2, risk analysis performed to support the previous Type A test interval extension to 12.1 years, when compared to the current re-evaluation, is the use of WCAP-15691 to estimate the increase in LERF.

RG 1.174 provides guidance for determining the risk impact of plant-specific changes to the licensing basis. RG 1.174 defines "very small changes" in risk as resulting in increases of Core Damage Frequency (CDF) below 10^{-6} and increases in LERF below 10^{-7}. Since the containment Type A testing does not impact CDF, the relevant criterion is LERF. The increase in LERF associated with the one-time extension of the containment Type A test interval from three times in 10 years to once in 15 years is 1.28E-8. Based on the guidance of RG 1.174, this change in LERF constitutes a "very small change" in risk.

No Significant Hazards Consideration Determination

Progress Energy Carolinas, Inc., also known as Carolina Power & Light (CP&L) Company, is proposing a change to the Appendix A, Technical Specifications (TS), of Facility Operating License No. DPR-23, for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. This change will revise the requirements of TS 5.5.16, "Containment Leakage Rate Testing Program," to incorporate a one-time extension to the 10 year interval for the performance-based leakage rate testing program for Type A tests specified by Nuclear Energy Institute (NEI) 94-01, "Industry Guideline For Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," Revision 0, July 26, 1995, and endorsed by 10 CFR Part 50, Appendix J, Option B. The proposed change will allow the Type A test to be performed within 15 years of the most recent Type A test that was performed in April 1992. The proposed change will require performance of the next HBRSEP, Unit No. 2, Type A test no later than April 9, 2007.

An evaluation of the proposed change has been performed in accordance with 10 CFR 50.91(a)(1) regarding no significant hazards considerations using the standards in 10 CFR 50.92(c). A discussion of these standards as they relate to this amendment request follows:

1. The Proposed Change Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

   The proposed change to TS 5.5.16 provides a one-time extension of the containment Type A test interval to 15 years for HBRSEP, Unit No. 2. The existing 10 year test interval is based on past test performance. The proposed TS change does not involve a physical change to the plant or a change in the manner in which the plant is operated or controlled. The containment vessel is designed to provide a leak-tight barrier against the uncontrolled release of radioactivity to the environment in the unlikely event of postulated accidents. As such, the containment vessel is not considered as the initiator of an accident. Therefore, the proposed TS change does not involve a significant increase in the probability of an accident previously evaluated.

   The proposed change involves only a one-time change to the interval between containment Type A tests. Type B and C leakage testing will continue to be performed at the intervals specified in 10 CFR Part 50, Appendix J, Option A, as required by the HBRSEP, Unit No. 2, TS. As documented in NUREG-1493, "Performance-Based Containment Leakage-Test Program," industry experience has shown that Type B and C containment leak rate tests have identified a very large percentage of containment leak paths, and that the percentage of containment leak paths that are detected only by Type A testing is very small. In fact, an analysis of 144 integrated leak rate tests, including 23 failures, found that none of the failures involved a containment liner breach. NUREG-1493 also concluded, in part, that reducing the frequency of containment Type A testing to once per 20 years results in an imperceptible increase in risk. The HBRSEP, Unit No. 2, test history and risk-based evaluation of the proposed extension to the Type A test interval supports this conclusion. The design and construction requirements of the containment vessel, combined with the

containment inspections performed in accordance with the American Society of Mechanical Engineers (ASME) Code, Section XI, and the Maintenance Rule (10 CFR 50.65) provide a high degree of assurance that the containment vessel will not degrade in a manner that is detectable only by Type A testing. Therefore, the proposed TS change does not involve a significant increase in the consequences of an accident previously evaluated.

Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. The Proposed Change Does Not Create the Possibility of a New or Different Kind of Accident From Any Previously Evaluated.

The proposed change to TS 5.5.16 provides a one-time extension of the containment Type A test interval to 15 years for HBRSEP, Unit No. 2. The existing 10 year test interval is based on past test performance. The proposed change to the Type A test interval does not result in any physical changes to HBRSEP, Unit No. 2. In addition, the proposed test interval extension does not change the operation of HBRSEP, Unit No. 2, such that a failure mode involving the possibility of a new or different kind of accident from any accident previously evaluated is created.

Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The Proposed Change Does Not Involve a Significant Reduction in the Margin of Safety.

The proposed change to TS 5.5.16 provides a one-time extension of the containment Type A test interval to 15 years for HBRSEP, Unit No. 2. The existing 10 year test interval is based on past test performance. The NUREG-1493 study of the effects of extending containment leak rate testing found that a 20 year extension for Type A testing resulted in an imperceptible increase in risk to the public. NUREG-1493 found that, generically, the design containment leak rate contributes a very small amount to the individual risk, and that the decrease in Type A testing frequency would have a minimal affect on this risk, since most potential leak paths are detected by Type B and C testing.

The proposed change involves only a one-time extension of the interval for containment Type A testing; the overall containment leak rate specified by the HBRSEP, Unit No. 2, TS is being maintained. Type B and C testing will continue to be performed at the frequency required by the HBRSEP, Unit No. 2, TS. The regular containment inspections being performed in accordance with the ASME Code, Section XI, and the Maintenance Rule (10 CFR 50.65) provide a high degree of assurance that the containment will not degrade in a manner that is only detectable by Type A testing. In addition, a plant-specific risk

evaluation has demonstrated that the one-time extension of the Type A test interval from 10 years to 15 years results in a very small increase in risk for those accident sequences influenced by Type A testing.

Therefore, this change does not involve a significant reduction in a margin of safety.

Based on the above discussion, Progress Energy Carolinas, Inc., has determined that the requested change does not involve a significant hazards consideration.

Environmental Impact Consideration

10 CFR 51.22(c)(9) provides criteria for identification of licensing and regulatory actions for categorical exclusion for performing an environmental assessment. A proposed change for an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed change would not (1) involve a significant hazards consideration; (2) result in a significant change in the types or significant increases in the amounts of any effluents that may be released offsite; (3) result in a significant increase in individual or cumulative occupational radiation exposure. Progress Energy Carolinas, Inc., also known as Carolina Power & Light (CP&L) Company, has reviewed this request and determined that the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the amendment. The basis for this determination follows.

Proposed Change

The H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, Technical Specifications 5.5.16, "Containment Leakage Rate Testing Program," is proposed to be revised to incorporate a one-time extension to the containment Type A test interval. The proposed change will allow the Type A test to be performed within 15 years of the most recent Type A test that was performed in April 1992. The proposed change will require performance of the next HBRSEP, Unit No. 2, Type A test no later than April 9, 2007.

Basis

The proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) for the following reasons.

1. As demonstrated in the No Significant Hazards Consideration Determination, the proposed change does not involve a significant hazards consideration.

2. Extension of the allowable date for the next containment Type A test has no negative impact on effluent releases. Therefore, the proposed change does not result in a significant change in the types or significant increases in the amounts of any effluents that may be released offsite.

3. The proposed change does not involve physical plant changes, or introduce any new mode of plant operation. Therefore, the proposed change does not result in a significant increase in individual or cumulative occupational radiation exposures.

United States Nuclear Regulatory Commission
Attachment III to Serial: RNP-RA/03-0070
2 Pages (including cover page)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR TECHNICAL SPECIFICATIONS CHANGE REGARDING ONE-TIME EXTENSION OF CONTAINMENT TYPE A TEST INTERVAL

MARKUP OF TECHNICAL SPECIFICATIONS PAGE

5.5 Programs and Manuals

5.5.16 Containment Leakage Rate Testing Program

This program provides controls for implementation of the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions for Type A testing. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exception:

a. NEI 94-01 - 1995, Section 9.2.3: The first Type A test performed after the April 9, 1992, Type A test shall be performed no later than ~~May 9, 2004~~.

Insert: April 9, 2007

Type B and C testing shall be implemented in the program in accordance with the requirements of 10 CFR 50, Appendix J, Option A.

The peak calculated containment internal pressure for the design basis loss of coolant accident, P_a, is 40.5 psig.

The maximum allowable containment leakage rate, L_a, at P_a, shall be 0.1% of the containment air weight per day.

