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Docket No. 50-261

DEC 28 1981

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Postel
Exemption

Mr. J. A. Jones
Senior Vice President
Carolina Power & Light Company
336 Fayetteville Street
Raleigh, North Carolina 27602

Dear Mr. Jones:

The Commission has issued the enclosed Exemption from certain requirements of Section 50.54(o) and Appendix J to 10 CFR Part 50 in response to your letter dated September 16, 1975 as supplemented by your letter dated September 21, 1977. This Exemption, which is being forwarded to the Office of the Federal Register for publication, pertains to the requirement for testing the integrity of containment air locks after they have been opened.

In addition to the enclosed Exemption, we have determined that your request for an exemption from the requirement for full testing airlocks every six months is not acceptable and that a Type B test, in accordance with Appendix J, must be performed every six months. The basis for our findings are contained in the enclosed Safety Evaluation Report.

I request that you submit revisions of the Technical Specifications for H. B. Robinson Unit 2 that include the pertinent requirements of Appendix J. The wording that you proposed in your August 7, 1975 letter for modifying Technical Specification 4.4.1.1.f.3 is acceptable and should be included in your submittal.

Sincerely,

Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

- Enclosures:
1. Exemption
 2. Safety Evaluation Report

cc: See next page

*See attached concurrence sheet for concurrences

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Carolina Power and Light Company

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Darlington, South Carolina 29535

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)

CAROLINA POWER AND LIGHT COMPANY)
(H. B. Robinson, Unit 2))

Docket No. 50-261

EXEMPTION

I.

The Carolina Power and Light Company (the licensee) is the holder of Operating License No. DPR-23 (the license) which authorize operation of the H. B. Robinson, Unit No. 2 located in Darlington County, South Carolina at steady state reactor core power levels not in excess of 2300 megawatts thermal (rated power). This license provides, among other things, that it is subject to all rules, regulations and Orders of the Commission now or hereafter in effect.

II.

Section 50.54(o) of 10 CFR Part 50 requires that primary reactor containments for water cooled power reactors be subject to the requirements of Appendix J to 10 CFR Part 50. Appendix J contains the leakage test requirements, schedules, and acceptance criteria for tests of the leak-tight integrity of the primary reactor containment and systems and components which penetrate the containment. Appendix J was published on February 14, 1973 and in August 1975 each licensee was requested to review the extent to which each facility met the requirements.

On August 7, 1975, Carolina Power and Light Company (CP&L) submitted their evaluation of the H. B. Robinson Unit No. 2 (Robinson 2). The CP&L

submission for Robinson-2 was supplemented by letter dated September 21, 1977. In these submissions, CP&L requested that certain testing frequencies be exempted from Appendix J requirements. The Franklin Research Center, as consultant to the NRR, has reviewed the licensee's submissions and prepared a Technical Evaluation Report on their findings. The NRC staff has reviewed this report and, in its Safety Evaluation Report dated August 5, 1981, the staff has concurred in the report's bases and findings. The exemption request found to be acceptable is as follows:

CP&L requested an exemption from the requirements of §III.D.2.b.iii of Appendix J relating to testing the integrity of air locks after they have been opened during periods when containment integrity is required by the plant's Technical Specifications. This section requires that the air lock shall be tested within 3 days after being opened, or at least every 3 days if the air locks are opened frequently. Air lock door seal testing shall not be substituted for the 6-month test of the entire air lock as required by §III.D.2.b.i.

For certain types of reactors frequent usage of air locks is needed. Testing of air locks after each opening may represent a situation which results in a more rapid degradation of the critical isolation barriers being tested. In addition, experience obtained since 1969 from testing of airlocks indicates that only a few airlock tests have resulted in greater than allowable leakage rates. The licensee, CP&L, applies continuous pressurization at a pressure of P_a (pressure related to the design basis accident) between the double-gasketed seals of the Robinson-2 airlock. This is an acceptable method to

- 3 -

detect door seal leakage while eliminating the impracticalities and possible reduction in reliability associated with full airlock testing at P_a after each opening.

III.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, an exemption is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest. Therefore, the Commission hereby approves the exemption request identified above.

The NRC staff has determined that the granting of this exemption will not result in any significant environmental impact and that pursuant to 10 CFR 51.5(d)(4), an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with this action.

FOR THE NUCLEAR REGULATORY COMMISSION


Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 28th day of December 1981.

