

May 22, 1987

Docket No. 50-261

Mr. E. E. Utley  
Senior Executive Vice President  
Power Supply and Engineering & Construction  
Carolina Power & Light Company  
Post Office Box 1551  
Raleigh, North Carolina 27602

Dear Mr. Utley:

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Docket No. 50-261		
NRC PDR	EAdensam	GPA/PA
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JSniezek	OGC-Bsda	
FMiraglia	EJordan	
CRossi	JPartlow	
SVarga	TBarnhart (4)	
GLainas	ACRS (10)	

**SUBJECT: EXEMPTION FROM THE REQUIREMENTS OF APPENDIX J  
FOR H. B. ROBINSON STEAM ELECTRIC PLANT,  
UNIT NO. 2 (TAC NO. 65137)**

The Nuclear Regulatory Commission, in response to your request dated April 17, 1987, has issued the enclosed Exemption from 10 CFR Part 50, Appendix J, Paragraph III.A.3, which requires all Type A containment integrated leak rate tests to be performed in accordance with ANSI N45.4-1972.

We have granted the exemption from the Type A testing requirements of Appendix J to use ANSI N45.4-1972 "Leakage Rate Testing of Containment Structures for Nuclear Reactors," which requires that the containment leakage calculations be performed using either the Point-to-Point or the Total Time method, to allow Carolina Power & Light to use the Mass-Point technique for containment leakage testing. The bases for this Exemption are discussed in the enclosed Exemption and Safety Evaluation. The Exemption is being forwarded to the Office of the Federal Register for publication. The enclosed Environmental Assessment and Finding of No Significant Impact has been published in the Federal Register.

Sincerely,

*Kenneth T. Eccleston*  
Kenneth T. Eccleston, Project Manager  
Project Directorate II-1  
Division of Reactor Projects I/II

**Enclosures:**

1. Exemption
2. Safety Evaluation

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cc: w/Enclosures:  
See next page

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PE: PD21:DRPR  
BZozafari/vag  
05/18/87

*KTE*  
PM: PD21:DRPR  
KEccleston  
05/18/87

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D: PD21:DRPR  
EAdensam  
05/18/87

Mr. E. E. Utley  
Carolina Power & Light Company

H. B. Robinson 2

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U.S. Nuclear Regulatory Commission  
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General Manager  
H. B. Robinson Steam Electric Plant  
Post Office Box 790  
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Mr. Avery Upchurch, Chairman  
Triangle J Council of Governments  
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Post Office Box 12276  
Research Triangle Park, NC 27709

## UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of

CAROLINA POWER &amp; LIGHT COMPANY

H. B. Robinson Steam Electric Plant,  
Unit No. 2

Docket No. 50-261

EXEMPTION

## I.

Carolina Power & Light Company (the licensee) is the holder of Facility Operating License No. DPR-23, which authorizes operation of the H. B. Robinson Steam Electric Plant, Unit No. 2. The license provides, among other things, that the facility is subject to all rules, regulations and Orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

The facility is a Westinghouse pressurized water reactor located at the licensee's site in Darlington County, South Carolina.

## II.

Paragraph III.A.3 of Appendix J to 10 CFR Part 50 requires that all Type A (Containment Integrated Leak Rate) tests be performed in accordance with ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." ANSI N45.4 requires that leakage calculations be performed using the Total Time method or the Point-to-Point method.

By letter dated April 17, 1987, the licensee requested an exemption from 10 CFR Part 50, Appendix J, Paragraph III.A.3, with regard to Type A, Containment Integrated Leak Rate Test calculations. Specifically, the licensee requested an exemption to permit the use of the Mass-Point method (as provided in ANSI/ANS 56.8-1981, paragraph 5) rather than the Total Time method described in ANSI N45.4-1972, paragraph 7.9. In support of its request, the licensee notes that the Mass-Point method is a newer and more accurate method of

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calculating containment leakage. The licensee also notes that utilizing the Total-Time method produces results which are less reliable than the Mass-Point method. The licensee has, therefore, requested the exemption to enable use of the Mass-Point method.