Leakage rate acceptance criteria are:

a. Containment leakage rate acceptance criteria is $\leq 1.0\ L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.60\ L_a$ for the Type B and Type C tests, and $\leq 0.75\ L_a$ for Type A tests.

The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

(continued)

United States Nuclear Regulatory Commission
Attachment IV to Serial: RNP-RA/03-0070
2 Pages (including cover page)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR TECHNICAL SPECIFICATIONS CHANGE REGARDING ONE-TIME EXTENSION OF CONTAINMENT TYPE A TEST INTERVAL

RETYPED TECHNICAL SPECIFICATIONS PAGE

5.5 Programs and Manuals

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This program provides controls for implementation of the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions for Type A testing. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exception:

a. NEI 94-01 - 1995, Section 9.2.3: The first Type A test performed after the April 9, 1992, Type A test shall be performed no later than April 9, 2007.

Type B and C testing shall be implemented in the program in accordance with the requirements of 10 CFR 50, Appendix J, Option A.

The peak calculated containment internal pressure for the design basis loss of coolant accident, P_a, is 40.5 psig.

The maximum allowable containment leakage rate, L_a, at P_a, shall be 0.1% of the containment air weight per day.

Leakage rate acceptance criteria are:

a. Containment leakage rate acceptance criteria is $\leq 1.0\ L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.60\ L_a$ for the Type B and Type C tests, and $\leq 0.75\ L_a$ for Type A tests.

The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

(continued)

United States Nuclear Regulatory Commission
Attachment V to Serial: RNP-RA/03-0070
16 Pages (including cover page)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

REQUEST FOR TECHNICAL SPECIFICATIONS CHANGE REGARDING ONE-TIME EXTENSION OF CONTAINMENT TYPE A TEST INTERVAL

CALCULATION RNP-F/PSA-0051, "EVALUATION OF RISK SIGNIFICANCE OF ILRT EXTENSION" (WITHOUT CALCULATION ATTACHMENTS)

SYSTEM # 9400
CALC. SUB-TYPE PSA
PRIORITY CODE 4
QUALITY CLASS D

NUCLEAR GENERATION GROUP

RNP-F/PSA-0051
(CALCULATION #)

EVALUATION OF RISK SIGNIFICANCE OF ILRT EXTENSION
(Title including structures, systems, components)

☐ BNP UNIT _____
☐ CR3 ☐ HNP ☒ RNP ☐ NES ☐ ALL

APPROVAL

REV	PREPARED BY	REVIEWED BY	SUPERVIOR
1	Signature S/ Brad Dolan	Signature S/ Bruce A. Morgen	Signature S/Steven A. Laur
	Name Brad Dolan	Name Bruce A. Morgen	Name Steven A. Laur
	Date 07/18/02	Date 07/18/02	Date 07/19/02
2	Signature S/ Brad Dolan	Signature S/Bruce A. Morgen	Signature S/Steven A. Laur
	Name Brad Dolan	Name Bruce A. Morgen	Name Steven A. Laur
	Date 04/02/03	Date 04/02/03	Date 04/02/03
3	Signature Brad Dolan	Signature B A Morgen	Signature Steven A Laur
	Name Brad Dolan	Name Bruce A. Morgen	Name Steven A. Laur
	Date 5/21/03	Date 5-21-03	Date 5/21/03

(For Vendor Calculations)

