

50-416



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 26, 1995

Mr. C. Randy Hutchinson
Vice President, Operations GGNS
Entergy Operations, Inc.
Post Office Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF EXEMPTION FROM THE
REQUIREMENTS OF 10 CFR PART 50, APPENDIX J, SECTION III.D
(TAC NO. 87209)

Dear Mr. Hutchinson:

The Commission has issued the enclosed exemption (Enclosure 1) from certain requirements of 10 CFR Part 50, Appendix J, to permit the selection of containment leakage rate testing intervals for components on the basis of performance. This exemption is related to your application dated August 13, 1993, as supplemented by letters dated April 15, May 11, June 24, and July 20, 1994, and April 18 1995, that requested exemption to Sections III.D.1(a), III.D.2, III.D.2(b)(i), III.D.2.(b)(iii), and III.D.3 of 10 CFR Part 50, Appendix J.

The NRC staff has reviewed the information provided in support of your exemption request. On the basis of the submitted information and as discussed in the enclosed Exemption, the NRC staff has concluded that there is a high degree of confidence that the containment will not degrade to an unacceptable extent while this Exemption is in effect. Thus, the NRC staff has concluded that your test intervals request is justified and your request for an exemption to Appendix J to permit the selection of containment leakage rate testing intervals for components on the basis of performance is granted. This approval is based on the assumption that all other aspects of Appendix J testing not explicitly addressed will be conducted in accordance with Appendix J. This exemption will remain in effect until startup following Refueling Outage 9. The staff's safety evaluation in this matter is provided in Enclosure 2.

We find that granting the Exemption from the requirements of 10 CFR Part 50, Appendix J, Section III.D, is authorized by law, will not present an undue risk to public health and safety, is consistent with the common defense and

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Mr. C. Randy Hutchinson

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security, and meets the special circumstances described in 10 CFR 50.12(a)(2)(ii). A copy of the Exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by:

Paul W. O'Connor, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures: 1. Exemption
2. Safety Evaluation

cc w/encls: See next page

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Mr. C. Randy Hutchinson

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security, and meets the special circumstances described in 10 CFR 50.12(a)(2)(ii). A copy of the Exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

A handwritten signature in cursive script that reads "Paul W. O'Connor".

Paul W. O'Connor, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures: 1. Exemption
2. Safety Evaluation

cc w/encls: See next page

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Grand Gulf Nuclear Station

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of)	
)	
ENERGY OPERATIONS INC.)	Docket No. 50-416
)	
(Grand Gulf Nuclear Station, Unit No. 1))	

EXEMPTION

I.

Entergy Operations, Inc., (the licensee) is the holder of Facility Operating License No. NPF-29, which authorizes operation of the Grand Gulf Nuclear Station, Unit 1. The operating license provides, among other things, that the licensee is subject to all rules, regulations, and orders of the Commission now and hereafter in effect.

The facility consists of a boiling water reactor at the licensee's site in Claiborne County, Mississippi.

II.

By letter dated August 13, 1993, as supplemented by letters dated April 15, May 11, June 24, and July 20, 1994, and April 18, 1995, pursuant to 10 CFR 50.12(a), Entergy Operations Inc. requested an exemption to Sections III.D.1(a), III.D.2, III.D.2(b)(i), III.D.2.(b)(iii) and III.D.3 of 10 CFR Part 50, Appendix J, to permit the selection of containment leakage rate testing intervals for components on the basis of performance.

Although the staff had issued an Advanced Notice of Proposed Rule Making to revise Appendix J on November 24, 1992 (57 FR 55156), the licensee stated in the August 13, 1993, submittal that the "plant specific needs of Grand

Gulf" would best be met by a plant specific submittal. The staff agreed to review the licensee's proposal in the context of the ongoing rulemaking activities. In SECY 94-036, dated February 17, 1994, the staff informed the Commission that it would review the Grand Gulf proposal because of its potential usefulness in the rulemaking process due to its scope and the technical information it provides. Testing methods were not included in the scope of the licensee's proposal. The licensee proposed changes to the frequency of testing only. The staff has reviewed the licensee's proposed exemption. The staff's safety evaluation is enclosed.

III.