The acceptability of the exemption request is addressed below. More details are contained in the Commission's related Safety Evaluation concurrently issued with this exemption.

### III.

The licensee's exemption request under consideration involves Type A testing requirements of Appendix J for containments. As indicated in the licensee's letter of April 17, 1987, until about 1976, containment leakage rate calculations were performed using only the Point-to-Point or the Total Time methods in accordance with ANSI N45.4-1972. In 1976, the NRC staff unofficially recognized the merits of a newer method, the Mass-Point method. ANSI N45.4-1972 has since been revised to incorporate the Mass-Point method into ANSI/ANS 56.8-1981. A proposed revision to Appendix J, which would permit use of the Mass-Point method, was published for public comment on October 29, 1986 (51 FR 39538); The licensee submits that the more accurate technique provides increased confidence in the integrity of the containment.

In addition, the licensee provided a determination that special circumstances exist under 10 CFR 50.12(a). The rule specifies particular methods for calculating leakage to assure that accurate and conservative methods are used to assess the results of containment leak rate tests. As discussed above, the licensee has determined that this underlying purpose is achieved

with use of the more accurate Mass-Point method. Therefore, they concluded that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The staff agrees with the licensee's conclusion and has determined that under 10 CFR 50.12(a)(2)(ii) special circumstances exist. Based on the above discussion, the licensee's request for exemption (allowing the Mass-Point technique for calculating containment leakage rate) from the requirements of Appendix J is granted for H. B. Robinson, Unit No. 2, with the condition that the test be conducted over a period of at least 24 hours.

#### IV.

The Commission has determined that, pursuant to 10 CFR 50.12, 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 provided in 10 CFR 50.12(a)(2)(ii), are present justifying the exemption. Namely, application of the regulation in the particular circumstances is not necessary to achieve its underlying purpose, which is to ensure that accurate and conservative methods are used to assess the results of containment leak rate tests. The Mass-Point method, which provides accurate results, has been a widely used method of performing leak rate calculations and satisfies the underlying purpose of the rule.

Accordingly the Commission hereby grants an exemption from Paragraph III.A.3 of Appendix J to 10 CFR Part 50 to allow use of the Mass-Point method in performing leakage rate calculations associated with Containment Integrated Leakage Rate Tests, provided that the minimum test duration is 24 hours.

Pursuant to 10 CFR 51.32, the Commission has determined that the

granting of this Exemption will have no significant impact on the environment (51 FR 18296).

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*14*

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

Dated at Bethesda, Maryland  
this 22 day of May, 1987.

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PAnderson  
05/18/87

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BMozaferi/vag  
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*KTE*  
PM:PD21:DRPR  
KEccleston  
05/18/87

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DGC  
M. Harman  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION REPORT

RELATED TO APPENDIX J EXEMPTION REQUESTS

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO.2

DOCKET NO. 50-261

INTRODUCTION

By letter dated April 17, 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 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 (referred to by the licensee as the Mass-Plot 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 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 been performing 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 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 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 is the leakage rate. The staff believes that the Mass-Point method was not specified in ANSI N45.4-1972 because the other more conservative methods (Point-to-Point and Total Time) were adequate and suitable for the sensitivity levels of the instrumentation in use at that time. However, with the present developments in technology, the Mass-Point method has gained recognition as the proper one to use. 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 data point and each individual data point thereafter. 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 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. A proposed revision to Appendix J, which has been published for public comment (51 FR 39538, dated October 29, 1986), refers to a proposed Regulatory Guide (MS 021-5, October, 1986), which endorses, with exceptions, the ANSI/ANS 56.8-1981 standard and 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 so as to maintain containment leakage within the limit specified in the facility Technical Specifications. The underlying purpose of the rule 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. As set forth above, the Mass-Point method has been a widely used method providing accurate results and, thus, satisfies the purpose of the rule.