Vendor_____ Vendor Document No. _____

Owner's Review By_____ Date_____

LIST OF EFFECTIVE PAGES

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Cover	3		
2-15	3		

ATTACHMENTS		
NUMBER	REV	Number of Pages
1	3	1
2	3	1
3	2	1
4	2	185

AMENDMENTS		
LETTER	REV	Number of Pages

REVISION SUMMARY

REV. #	DATE	REVISION SUMMARY (list ECs incorporated)
0	2/15/02	Revision 0 reviews and documents the vendor report RSC 02-12, "Risk Significance of ILRT Extension Based on NEI Guidance" and the summary spreadsheet for MOR99.
1	07/19/02	Vendor report RSC 02-12, documented in Revision 0 of this calculation, considers the risk significance of an ILRT test interval extension of 15 years. This revision evaluates the risk significance of a 12.1 year test interval, using information from the vendor report. It also credits the potential for visual detection of some containment liner flaws.
2	04/02/03	Revision 1 of this calculation considered the risk of a 12.1 year test interval using applicable guidance from NEI letters dated 11/13/01 and 11/30/01. This revision evaluates the risk associated with a one-time extension to 15 years, using an updated methodology documented in WCAP-15691. It also incorporates an assessment of the risk due to potential concealed corrosion.
3	5/21/03	This revision corrects a minor typographical error.

TABLE OF CONTENTS

1.0 PURPOSE

Revision 0 of this calculation reviewed and documented the vendor report RSC 02-12, "Evaluation of Risk Significance of ILRT Extension Based on NEI Guidance". The report evaluated the risk of extending the Type A Integrated Leak Rate Test (ILRT) interval at the Robinson Nuclear Plant beyond the current ten years required by 10 CFR 50, Appendix J. This calculation also documented the RNP Summary Spreadsheet for MOR99.

Revision 0 determined the risk significance of extending the ILRT test interval to 15 years. Revision 1 calculated the risk significance of extending the test interval to 12.1 years, using the information and approach in Revision 0. Revision 1 also evaluated risks associated with potential concealed corrosion of the containment liner.

Revision 2 of this calculation calculates the risk significance of extending the ILRT test interval to 15 years, using plant and model information from previous revisions but employing an updated methodology from WCAP-15691 (Reference 2.11). This calculation also documents the Owner's Review for this methodology. Revision 2 also references and incorporates the previous evaluation of risk due to concealed liner corrosion.

Revision 3 of this calculation corrects a minor typographical.

2.0 LIST OF REFERENCES

2.1 Carolina Power & Light Company, H. B. Robinson Steam Electric Plant Unit No. 2, Individual Plant Examination Submittal, August 1992.
2.2 RNP-F/PSA-0001, "Updated Individual Plant Examination Probabilistic Safety Assessment Model", Revision 1, July 24, 2000.
2.3 RSC Report 02-12, "Risk Significance of ILRT Extension Based on NEI Guidance", Revision 0, February 2002. (Attachment C of revision 1 to this calculation)
2.4 Summary Spreadsheet for RNP MOR99, "RNP SUMMARY MOR 99 r3f.xls".
2.5 Constellation Nuclear, Calvert Cliffs Nuclear Power Plant, Response to Request for Additional Information Concerning the License Amendment Request for a One-Time Integrated Leakage Rate Test Extension, 3/27/02.
2.6 Nuclear Regulatory Commission, Safety Evaluation Related to Amendment No. 252 to Facility Operating License No. DPR.-53, Calvert Cliffs Nuclear Power Plant, 5/1/2002.
2.7 Nuclear Energy Institute, Letter Report, "One-time extensions of containment integrated leak rate test interval," 11/13/2001.
2.8 Nuclear Energy Institute, Letter Report, "One-time extensions of containment integrated leak rate test interval – additional information," 11/30/2001.

2.9 Carolina Power & Light Company, "Evaluation of Risk Significance of ILRT Extension," RNP-F/PSA-0051, R1, July 2002.

2.10 Nuclear Regulatory Commission, Regulatory Guide 1.174, An Approach for Using Probabilistic Risk Assessment in Risk-Informed decisions on Plant-Specific Changes to the Licensing Basis, July 1998.

2.11 Joint Applications Report for Containment Integrated Leak Rate Test Interval Extension, WCAP-15691, Revision 2 (June 2002) and Revision 3, (August 2002) (Attachment 4).

2.12 Nuclear Regulatory Commission, NUREG-1493, Performance-Based Containment Leak-Test Program, 1995.

2.13 Electric Power Research Institute Technical Report TR-104285, Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals, 1994.

2.14 Carolina Power and Light Company, RNP-RA/02-0120, Response to Request for Additional Information on Amendment Request Regarding One-Time Extension of Containment Type A Test Interval (TAC No. MB4658), 2002.

