



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO APPENDIX J EXEMPTION REQUESTS

AND AMENDMENT NO. 116 TO FACILITY LICENSE NO. DPR-71

AND AMENDMENT NO. 144 TO FACILITY LICENSE NO. DPR-62

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1 AND 2

DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

By letter dated August 5, 1987, the licensee requested an exemption from 10 CFR Part 50, Appendix J, Paragraph III.A.3, which requires that all Containment Integrated Leakage Rate Tests (CILRTs) be performed in accordance with the American National Standard Institute (ANSI) N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." ANSI N45.4-1972 requires that leakage rate calculations be performed using either the Total Time method or the Point-to-Point method. The licensee's requested exemption would allow use of the Mass-Point method to calculate containment leakage rate. The Mass-Point method is described in a more recent standard, ANSI/ANS 56.8-1981, "Containment System Leakage Testing Requirements." Also included in the licensee's submittal was a request to change the Technical Specifications (TS), specifically surveillance requirement 4.6.1.2 and the associated bases. The changes are needed for consistency between Appendix J and the TS. The staff's review of this request for exemption and amendment follows.

2.0 EVALUATION

The licensee indicated that in 1976 the NRC staff unofficially recognized the merits of the Mass-Point technique and that this method was the recommended method to use. On this basis, the licensee has performed calculations using the Mass-Point method. The licensee was recently informed by the staff that, with regard to the Mass-Point method, this method has not been incorporated into the current provisions of 10 CFR Part 50, Appendix J, and, therefore, its use requires an exemption. In response to this staff position, the licensee has requested an Appendix J exemption. The licensee has stated, in support of the application for exemption from Appendix J, that the Mass-Point method is a more accurate method of calculating containment leakage.

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The Mass-Point method has been recognized by the professional community as superior to the two other methods, Point-to-Point and Total Time, which are referenced in ANSI N45.4-1972 and endorsed by the present regulations. The Mass-Point method calculates the air mass at each point in time, and plots it against time. A linear regression line is plotted through the mass-time points using a least square fit. The slope of this line, divided by its intercept and multiplied by an appropriate constant, is the leakage rate. The superiority of the Mass-Point method becomes apparent when it is compared with the other methods. With the Total Time method, a series of leakage rates are calculated on the basis of air mass differences between an initial datum point and each individual datum point thereafter. If for any reason (e.g., instrument error, lack of temperature equilibrium, ingassing, or outgassing), the initial datum point is not accurate, the results of the test will be affected. In the Point-to-Point method, the leak rates are based on the mass difference between each pair of consecutive points which are then averaged to yield a single leakage rate estimate. Mathematically this can be shown to be the difference between the air mass at the beginning of the test and the air mass at the end of the test, expressed as a percentage of the containment air mass.

It follows from the above that the Point-to-Point method ignores any mass readings taken during the test; and, thus, the leakage rate is calculated on the basis of the difference in mass between two measurements taken at the beginning and at the end of the test, which are 24 hours apart.

ANSI/ANS 56.8-1981, which was intended to replace ANSI N45.4-1972, specifies the use of the Mass-Point method, to the exclusion of the two older methods. The staff anticipates publishing for comment in the near future a proposed amendment to Appendix J that would permit the use of the Mass-Point method.

In addition to the method of calculation, consideration of the length of the test should also be included in the overall program. In accordance with Section 7.6 of ANSI N45.4-1972, a test duration less than 24 hours is only allowed if approved by the NRC staff, and the only currently approved methodology for such a test is contained in Bechtel Topical Report BN-TOP-1, Revision 1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants," dated November 1, 1972. This approach only allows use of the Total Time method. Therefore, the staff will condition the exemption to require a minimum test duration of 24 hours when the Mass-Point method is used.

Information identifying the special circumstances for granting this exemption pursuant to 10 CFR 50.12 was also provided in the licensee's letter. The purpose of Appendix J to 10 CFR Part 50 is to assure that containment leak tight integrity can be verified periodically throughout the service lifetime in order to maintain containment leakage within the limit specified in the facility TS. The underlying purpose of the rule, in specifying particular methods for calculating leakage rates, is to assure that accurate and conservative methods are used to assess the results of containment leak rate tests. The staff has determined that the Mass Point method is an acceptable method for calculation of containment leakage rate and satisfies the purpose of the rule.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration, and there has been no public comment on such finding. Accordingly, this amendment 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 need be prepared in connection with the issuance of this amendment.

4.0 CONCLUSION

Based on the above evaluation, the Commission's staff finds that the licensee's proposed exemption from 10 CFR Part 50, Paragraph III.A.3 of Appendix J, to allow use of the Mass-Point method as requested in the submittal dated August 5, 1987, is acceptable with the condition that the minimum test duration is 24 hours. The exemption applies only to the method of calculating leakage by use of the Mass-Point method and not to any other aspects of the tests.

The Commission made a proposed determination that the amendment involves no significant hazards consideration, which was published in the Federal Register on December 16, 1987 at 52 FR 47776 and consulted with the State of North Carolina. No public comments or requests for hearing were received and the State of North Carolina did not have any comments.

The staff has concluded, based on the consideration discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and the security nor to the health and safety of the public.

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Dated: February 17, 1988