

September 27, 1988

*Docket*

Dockets Nos. 50-282 and 50-306

Mr. D. M. Musolf, Manager  
Nuclear Support Services  
Northern States Power Company  
414 Nicollet Mall  
Minneapolis, Minnesota 55401

Dear Mr. Musolf:

SUBJECT: EXEMPTION FROM APPENDIX J, 10 CFR PART 50, PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS NOS. 1 AND 2 (TACS NOS. 69172 AND 69173)

By letter dated August 1, 1988, as supplemented by letter dated August 23, 1988, you requested an exemption from the requirements of Appendix J, 10 CFR Part 50, Section III.A.3, pertaining to the containment integrated leakage rate tests (CILRT) of Units 1 and 2 of the Prairie Island Nuclear Generating Plant.

Based on our evaluation of your submittals, we have granted the exemption requested from the CILRT requirements of Appendix J, which specify through incorporation by reference of American National Standard ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors," that the containment leakage rate calculations be performed using either the Point-to-Point or the Total Time method. This exemption permits you to use the Mass Point method as an acceptable alternative for calculating containment leakage rates. The bases for this action are discussed in the enclosed Exemption. This exemption is granted until such provisions of Appendix J are modified.

A copy of the Exemption is being filed with the Office of the Federal Register for publication.

Sincerely,

*Ted Quay for*

Martin J. Virgilio, Director  
Project Directorate III-1  
Division of Reactor Projects - III, IV, V  
& Special Projects

Enclosure:  
Exemption

cc w/enclosure:

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*No legal objection.  
Note modifications.*

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D. C. 20555

September 27, 1988

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Nuclear Support Services  
Northern States Power Company  
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Sincerely,

A handwritten signature in black ink, appearing to read "Red Quay for".

Martin J. Virgilio, Director  
Project Directorate III-1  
Division of Reactor Projects - III, IV, V  
& Special Projects

Enclosure:  
Exemption

cc w/enclosure:  
See next page

Mr. D. M. Musolf  
Northern States Power Company

Prairie Island Nuclear Generating  
Plant

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Mr. William Miller, Auditor  
Goodhue County Courthouse  
Red Wing, Minnesota 55066

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
NORTHERN STATES POWER	)	Dockets Nos. 50-282
COMPANY	)	and 50-306
	)	
(Prairie Island Nuclear	)	
Generating Plant, Units	)	
Nos. 1 and 2)	)	

EXEMPTION

I.

The Northern States Power Company (NSP, the licensee) is the holder of Facility Operating Licenses Nos. DPR-42 and DPR-60, which authorize operation of the Prairie Island Nuclear Generating Plant, Units Nos. 1 and 2 (Prairie Island) at a steady-state power level not in excess of 1633 megawatts thermal for each unit. The facilities are pressurized water reactors located at the licensee's site in Goodhue County, Minnesota. The licenses provide, among other things, that Prairie Island is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

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

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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 Commission's 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 August 1, 1988, as supplemented by letter dated August 23, 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 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 Commission 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 Commission's 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 Commission, 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 Commission conditions the exemption to require a minimum test duration of 24 hours when the Mass Point method is used. By letter dated August 23, 1988, the licensee confirmed that a minimum test duration of 24 hours will be utilized when the Mass Point method is used.

In the August 1, 1988 letter, the licensee also submitted information to identify the special circumstances for granting this exemption for Prairie Island 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

Commission's 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 exemption from paragraph III.A.3 of Appendix J to allow use of the Mass Point method as requested in the submittal dated August 1, 1988, as revised by letter dated August 23, 1988, is acceptable, 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 rates (by use of the Mass Point method) and not to any other aspects of the tests.

#### IV.

Accordingly, the Commission has determined pursuant to 10 CFR 50.12(a)(1), that 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 granting of this exemption will not have a significant effect on the quality of the human environment (September 27, 1988, 53 FR 37660).

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Gary M. Holahan, Acting Director  
Division of Reactor Projects III,  
IV, V and Special Projects  
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland this 27<sup>th</sup> day of September 1988.