2.15 Carolina Power and Light Company, H. B. Robinson Updated Final Safety Analysis Report, section 6.2.4.3.

3.0 ENGINEERING ANALYSIS SOFTWARE

3.1 Computer Codes Used

None.

3.2 Computers Used

None.

4.0 BODY OF CALCULATION

4.1 Design Inputs

The ILRT extension does not provide plant design basis information nor is the ILRT evaluation used to modify design outputs. Therefore, no design inputs are used.

The inputs to the ILRT evaluation are documented in the attached report. The inputs to the spreadsheet are from the Updated IPE Model, MOR99 (Reference 2.2).

4.2 Assumptions

The updated IPE PSA Model and assumptions are described in the documentation prepared for the IPE submittal (References 2.1), in the design calculation documenting subsequent updates (Reference 2.2) and in the attached report.

Assumptions regarding the likelihood and probability of detection of concealed containment corrosion are adopted from an evaluation performed by Constellation Nuclear Corporation's Calvert Cliffs plant (Reference 2.5) and the Nuclear Regulatory Commission's review of that evaluation (Reference 2.6).

4.3 Calculations

Attachment C to revision 1 of this calculation contains the vendor report evaluating the risk significance of extending the ILRT interval at the Robinson Nuclear Plant. Acceptance of this report is documented by the Owner's Review shown as Attachment B to revision 1. This report is maintained in the NFM&SA Controlled Directory at current location:

P:\Site\HNPApps\Control\DOCUMENT\PSA\@PSA Applications\RNP Apps\ RNP Design Calculations

Attachment D to revision 1 contains the summary spreadsheets for the Robinson Nuclear Plant PSA model based on plant configuration updated through Refueling Outage 19. This model is referred to as MOR99. Acceptance of this spreadsheet is documented by the Owner's Review shown as Attachment B to revision 1.

This spreadsheet is maintained in the NFM&SA Controlled Directory at current location:

P:\Site\HNPApps\Control\DOCUMENT\PSA\#DOCUMNT.MOR\RNP\Section 1-10\Section 6

4.3.1 Discussion

This calculation is provided to evaluate the increase in risk due to an extension of the ILRT test interval for the Robinson Nuclear Plant Unit 2 containment to a total interval of 15 years. Comparisons are made with other possible test intervals of approximately 3 years and 10 years.

A number of investigations such as the one documented in Reference 2.12 have determined that extending the interval between ILRT tests up to a period of 20 years will lead to an imperceptible increase in risk, and can result in

substantial cost savings. Several methods have been proposed to quantify or bound the imperceptible increase in risk. All contain substantial conservatisms. The method adopted herein was developed in WCAP-15691 (Reference 2.11). This method is more realistic than some previous methods because it attempts to predict the likelihood of a substantial containment leakage event using observed data from previous ILRT tests. It demonstrates that, based on measures such as change in Large Early Release Frequency and population dose risk measures such as person-rem/year, the risk associated with ILRT interval extension is very small.

4.3.2 Method

Following the guidance in Reference 2.11, included as Attachment 4 of this calculation, this analysis adopts the EPRI accident class definitions used in Reference 2.13. Attachment 3 of this calculation documents the Owner's Review of Reference 2.11. The frequency of EPRI class 1, intact containment events, is obtained from Attachment C to revision 1 of this calculation. In accordance with the guidance, this frequency is then modified to account for two postulated sizes of pre-existing containment failures which could only be detected by a type A ILRT test. Class 3A represents a small failure, below the threshold which could contribute to LERF and class 3B represents a larger failure which is defined to have a potential to contribute to LERF in event that a core damage accident occurs. The intact containment frequency is reduced by the amount assigned to classes 3A and 3B.

Freq Class 1 = CDF Intact - Freq Class 3A - Freq Class 3B

For the purpose of estimating consequences, leakage for class 1 is assumed to be equal to the containment allowable leakage, L(a). Reference 2.15 indicates that, for Robinson, the maximum allowable containment vessel leakage rate is 0.1% per day of the containment atmosphere.