#### CONCLUSION

Based on the above discussion, 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 April 17, 1987, is acceptable with the condition that the minimum test duration is 24 hours, until the presently proposed changes to Appendix J become effective.

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 by use of the Mass-Point method and not to any other aspects of the tests.

Principal Contributors: J. Pulsipher

Dated: May 22, 1987

May 22, 1987

Docket No. 50-261

Mr. E. E. Utley  
Senior Executive Vice President  
Power Supply and Engineering & Construction  
Carolina Power & Light Company  
Post Office Box 1551  
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Dear Mr. Utley:

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SUBJECT: EXEMPTION FROM THE REQUIREMENTS OF APPENDIX J  
FOR H. B. ROBINSON STEAM ELECTRIC PLANT,  
UNIT NO. 2 (TAC NO. 65137)

The Nuclear Regulatory Commission, in response to your request dated April 17, 1987, has issued the enclosed Exemption from 10 CFR Part 50, Appendix J, Paragraph III.A.3, which requires all Type A containment integrated leak rate tests to be performed in accordance with ANSI N45.4-1972.

We have granted the exemption from the Type A testing requirements of Appendix J to use ANSI N45.4-1972 "Leakage Rate Testing of Containment Structures for Nuclear Reactors," which requires that the containment leakage calculations be performed using either the Point-to-Point or the Total Time method, to allow Carolina Power & Light to use the Mass-Point technique for containment leakage testing. The bases for this Exemption are discussed in the enclosed Exemption and Safety Evaluation. The Exemption is being forwarded to the Office of the Federal Register for publication. The enclosed Environmental Assessment and Finding of No Significant Impact has been published in the Federal Register.

Sincerely,

*Kenneth T. Eccleston*

Kenneth T. Eccleston, Project Manager  
Project Directorate II-1  
Division of Reactor Projects I/II

Enclosures:

1. Exemption
2. Safety Evaluation

cc: w/Enclosures:  
See next page

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KEccleston  
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D: PD21:DRPR  
EAdensam  
05/18/87

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Mr. E. E. Utley  
Carolina Power & Light Company

H. B. Robinson 2

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## UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of

CAROLINA POWER &amp; LIGHT COMPANY

H. B. Robinson Steam Electric Plant,  
Unit No. 2

Docket No. 50-261

EXEMPTION

## I.

Carolina Power & Light Company (the licensee) is the holder of Facility Operating License No. DPR-23, which authorizes operation of the H. B. Robinson Steam Electric Plant, Unit No. 2. The license provides, among other things, that the facility is subject to all rules, regulations and Orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

The facility is a Westinghouse pressurized water reactor located at the licensee's site in Darlington County, South Carolina.

## II.

Paragraph III.A.3 of Appendix J to 10 CFR Part 50 requires that all Type A (Containment Integrated Leak Rate) tests be performed in accordance with ANSI N45.4-1972, "Leakage Rate Testing of Containment Structures for Nuclear Reactors." ANSI N45.4 requires that leakage calculations be performed using the Total Time method or the Point-to-Point method.

By letter dated April 17, 1987, the licensee requested an exemption from 10 CFR Part 50, Appendix J, Paragraph III.A.3, with regard to Type A, Containment Integrated Leak Rate Test calculations. Specifically, the licensee requested an exemption to permit the use of the Mass-Point method (as provided in ANSI/ANS 56.8-1981, paragraph 5) rather than the Total Time method described in ANSI N45.4-1972, paragraph 7.9. In support of its request, the licensee notes that the Mass-Point method is a newer and more accurate method of

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calculating containment leakage. The licensee also notes that utilizing the Total-Time method produces results which are less reliable than the Mass-Point method. The licensee has, therefore, requested the exemption to enable use of the Mass-Point method.

The acceptability of the exemption request is addressed below. More details are contained in the Commission's related Safety Evaluation concurrently issued with this exemption.

