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REPLY TO
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FVY 88-77

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

Reference: (a) License No. DPR-28 (Docket No. 50-271)

Subject: Request for Exemption to 10CFR50, Appendix J

Dear Sir:

Pursuant to 10CFR50.12, Vermont Yankee Nuclear Power Corporation hereby requests an exemption from the requirement of 10CFR50, Appendix J, Paragraph III.A.3, Test Methods. The exemption request is provided as Attachment A to this letter.

The Code of Federal Regulations, 10CFR50.54(o), specifies that primary reactor containments for water-cooled power reactors shall comply with Appendix J to 10CFR, Part 50. 10CFR50, Appendix J, Paragraph III.A.3, requires that all Type A (containment integrated leak rate) tests be performed in accordance with the referenced ANSI Standard N45.4-1972, wherein, containment leakage calculations are to be performed using either the point-to-point method or total time method. Subsequently, 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. Although ANSI N45.4-1972 has been revised (ANSI/ANS 56.8-1981) to incorporate leakage calculations using the mass point method, Appendix J has not been revised to reference this new standard.

The Nuclear Regulatory Commission (NRC) has recently proposed a specific rule change to clarify the requirements of its regulations applicable to the leakage testing of containments of light water-cooled nuclear power plants [53 Federal Register, 5985, dated February 29, 1988]. This proposed rule would explicitly permit the use of the mass point method for Type A test leakage calculations pursuant to 10CFR50, Appendix J, Section III.A.3. However, pending final Commission approval of the rule change, an exemption is required in order to use the mass point method for Type A test leakage calculations.

The next Type A test for Vermont Yankee is scheduled to be performed during the 1989 refueling outage (approximately February - April 1989). Accordingly, in order to ensure compliance with NRC regulations for the next

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scheduled Type A test, Vermont Yankee will either have to perform the subject test leakage calculations in accordance with ANSI N45.4-1972, as specified in 10CFR, Part 50, Appendix J, Paragraph III.A.3, or receive an exemption from the requirements of Appendix J to 10CFR, Part 50, Paragraph III.A.3. to use only the improved alternate mass point methodology.

Therefore, Vermont Yankee hereby submits, as Attachment A to this letter, an application for exemption from the requirements of 10CFR50, Appendix J, Paragraph III.A.3, pursuant to 10CFR50.12. We request that your review of the subject exemption request be performed consistent with the above schedule. An application fee of $150.00 is enclosed in accordance with 10CFR170.21.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

R. W. Capstick

R. W. Capstick
Licensing Engineer

RWC/12.437

Attachment

cc: USNRC
Region I

USNRC
Resident Inspector - VYNPS

ATTACHMENT A

Background

In 1973, the Commission initially promulgated its requirements concerning containment integrated leakage rate testing (10CFR, Part 50, Appendix J), and required licensees to use state-of-the-art leakage test methodology and specifically called for Type A test methods described in American National Standard ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors" (Appendix J, Section III.A.3). That standard accepted two techniques for evaluating test results: the total time method and the point-to-point method. 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. In the point-to-point method, the leakage rates are based on the air mass difference between each pair of consecutive data points, and these leakage rates are then averaged to yield a single leakage rate estimate.

Subsequently, 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. The mass point method involves calculation of the air mass at a series of points in time and the plotting of mass against time. A linear regression line is plotted through the mass-time points using a least squares 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.

This mass point method was incorporated in a newer ANSI 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, it was recently recognized by the NRC staff that a strict interpretation of the specific wording of Appendix J, III.A.3, by referencing only the older ANSI standard, would preclude use of the newer, improved method.

To alleviate this restriction on the use of an improved alternative methodology, NRC has proposed a rule change to clarify the language in Section II.A.3 to explicitly permit the use of the newer mass point method in addition to the earlier methods covered by ANSI N45.4-1972 [53 Federal Register 5985, dated February 29, 1988]. A similar revision was proposed as part of the currently pending general revision to Appendix J (see 51FR39538, dated October 29, 1986). However, in order to minimize any further delay in codifying the accepted use the mass point method, the Commission recently proposed to modify Section III.A.3 to explicitly permit the use of the mass point method, subject to certain conditions that have been accepted by the NRC staff since approximately 1976 as well as to permit the use of the prior methods referenced in ANSI N45.4-1972. Pending this revision to Appendix J to incorporate mass-plot analysis, licensees who wish to use mass-plot must submit an application for exemption from the Appendix J requirement that containment integrated leakage rate testing conform to ANSI N45.4-1972.

Justification

Vermont Yankee believes that this exemption should be granted pursuant to 10CFR50.12(a)(2)(ii); i.e., application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule, which is to provide an accurate and conservative test of containment integrity. In addition, a "material circumstance" (Paragraph 50.12(a)(2)(vi)) exists in that the mass-point methodology has been accepted by the NRC staff as an improved alternative method for calculating containment leakage rates and the NRC has proposed a rule change to explicitly permit the use of this methodology. The need for this exemption is predicated on the determination that, although the technical adequacy of the mass-point method is not in question, the recommendation to use it is not consistent with the requirements of Appendix J.

Mass-point is a newer and more accurate method of calculating containment leakage. The total time method calculates a series of leakage rates based upon air mass differences between an initial data point and each individual data point thereafter. The adequacy of the method is extremely sensitive to the accuracy of that initial data point. If, due to any reason (such as instrument error, lack of temperature equilibrium, ingassing, or outgassing), the initial data point is not accurate, the results of the test will be affected. Even if the data point is accurate during the early stages of the test, the leakage varies with time; as a result, the initial value and, therefore, the calculated leak rate become time dependent. In the mass-point method, the mass of air in containment is calculated and plotted as a function of time. The slope of the linear least squares fit to the data is the leakage.

The calculation of leakage rates as a function of time required using the total time method creates the situation where increasing the amount of data available causes the results to become more erratic and the 95% confidence interval to become wider. Using total time, the 95% confidence interval may range from one-half to twice the measured leak rate. In the case of mass-plot, the 95% confidence interval is between 5% and 20% of the measured leak rate.

This exemption will enable Vermont Yankee to perform the next scheduled Type A test leakage calculations in accordance with ANSI/ANS 56.8 (the mass point method).