Attachments:

1. Safety Evaluation Report
2. Technical Evaluation Report

SAFETY EVALUATION REPORT
APPENDIX J REVIEW
H. B. ROBINSON, UNIT 2

1.0 INTRODUCTION

By letter dated August 7, 1975(1), the NRC requested Carolina Power and Light Company (CP&L) to review its containment leakage testing program for H. B. Robinson, Unit 2, and the associated Technical Specifications, for compliance with the requirements of Appendix J to 10 CFR Part 50.

Appendix J to 10 CFR Part 50 was published on February 14, 1973. Since there already were many operating nuclear power plants and a number of others in advanced stages of design or construction, the NRC decided to have these plants re-evaluated against the requirements of this new regulation. Therefore, beginning in August 1975, requests for review of the extent of compliance with the requirements of Appendix J were made of each licensee. Following the initial responses to these requests, NRC staff positions were developed which would assure that the objectives of the testing requirements of the above cited regulation were satisfied. These staff positions have since been applied in our review of the submittals filed by the H. B. Robinson, Unit 2 licensee. The results of our evaluation are provided below.

2.0 EVALUATION

Our consultant, the Franklin Research Center, has reviewed the licensee's submittals [2, 4] and prepared the attached Technical Evaluation Report (TER) of containment leak rate tests for H. B. Robinson, Unit 2. We have reviewed this evaluation and concur in its bases and findings.

In the TER, the staff's consultant agreed with the licensee's proposed change to Technical Specification (T.S.) 4.4.1.1-f.3 as stated in

ENCLOSURE

reference (2) which requires that the allowable test leakage shall not exceed 0.75 L . The acceptance criteria of Appendix J require that the allowable test leakage shall be less than 0.75 L . Since the licensee's modification meets the requirements of Appendix J, both we and our consultant conclude that this modification to the T.S. is acceptable.

The licensee requested an exemption from the frequency of testing the airlocks, and indicated that the airlock door seals are tested at pressure P_a on a continuous basis by the plant penetration pressurization system. Specifically, the licensee proposed to substitute a Type B test at P_a during refueling outages for the six-month Type B test at P_a , and substitute a continuous pressure test at P_a using the plant penetration pressurization system for the seal test after each opening of the airlock.

Appendix J, at Sections III.B.2 and III.D.2, requires that reactor containment airlocks be leak tested at the peak calculated accident pressure, P_a , at six month intervals. Further, should the airlocks be opened between such intervals, the airlocks must be leak tested after each opening.

Although continuous pressurization at P_a demonstrates the adequacy of the the door seals, it does not satisfy the objective that the six month test provide an integrated leakage rate for the entire airlock assembly, including electrical and mechanical penetrations, the airlock cylinder, hinge assemblies, welded connections, and other potential leakage paths.

In view of the above, our consultant finds that CP&L's proposal to perform a verification of airlock door seals at P_a on a continuous basis by pressurizing between the double-gasketed seals is an acceptable alternative to performing a Type B test of the airlock after each use and that an exemption from this requirement of Appendix J is acceptable. Our consultant

also finds that CP&L's request for an exemption from the requirement for testing the airlocks every six months is not acceptable and that a Type B test in accordance with Appendix J must be performed every six months. We concur with our consultant's conclusion that the exemption from the requirement for a seal test after each opening of the airlock is acceptable and the exemption from the Type B test every six months is unacceptable.

3.0 CONCLUSION

Based on our review of the attached technical evaluation report as prepared by our consultant, and the above discussion, we conclude that:

- 1) CP&L's request for an exemption from the requirement for testing airlocks every six months is not acceptable.
- 2) CP&L's request for an exemption from the requirement for testing airlocks after each opening is acceptable, provided that the double seals are pressurized on a continuous basis at pressure P_a.
- 3) CP&L's proposed modification to Technical Specification 4.4.1.1.f.3 to change "shall not exceed 0.75 ..." to read "shall be less than 0.75 ..." is acceptable.

4.0 REFERENCES

- [1] NRC generic letter from Mr. Karl Goller, Assistant Director for Operating Reactors, to CP&L dated August 7, 1975.
- [2] CP&L letter from Mr. E. E. Utley, Vice President, to Mr. Karl Goller, Assistant Director for Operating Reactors, dated September 16, 1975.
- [3] NRC letter from Mr. R. W. Reid, Chief, Operating Reactors Branch #4, to Mr. J. A. Jones, Senior Vice President, dated July 5, 1977.
- [4] CP&L letter from Mr. E. E. Utley, Senior Vice President, to Mr. R. W. Reid, Chief, Operating Reactors Branch #4, dated September 21, 1977.

