

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

VIRGINIA ELECTRIC
AND POWER COMPANY

(Surry Power Station,
Units 1 and 2)

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Docket Nos. 50-280
and 50-281

EXEMPTION

I.

The Virginia Electric and Power Company (VEPCO, the licensee) is the holder of Operating License No. DPR-32, which authorizes operation of Surry Power Station Unit 1, and Operating License No. DPR-37, which authorizes operation of Surry Power Station Unit 2. The operating licenses provide, among other things, that the Surry Power Station is subject to all rules, regulations, and Orders of the Commission now or hereafter in effect.

The station is comprised of two pressurized water reactors at the licensee's site in Surry, Virginia.

II.

The Code of Federal Regulations, 10 CFR 50.54(o), specifies that primary reactor containments for water-cooled power reactors shall comply with Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors." Paragraph III.A.3 of Appendix J incorporates by reference the American National Standard ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." This standard requires that

containment leakage rate calculations for Containment Integrated Leakage Rate Tests (CILRTs) be performed using either the Point-to-Point method or Total Time method.

Further advances in leakage rate testing technology have provided improved test methods, including a newer method of evaluating test data called the Mass Point method. This Mass Point method was incorporated in a newer standard, ANSI/ANS- 56.8-1981, "Containment System Leakage Testing Requirements" (revised 1987) and in fact has been accepted by the NRC staff as an improved alternative method of calculating containment leakage rates. However, a strict interpretation of the specific wording of Appendix J, III.A.3, by referencing only the older ANSI standard, precludes use of the newer improved method, unless the licensees who wish to use this method receive an exemption from the Appendix J requirement of conforming to this provision of ANSI N45.4-1972.

III.

By letter dated March 1, 1988, as revised by letter dated April 8, 1988, the licensee requested an exemption from 10 CFR Part 50, Appendix J, Paragraph III.A.3, which requires that all CILRTs be performed in accordance with ANSI N45.4-1972. ANSI N45.4-1972 requires that leakage rate calculations be performed using either the Total Time method or the Point-to-Point method. The March 1, 1988 letter also proposed amendments to the Technical Specifications (TSs) to maintain consistency between the TSs and the requested exemption. The staff will respond to the proposed amendments by separate correspondence.

The licensee indicated that since the issuance of ANSI N45.4-1972, a more accurate method of determining containment leakage rates, the Mass Point method, has been developed as described in ANSI/ANS- 56.8. Therefore, the licensee has requested an exemption to allow the use of the Mass Point method for calculating containment leakage rates.

It has been recognized by the professional community that the Mass Point method is superior to the Point-to-Point and Total Time methods which are referenced in ANSI N45.4-1972 and endorsed by the present regulations. The Mass Point method calculates the air mass at a series of points 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 is divided by the intercept of this line, and the result is multiplied by an appropriate constant to obtain the calculated leakage rate.

The superiority of the Mass Point method becomes apparent when it is compared with the two other methods. In the Total Time method, a series of leakage rates are calculated on the basis of containment air mass differences between an initial data point and each individual data point thereafter, and an average of these leakage rates is then determined. If for any reason (e.g., instrument error, lack of temperature equilibrium, ingassing, or outgassing) the initial data 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 data points, and these leakage rates 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.

On February 29, 1988 (53 FR 5985), the staff published a proposed amendment to Appendix J to explicitly permit the use of the Mass Point method, subject to certain conditions that have been accepted by the staff since approximately 1976, as well as to permit the use of the prior methods referenced in ANSI N45.4-1972.

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 of 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 conditions the exemption to require a minimum test duration of 24 hours when the Mass Point method is used. By letter dated April 8, 1988, the licensee confirmed that a minimum test duration of 24 hours will be utilized when the Mass Point method is used.

In the March 1, 1988 letter, the licensee also submitted information to identify the special circumstances for granting this exemption for Surry 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 in order to maintain containment leakage rate within

the limit specified in the facility Technical Specifications. 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 leakage rate tests. The staff has determined that the Mass Point method is an acceptable method for calculating containment leakage rates and satisfies the purpose of the rule.

Based on the above discussion, 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 March 1, 1988, as revised by letter dated April 8, 1988, is acceptable, until such provision of Appendix J is modified. Thereafter, the licensee shall comply with the provisions of such rule (or may renew its request for exemption). The exemption applies only to the method of calculating leakage rates (by use of the Mass Point method) and not to any other aspects of the tests.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR Part 50.12(a)(1), this exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. The Commission has further determined that special circumstances, as set forth in 10 CFR 50.12(a)(2)(ii), are present justifying the exemption, namely that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. Accordingly, the Commission hereby grants an exemption as described in Section III above from Paragraph III.A.3 of Appendix J to the extent that the Mass Point method may be used for containment leakage rate calculations, providing it is used with a


minimum test duration of 24 hours. The exemption is granted until such provision of Appendix J is modified. Thereafter, the licensee shall comply with the provisions of such rule. The exemption applies only to the method of calculating leakage rate (using the Mass Point method) and not to any other aspects of the tests.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will have no significant impact on the environment May 9, 1988 (53 FR 16479).

A copy of the licensee's request for exemption dated March 1, 1988, as revised on April 8, 1988, is available for public inspection at the Commission's Public Document Room, 1717 H Street, NW, Washington, DC and at the Swem Library, College of William and Mary, Williamsburg, Virginia 23185. Copies may be obtained upon written request to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Director, Division of Reactor Projects I/II.

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION


Steven A. Varga, Director
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 9th day of May 1988