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

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

## CONCERNING AN EXEMPTION FROM APPENDIX J

## FOR CONTAINMENT INTEGRATED LEAKAGE RATE TEST METHODOLOGY

## GPU NUCLEAR CORPORATION AND
## JERSEY CENTRAL POWER & LIGHT COMPANY

## OYSTER CREEK NUCLEAR GENERATING STATION

## DOCKET NO. 50-219

## INTRODUCTION

By letter dated February 19, 1988, 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 (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 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." The staff's review of this request for exemption follows.

## EVALUATION

The licensee was recently informed by the staff that the use of the mass point method has not been incorporated into the current provisions of 10 CFR Part 50, Appendix J, and is therefore not legally permitted without 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.

It has been recognized by the professional community that the mass point method is an acceptable means for calculation of containment leakage rate in addition 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 the intercept of this line, and multiplied by an appropriate constant is the leakage rate. The mass point method has some advantages when it is compared with the other methods. In the total time method, a series of leakage rates is calculated on the basis of air mass differences between an initial data point and each individual data point thereafter. If for any reason (such as instrument error, lack of temperature equilibrium, ingassing, or outgassing) the initial data point is not accurate, the result of the test will be affected. In the point-to-point method, the leakage 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 does not make use of 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. However, the staff has determined that these three methods (mass-point, total time and point-to-point) are acceptable methods which may be used to calculate containment leakage rates. A proposed revision to Appendix J, which has been published for public comment (53 FR 5985, February 29, 1988) would permit the use of the mass point method provided it is used with a test duration of at least 24 hours.

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, 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.

The licensee's letter also submitted information to identify the special circumstances for granting this exemption pursuant to 10 CFR 50.12. 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 so as to maintain containment leakage rate within the limit specified in the facility Technical Specifications. The underlying purpose of the provision specifying particular methods for calculating leakage rates is to assure that accurate and conservative methods are used to assess the results of containment leakage 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. Thus, there are special circumstances in this case.

CONCLUSION

Based on the above discussion, the staff finds that the licensee's proposed partial exemption from paragraph III.A.3 of Appendix J, to allow use of the mass point method as requested in the submittal dated February 19, 1988, is acceptable with the condition of 24 hours minimum test duration, until such provision of Appendix J is modified. The exemption applies only to the method of calculating leakage rate by use of the mass point method and not to any other aspects of the tests.

Dated: April 18, 1988

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