TECHNICAL EVALUATION REPORT

CONTAINMENT LEAKAGE RATE TESTING

CAROLINA POWER AND LIGHT COMPANY
H. B. ROBINSON, UNIT 2

NRC DOCKET NO. 50-261

NRC TAC NO. 01954

FRC PROJECT C5257

NRC CONTRACT NO. NRC-03-79-118

FRC TASK 48

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July 28, 1981

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1. BACKGROUND

On August 7, 1975 [1], the NRC requested Carolina Power and Light Company (CP&L) to review the containment leakage testing program at H. B. Robinson Unit 2 and to provide a plan for achieving full compliance, where necessary, including appropriate design modifications, changes to technical specifications, and requests for exemption from the requirements pursuant to 10CFR50.12.

On September 16, 1975 [2], CP&L replied that three areas had been found which, while in compliance with technical specifications, did not comply with Appendix J. In this reply, CP&L submitted requests for exemption from the method of calculating the maximum allowable leakage rate at the reduced containment test pressure and from Type B testing of the containment airlocks every 6 months or after each opening. In addition, CP&L noted that a technical specification change was required so that the acceptance criteria for Type A tests would comply with Appendix J.

This report provides technical evaluations of the requests for exemption from the requirements of Appendix J submitted by CP&L in Reference 2.

2. REVIEW CRITERIA

Code of Federal Regulations, Title 10, Part 50 (10CFR50), Appendix J, Containment Leakage Testing, was specified by the NRC as the basis of these evaluations. The criteria are either referenced or briefly stated to support the results of the evaluations. Furthermore, in recognition of the plant-specific conditions which could lead to requests for exemption not explicitly covered by the regulations, the NRC directed that the technical review constantly emphasize the basic intent of Appendix J, that potential containment atmospheric leakage paths be identified, monitored, and maintained below established limits.

3. TECHNICAL EVALUATION

3.1 REQUEST FOR EXEMPTION FROM THE REQUIREMENTS OF APPENDIX J

Reference 2 requested exemptions from the requirements of Appendix J regarding (1) the method of calculating the maximum allowable leakage rate at the reduced containment test pressure and (2) Type B testing of the containment airlocks every 6 months or after each opening. The following sections provide an evaluation of these requests.

3.1.1 Exemption from the Method of Calculating the Maximum Allowable Leakage Rate at the Reduced Containment Test Pressure

Section III.A.4(a)(iii) of Appendix J requires that the following equations be used to calculate L_t , the maximum allowable leakage rate at the reduced containment test pressure, P_t :

$$L_t = L_a \left(\frac{L_{tm}}{L_{am}} \right) \quad \text{for } \frac{L_{tm}}{L_{am}} < 0.7$$

$$L_t = L_a \left(\frac{P_t}{P_a} \right)^{1/2} \quad \text{for } \frac{L_{tm}}{L_{am}} > 0.7$$

L_a is the maximum allowable leakage rate at the calculated peak containment pressure (P_a) related to the design basis accident. The subscript "m" denotes the total measured containment leakage rates.

In Reference 2, CP&L stated:

Technical Specification 4.4.1.1.f.2 of H. B. Robinson Unit 2 utilizes the same equations, although with a different nomenclature, but specifies that the minimum of the values determined from the equations be used as the limit. The use of the lowest value of acceptable test leakage is clearly conservative.

CP&L requested an exemption from the above-cited requirement of Appendix J for the maximum acceptable test leakage if the ratio L_{tm}/L_{am} becomes greater than 0.7, and proposed to continue using the lower of the values calculated by the use of the two equations.

Evaluation. The procedure used by CP&L for the H. B. Robinson Unit 2 facility meets the requirements of Appendix J, Section III.A.4(a)(iii), and the use of the lower calculated value of L_t is acceptable. Using the lower calculated value of L_t results in a smaller value of maximum acceptable test leakage, never greater than the value allowed by Appendix J. No exemption from the requirements of Appendix J is required.

3.1.2 Airlock Testing

In Reference 2, CP&L requested exemption from the Type B testing requirements of the containment airlocks. Specifically, CP&L requested an exemption from the frequency of airlock testing and indicated that the airlock door seals are tested at pressure P_a on a continuous basis by the plant penetration pressurization system. In Reference 3, the NRC requested additional information. This request questioned the definition of an acceptable leakage rate for the airlock door seals, the sensitivity of the continuous pressurization monitoring system to detect the leakage rate, and the reliability of maintaining an acceptable leak rate for the total airlock system when the interval between tests is increased.

In response to Reference 3, CP&L submitted additional information [4] supporting the contention that airlocks should be tested during each refueling outage. In addition to providing the basis for leakage detection sensitivity, CP&L stated that the only unmonitored portion of the airlock is the handwheel shaft seals. CP&L also cited the need for continuous access to containment and the performance history of the shaft seals as sufficient bases for exemption from the required 6-month test interval and for continued use of refueling interval testing.