Reference 2.12 reviewed results from approximately 180 ILRT tests. Five instances were identified where a leak existed which might not otherwise have been identified by a type B or C leak test. The leaks which were identified were relatively small compared to the size required to result in a LERF event. Therefore the probability of finding a small type A leak (Class 3A) in an ILRT test was estimated by Reference 2.11 to be 0.028. This is based on a frequency of 3 tests per 10 year period. The baseline frequency of a 3A leakage event is then calculated by multiplying the class 1 frequency by 0.028.

Reference 2.7 provided the analytical approach used in previous revisions of this calculation. It suggested a very conservative approach for estimating the likelihood of a larger class 3B leak which was assumed to contribute to LERF.

Having observed no large failures in 182 tests, the equivalent of one half a failure was assumed and a class 3B frequency of 0.0027 was calculated. Note that if this method is applied to an event which is rare, an overstatement of the frequency of occurrence will result. For example, no reactor vessel ruptures have been observed in about 2000 reactor years of U.S. commercial nuclear power plant operation but it would be regarded as quite conservative to estimate the frequency of vessel rupture to be 2.5E-4 /year, as the above method would do. Reference 2.11 makes use of additional available information to refine the method of estimating the likelihood of a class 3B leak.

During performance of the ILRTs evaluated in Reference 2.12, 23 leaks of varying sizes were detected. The largest leak was 21 L(a), the next largest was 10 L(a), the third was below 3 L(a), and other leaks were smaller still. Reference 2.11 assumed that a leak would have to result in leakage of at least 100 L(a) to be properly classified as large, and a lognormal distribution was fitted approximately to the observed distribution of leaks to estimate the likelihood of a leak exceeding 100 L(a). Reference 2.11 found that the data showed the probability of exceeding 21 L(a) was < 5% and estimated that the probability of exceeding 100 L(a) was less than 1%. As a result, a lognormal distribution with mean of 1.8098 and error factor of 6 resulted. From this, a probability of 0.006 was estimated that a leak exceeding 100 L(a) might occur. This is the conditional probability of a leak greater than 100 L(a), given that a type A leak occurs. The probability of a 3B leak > 100 L(a) is thus 0.028 * .006 or 1.68E-4, for the baseline of 3 tests in 10 years. This is multiplied by the class 1 frequency to conservatively estimate the LERF contribution from class 3B.

The baseline frequencies for classes 3A and 3B were then used to calculate frequencies for extended intervals of 10 and 15 years, according to the method from Reference 2.11. If a containment flaw exists on average for 20 months during a three-in-ten-year surveillance interval and for 60 months during a once-per-ten-year surveillance interval, then the probabilities of undetected class 3A and 3B leaks for a 10 year surveillance interval are assumed to be increased by 60/20 or 3x in comparison with a three-in-ten-year surveillance interval. Multiplying 0.028 and 1.68E-4 by 3, we obtain 0.084 and 5.04E-4 respectively for classes 3A and 3B. A similar calculation for a 15 year interval results in a 3A probability of 0.126 and a 3B probability of 7.56E-4.

Attachment C to revision 1 of this calculation indicates that the unadjusted class 1 intact containment frequency for Robinson is 2.18E-5/year and the aggregate person-rem associated with a class 1 release is 1.56E+3. The adjusted event class frequencies associated with classes 1, 3A and 3B are provided in Table 1:

Class	Base 3/10 y	10 y	15 y
1-adjusted	2.12E-05	2.00E-05	1.90E-05
3A	6.10E-07	1.83E-06	2.75E-06
3B	3.66E-09	1.10E-08	1.65E-08
Total	2.18E-05	2.18E-05	2.18E-05

Table 1. Mean Event Class Frequencies for Various ILRT Intervals (per year)

Reference 2.11 indicates that class 3A releases are assumed to be 25 L(a) and class 3B releases are assumed to be 100 wt% / day.

The EPRI accident class 2 grouping contains contributions from sequences involving large isolation failures. As discussed in Attachment C to revision 1, the Robinson model does not identify a contribution to this grouping large enough to fall above quantification truncation limits.