The licensee proposed changes to the frequency of performing Type A, B, and C tests including changes to the frequency of leakage rate testing of air locks. The test frequencies will be determined individually for each component based on previous performance. The licensee presented plant specific data and plant specific risk analyses to support the proposed changes. In addition to information supplied by the licensee, the staff, in reviewing this exemption request, utilized technical information available from the on-going Appendix J rulemaking, including NUREG-1493 "Performance-Based Containment Leak-Test Program", dated December 1994. This rulemaking will also revise the frequency of leakage rate testing so that the intervals between tests is a function of individual component performance.

Because an Appendix J rulemaking is in progress, this exemption shall be valid until startup following Refueling Outage 9.

IV.

A Type A test assures that the overall or integrated leakage rate from the whole containment is below the acceptance criterion specified in Appendix J. This exemption does not change this value. Appendix J presently specifies the test frequency for a Type A test as a set of three tests, at approximately equal intervals during each 10-year service period. The licensee proposes to change the test frequency to one Type A test in 10 years. Both an analysis of the test results from operating reactors over an extended period (NUREG-1493) and a risk analysis (EPRI TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals") support extending the Type A test interval to once in 10 years.

The staff proposed that the exemption include a precondition before extending the Type A test. Two consecutive Type A tests must be successful before the interval is extended. This is included in the exemption. By letter dated April 18, 1995, the licensee agreed to this change. The following exemption is granted until startup from Refueling Outage (RFO) 9, currently scheduled for Spring 1998.

Exemption from Section III.D.1(a):

Type A tests shall be performed on a 10-year interval provided that the two previous consecutive Type A tests, performed on the test interval specified in Appendix J (three tests, at approximately equal intervals in a 10-year period), have been successful.

If a Type A test is failed, and the failure is not due to a Type B or C component, acceptable performance must be reestablished by performing a Type A test within 48 months of the unsuccessful Type A test. Following a successful Type A test, the surveillance frequency may be returned to once per 10 years.

In addition, the licensee must perform general inspections of the accessible interior and exterior surfaces of the containment structures, as specified in Section V.A of Appendix J, at the test interval specified in Appendix J for Type A tests, even when no Type A test is required during that outage. By letter dated April 18, 1995, the licensee agreed to this change.

There is no relationship between Type A testing and the inservice inspection (ISI) service period. This exemption will continue in effect until startup from RFO 9.

V.

The licensee proposed an exemption from Sections III.D.2(a) and III.D.3 of Appendix J to permit Type B and C testing to be done based on previous performance of a component. The licensee presented data and analyses to show that the risk from using a performance-based approach to Type B and C testing is negligible. This is in agreement with the conclusions of NUREG-1493.

The licensee proposed that the test interval be determined as follows: (1) One successful test or a failure would require maintaining the present test interval of 2 years. (2) Two successful consecutive tests would permit extending the test interval to five years. (3) Three successful consecutive tests would result in increasing the test interval to 10 years. The staff does not agree with a 10-year interval. It is the staff's judgment that the licensee has not justified the 10-year interval to the same degree of confidence as the 5-year interval. By letter dated April 18, 1995, the licensee agreed to this change.

In addition, there are certain valves which the staff considers to be so safety significant that the test interval for these valves should not be extended without prior staff review and approval. The staff has specified

these valves in the exemption. By letter dated April 18, 1995, the licensee agreed to this change.

Exemption from Sections III.D.2(a) and III.D.3 of Appendix J:

After two successful consecutive tests, performed at the present Appendix J test interval of no more than 2 years, a Type B or C component may be tested once every 5 years. If this test or a subsequent test is a failure, the test interval for this component shall revert to a 2-year interval until the component passes two consecutive tests. The 5-year interval may then be resumed. By letter dated April 18, 1995, the licensee agreed to this change.

Main steam isolation valves, feedwater valves and containment system supply and exhaust isolation valves shall remain on a 2-year test interval. Any change will require prior review and approval by the NRC. This exemption will continue in effect until startup from RFO 9.

VI.

The licensee proposed to increase the test intervals for air locks based on the good performance of the air locks at Grand Gulf. The licensee's August 13, 1993, submittal provides a summary of test data which shows excellent performance in both air lock and air lock door seal testing.

The staff proposed an addition to the requested exemption to account for the contingency that the performance may not be maintained at this high level. If an air lock fails a test, the extended interval would revert to the Appendix J test intervals until two consecutive successful tests demonstrate that the problem has been resolved. By letter dated April 18, 1995, the licensee agreed to this change.