### III.

The licensee's exemption request under consideration involves Type A testing requirements of Appendix J for containments. As indicated in the licensee's letter of April 17, 1987, until about 1976, containment leakage rate calculations were performed using only the Point-to-Point or the Total Time methods in accordance with ANSI N45.4-1972. In 1976, the NRC staff unofficially recognized the merits of a newer method, the Mass-Point method. ANSI N45.4-1972 has since been revised to incorporate the Mass-Point method into ANSI/ANS 56.8-1981. A proposed revision to Appendix J, which would permit use of the Mass-Point method, was published for public comment on October 29, 1986 (51 FR 39538); The licensee submits that the more accurate technique provides increased confidence in the integrity of the containment.

In addition, the licensee provided a determination that special circumstances exist under 10 CFR 50.12(a). The rule specifies particular methods for calculating leakage to assure that accurate and conservative methods are used to assess the results of containment leak rate tests. As discussed above, the licensee has determined that this underlying purpose is achieved

with use of the more accurate Mass-Point method. Therefore, they concluded that application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The staff agrees with the licensee's conclusion and has determined that under 10 CFR 50.12(a)(2)(ii) special circumstances exist. Based on the above discussion, the licensee's request for exemption (allowing the Mass-Point technique for calculating containment leakage rate) from the requirements of Appendix J is granted for H. B. Robinson, Unit No. 2, with the condition that the test be conducted over a period of at least 24 hours.

#### IV.

The Commission has determined that, pursuant to 10 CFR 50.12, 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 provided in 10 CFR 50.12(a)(2)(ii), are present justifying the exemption. Namely, application of the regulation in the particular circumstances is not necessary to achieve its underlying purpose, which is to ensure that accurate and conservative methods are used to assess the results of containment leak rate tests. The Mass-Point method, which provides accurate results, has been a widely used method of performing leak rate calculations and satisfies the underlying purpose of the rule.

Accordingly the Commission hereby grants an exemption from Paragraph III.A.3 of Appendix J to 10 CFR Part 50 to allow use of the Mass-Point method in performing leakage rate calculations associated with Containment Integrated Leakage Rate Tests, provided that the minimum test duration is 24 hours.

Pursuant to 10 CFR 51.32, the Commission has determined that the

granting of this Exemption will have no significant impact on the environment (51 FR 18296).

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*14*

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

Dated at Bethesda, Maryland  
this 22 day of May, 1987.

*[Signature]*  
LA:PD21:DRPR  
PAnderson  
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PE:PD21:DRPR  
BMozaferi/vag  
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SVarga  
05/21/87

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

SAFETY EVALUATION REPORT

RELATED TO APPENDIX J EXEMPTION REQUESTS

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO.2

DOCKET NO. 50-261

INTRODUCTION

By letter dated April 17, 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 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 (referred to by the licensee as the Mass-Plot 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 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 been performing 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 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 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 is the leakage rate. The staff believes that the Mass-Point method was not specified in ANSI N45.4-1972 because the other more conservative methods (Point-to-Point and Total Time) were adequate and suitable for the sensitivity levels of the instrumentation in use at that time. However, with the present developments in technology, the Mass-Point method has gained recognition as the proper one to use. 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 data point and each individual data point thereafter. If for any reason (e.g, instrument error, lack of temperature

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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. A proposed revision to Appendix J, which has been published for public comment (51 FR 39538, dated October 29, 1986), refers to a proposed Regulatory Guide (MS 021-5, October, 1986), which endorses, with exceptions, the ANSI/ANS 56.8-1981 standard and 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 so as to maintain containment leakage within the limit specified in the facility Technical Specifications. The underlying purpose of the rule 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. As set forth above, the Mass-Point method has been a widely used method providing accurate results and, thus, satisfies the purpose of the rule.

#### CONCLUSION

Based on the above discussion, 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 April 17, 1987, is acceptable with the condition that the minimum test duration is 24 hours, until the presently proposed changes to Appendix J become effective.

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 by use of the Mass-Point method and not to any other aspects of the tests.

Principal Contributors: J. Pulsipher

Dated: May 22, 1987