EPRI classes 4 and 5 pertain to types B and C leak rate testing and are not relevant to type A ILRT testing. The frequencies associated with these classes are very low and the classes are not considered here.

EPRI class 6 is described as "Other isolation failures, eg. dependent failures," and includes things such as latent maintenance restoration errors. Attachment C to revision 1 indicates the frequency for this class is 9.34E-7 /y. Reference 2.11 indicates that maximum containment leakage for class 6 should be assumed to be 35 wt% / day.

Class 7 is the group containing severe accident induced phenomena, both early and late. The frequency for this group is obtained from Attachment C to revision 1 and is 1.54E-5 /y. Reference 2.11 indicates that an associated containment leakage of 280 wt%/day should be assumed.

Class 8 contains the containment bypass sequences, consisting primarily of contributions from ISLOCA and SGTR. Releases and associated doses must be estimated on a plant specific basis for this class. The frequency for this group is taken from Attachment C to revision 1 and is 4.73E-6 /y and the population dose estimate is 9.33E6 p-r.

A summary of frequencies for each class, both for the baseline case and for the 10-year and 15-year test interval cases, is provided in Table 2:

Class	baseline	10 y interval	15 y interval
1	2.12E-05	2.00E-05	1.90E-05
2	0	0	0
3A	6.10E-07	1.83E-06	2.75E-06
3B	3.66E-09	1.10E-08	1.65E-08
4	0	0	0
5	0	0	0
6	9.34E-07	9.34E-07	9.34E-07
7	1.54E-05	1.54E-05	1.54E-05
8	4.73E-06	4.73E-06	4.73E-06
Total	4.29E-05		

Table 2. Event Class Frequencies (per year)

Attachment C to revision 1 of this calculation determined plant-specific population doses for each class. Reference 2.11 utilizes two of the class dose estimates as inputs and calculates the others. That method is followed here. The class 1 intact containment dose ["REL(int)"] of 1.56E+3 person-rem/y and the class 8 dose of 9.33E+6 p-r/y were taken from Attachment C to revision 1 of this calculation. From this information, the remaining class doses and the expected person-rem/y for the base case were calculated and are presented in Table 3:

Class	Dose Calc	Base Dose p-r	Base Freq /y	Base Risk p-r/y
1	REL(int)	1.56E+3	2.12E-05	3.31E-02
2	(100/La)*REL(int)	0	0	0
3A	25 * REL(int)	3.90E+4	6.10E-07	2.38E-02
3B	(100/La)*REL(int)	1.56E+6	3.66E-09	5.71E-03
4	N/A	0	0	0
5	N/A	0	0	0
6	(35/La)*REL(int)	5.46E+5	9.34E-07	5.10E-01
7	(280/La)*REL(int)	4.37E+6	1.54E-05	6.73E+01
8	Plant specific	9.33E+6	4.73E-06	4.41E+01
Total		1.58E+7		1.12E+02

Table 3. Base Containment Leakage Rates, Doses, and Frequencies

Similar calculations were performed for the 10 year and 15 year cases and are presented in Table 4:

Class	10 y risk	15 y risk
1	3.11E-02	2.97E-02
2	0	0
3A	7.14E-02	1.07E-01
3B	1.71E-02	2.57E-02
4	0	0
5	0	0
6	5.10E-01	5.10E-01
7	6.73E+01	6.73E+01
8	4.41E+01	4.41E+01
Total	1.12E+02	1.12E+02

Table 4. Risk (Person-Rem / year), 10 y and 15 y Test Intervals

The percent risk contribution associated with intact containment sequences for classes 1 and 3 can then be calculated via this formula:

%Risk =[(Risk-Class 1 + Risk- Class 3A + Risk- Class 3B) / Total] x 100

The percent risk increase, % Delta Risk due to an N year ILRT over the baseline case is calculated:

%Delta Risk(n) =[(total(n) – total(base)) / total (base)] x 100

and the results are provided in Table 5:

	Base	10 year	15 year
%risk	5.59E-02	1.07E-01	1.45E-01
%delta risk		5.10E-02	8.93E-02