Evaluation. Appendix J, Sections III.B.2 and III.D.2, require that reactor containment airlocks be leak tested at the peak calculated accident pressure, P_a , at 6-month intervals. Further, should the airlocks be opened between such intervals, they will be leak tested after each opening. Airlocks represent potentially large leakage paths that are more subject to human error than other isolation barriers; therefore, they are tested more often than

other isolation barriers. Additionally, to ensure that the sealing mechanisms were not damaged during an airlock entry and also to ensure that this large potential leakage path was correctly secured after use, the requirement to test after each use was added.

For certain types of reactors in which airlocks are used frequently, testing of airlocks after each opening may create a situation in which more rapid degradation of the critical isolation barriers occurs. Moreover, experience obtained from testing of airlocks since 1969 indicates that only a few airlock tests have resulted in greater-than-allowable leakage rates. This infrequent failure of airlock tests plus the possibility that excessive testing could lead to a loss of reliability due to equipment degradation leads to the conclusion that testing after each opening may be undesirable.

Since 1969, there have been approximately 40 instances in which airlock leak tests have resulted in greater-than-allowable leak rates. However, they all were caused by the failure of door seals, not the entire doors. Continuous pressurization at a pressure of Pa between the double-gasketed seals at H. B. Robinson Unit 2 is an acceptable method for detecting door seal leakage while at the same time eliminating the impracticalities, and perhaps the reduction of reliability, associated with full airlock testing at Pa after each opening. In Reference 4, CP&L has demonstrated that the plant penetration pressurization system is sufficiently sensitive to detect a change in the leakage rate of the door seals with an alarm setpoint on this system equivalent to 0.1 La.

CP&L proposes to test airlocks once per refueling cycle and opposes a 6-month test interval because of an apparent need for continuous and immediate access to the containment during normal operation. Although continuous pressurization at Pa demonstrates the adequacy of the door seals, it does not satisfy the objective of the 6-month test interval, i.e., to provide an integrated leakage rate for the entire airlock assembly, including electrical and mechanical penetrations, the airlock cylinder, hinge assemblies, welded connections, and other potential leakage paths.

In view of the above discussions, CP&L's proposal to verify airlock door seals at Pa on a continuous basis by pressurizing between the double-gasketed seals is an acceptable alternative to performing a Type B test of the airlock after each use; an exemption from this requirement of Appendix J is acceptable. However, CP&L's request for an exemption from the required testing of airlocks every 6 months is not acceptable, and a Type B test in accordance with Appendix J must be performed every 6 months.

3.2 TECHNICAL SPECIFICATION CHANGES

In Reference 2, CP&L stated that a revised Technical Specification 4.4.1.1.f.3 would be submitted to bring it into compliance with Appendix J. Specifically, the Technical Specification currently requires that the allowable test leakage "shall not exceed 0.75," while the acceptance criteria for Type A test in Section III.A.4.(b).(1) and (2) of Appendix J require that values "shall be less than 0.75."

Evaluation. CP&L's suggested modification meets the requirements of Appendix J, Sections III.A.4.(b).(1) and (2). A Technical Specification modification would be acceptable.

4. CONCLUSIONS

Technical evaluation of CP&L's requests for exemptions from the requirements of 10CFR50, Appendix J, Containment Leakage Testing, and technical evaluation of a proposed modification to Technical Specification 4.4.1.1.f.3 for H. B. Robinson Unit 2 have resulted in the following conclusions:

1. CP&L's request for exemption from the maximum acceptable test leakage if the ratio L_{tm}/L_{am} becomes greater than 0.7 is not necessary since the intent of Appendix J has been satisfied.
2. CP&L's request for exemption from testing airlocks every 6 months is unacceptable.
3. CP&L's request for exemption from testing airlocks after each opening is acceptable provided that the double seals are pressurized on a continuous basis at pressure Pa.
4. A proposed modification to Technical Specification 4.4.1.1.f.3 to change "shall not exceed 0.75" to read "shall be less than 0.75" is acceptable.

5. REFERENCES

1. K. Goller (NRC)
Letter to Carolina Power and Light Company
August 7, 1975
2. E. E. Utley (CP&L)
Letter to K. Goller (NRC)
September 16, 1975
3. R. W. Reid (NRC)
Letter to J. A. Jones (CP&L)
July 5, 1977
4. E. E. Utley (CP&L)
Letter to R. W. Reid (NRC)
September 21, 1977