Table 5. Percent Risk, Percent Change in Total Risk

Reference 2.11 indicates that LERF should be evaluated by summing contributions from classes 2, 3B, 6, 7 (early failures only) and 8. Note that this definition and the associated frequency total differ slightly from the RNP model of record. For example, the model of record does not consider that there will be any contribution from intact containment sequences to LERF. A plant-specific estimate of the early contribution to class 7, 2.97E-9/y, is provided in Attachment C of revision 1 of this calculation. The LERF frequencies from the various test intervals were calculated and are presented in Table 6:

	Base LERF	10 y LERF	15 y LERF
Class			
2	0	0	0
3B	3.66E-09	1.10E-08	1.65E-08
6	9.34E-07	9.34E-07	9.34E-07
7(early)	2.97E-09	2.97E-09	2.97E-09
8	4.73E-06	4.73E-06	4.73E-06
total	5.671E-06	5.678E-06	5.683E-06

Table 6. Plant Specific LERF Frequencies; Base, 10 y and 15 y Cases

The increase or delta in the LERF values with respect to the baseline and the percentage change were also calculated and are presented in Table 7:

	10 y interval	15 y interval
Delta LERF from base	7.325E-09	1.282E-08
%Delta LERF	0.129	0.226

Table 7. Change in LERF for 10 and 15 Year Cases (from Base)

4.3.3 Results

The results of the evaluations of risk impacts of ILRT test interval extension are summarized in Table 8:

	Plant Specific Risk Measures
Baseline ILRT Interval	
Baseline Risk Contribution from Classes 1 & 3	0.06%
Baseline LERF (per year)	5.671E-6
10 Year ILRT Interval	
10 Year Interval Risk from Classes 1 & 3	0.11%
Increase in total Risk from baseline to 10 years	0.05%
10 Year Interval LERF (per year)	5.678E-6
Increase in LERF – Baseline to 10 years (per year)	7.32E-9
15 Year ILRT Interval	
15 Year Interval Risk from Classes 1 & 3	0.15%
Increase in total Risk from baseline to 15 years	0.09%
15 Year Interval LERF (per year)	5.68E-6
Increase in LERF - 10 to 15 years (per year)	5.49E-9
Increase in LERF - 3 to 15 years (per year)	1.28E-8
% Increase in LERF - 10 to 15 years	0.097%
% Increase in LERF - 3 to 15 years	0.226%

Table 8. Summary of Results

Conclusions from Evaluation of Risks due to undetected class 3 failures

Results support the conclusion that there is a "very small" or negligible increase in risk and LERF due to a change in the Type A test interval to 15 years.

Risks due to concealed corrosion

Concerns have been raised in the past concerning the potential for concealed containment liner corrosion to contribute to risk. An evaluation of these concerns was provided by Reference 2.14, which determined that the increase in LERF associated with containment liner corrosion could be bounded below 1.24E-8 per year, based on an increase in ILRT frequency from once per three years to once per 15 years.

If this value is added to the delta-LERF value estimated for class 3 failures, the following result is obtained for the three-to-fifteen year case:

1.24E-8 /y + 1.28E-8 /y = 2.52E-8 /y.

This is negligible, or "very small."

4.4 Precautions and Limitations

The evaluation of the risk significance of extending the ILRT interval documented by this calculation was prepared in support of a licensing submittal. Use of this report by other organizations should be with the full knowledge of the PSA Unit and the RNP Licensing.

5.0 CONCLUSIONS

An extension of the ILRT interval to 15 years will have a negligible impact on risk.

6.0 CROSS DISCIPLINE IMPACT

This calculation has no impact on any design documents outside of the PSA Unit of NFM&SA. Therefore, no additional review is required.

7.0 LICENSING DOCUMENT/DESIGN BASIS IMPACT

The attached report provides supporting information for a planned licensing submittal. This calculation has no impact on any other licensing documents. Therefore, no additional review is required.

8.0 PLANT DOCUMENT IMPACT

This calculation does not change any existing plant document.

9.0 SCOPE OF REVIEW

The following is the suggested minimum scope for this calculation:

Complete the EGR-NGGC-0003 Record of Lead Review (Engineering Review) and include in Attachment 2.