Exemption from Section III.D.2(b)(i) and (b)(iii):

Air locks may be leakage rate tested at intervals of no more than 2 years. If an air lock fails a leakage rate test, the air lock shall then be required to pass two consecutive leakage rate tests at a test interval of 6 months prior to returning to the 2-year test interval. During a period of frequent opening of air lock doors, the air locks shall be tested at least every 30 days. If an air lock fails a leakage rate test during a period of frequent opening, the air lock shall be required to pass two consecutive leakage rate tests at a test interval of 72 hours prior to returning to the 30-day interval. Since the Grand Gulf air lock doors have testable seals, testing the seals fulfills the 30-day test requirement. This exemption will continue in effect until startup from RFO 9.

VII.

The staff's safety evaluation, which is enclosed and summarized above, concludes that the licensee's proposed extension of Appendix J test intervals is acceptable. This exemption will remain valid until startup following Refueling Outage 9. This approval is based on the assumption that all other aspects of Appendix J testing not explicitly addressed will be conducted in accordance with Appendix J.

Section 50.12 of Title 10 of the Code of Federal Regulations, "Specific Exemptions", delineates the conditions which must be satisfied in order for the Commission to grant an exemption from the regulations of 10 CFR Part 50. The proposed exemption must not violate applicable law, it must not "present an undue risk to the public health and safety", and must be "consistent with the common defense and security". The licensee states that it believes these conditions are satisfied. The staff concurs.

In addition, 10 CFR 50.12 states that the Commission will not consider granting an exemption unless special circumstances are present. The licensee, in the August 13, 1993, submittal presented its argument as to why this exemption request meets several of the special circumstances specified in 10 CFR 50.12. It is the staff's opinion that the licensee's proposal satisfies special circumstance 50.12(a)(2)(iv). Special circumstance (iv) states that:

The exemption would result in benefit to the public health and safety that compensates for any decrease in safety that may result from the grant of the exemption.

It is the staff's judgment that there is a significant public benefit to be derived from granting the licensee's exemption request to 10 CFR Part 50, Appendix J. The licensee's proposal was detailed and well thought-out and thoroughly considered the effect on safety of the proposed changes. Reviewing this exemption request was beneficial to the staff's Appendix J rulemaking effort. Granting the exemption will assist the staff in assessing the process of implementing a performance-based containment leakage rate testing rule which, in turn, is of a clear benefit to the public. The staff considers any decrease in safety that may result from granting the exemption to be very small. This was confirmed by the risk studies discussed in Section 3 of the safety evaluation on this exemption request.

Accordingly, the Commission has determined, pursuant to 10 CFR 50.12(a), that this exemption is authorized by law and will not present an undue risk to the public health and safety, and is consistent with the common defense and security. In addition, the Commission has found special circumstances in that granting of this exemption will result in a benefit to public health and

safety that compensates for any decrease in safety that may result from the grant of the exemption. Therefore, the Commission hereby grants the exemption from 10 CFR Part 50, Appendix J, Sections III.D.1(a), III.D.2(a) and III.D.3 and Section III.D.(b)(i) and III.D.2.(b)(iii). The specific exemptions are stated as in Sections IV, V, and VI above.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will have no significant impact on the quality of the human environment (60 FR 19791). The exemption is effective upon issuance.

Dated at Rockville, Maryland, this 26th day of April 1995.

FOR THE NUCLEAR REGULATORY COMMISSION

Elinor G. Adensam

Elinor G. Adensam, Acting Director
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

safety that compensates for any decrease in safety that may result from the grant of the exemption. Therefore, the Commission hereby grants the exemption from 10 CFR Part 50, Appendix J, Sections III.D.1(a), III.D.2(a) and III.D.3 and Section III.D.(b)(i) and III.D.2.(b)(iii). The specific exemptions are stated as in Sections IV, V, and VI above.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will have no significant impact on the quality of the human environment (60 FR 19791). The exemption is effective upon issuance.

Dated at Rockville, Maryland, this 26th day of April 1995.

FOR THE NUCLEAR REGULATORY COMMISSION

Original signed by:

Elinor G. Adensam, Acting Director
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

*See previous concurrence
Document Name: GG87209.EXE

OFC	LA/PD4-1 <i>DN</i>	PM/PD4-1 <i>POC</i>	OGC*	D/PD4-1 <i>POC</i>	(A&B/DRPW)
NAME	PNoonan	PO'Connor/v	CMarco*	WBeckner	EAdensam
DATE	4/21/95	4/24/95	4/14/95	4/25/95	4/26/95



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

APPENDIX J EXEMPTION

ENTERGY OPERATIONS, INC.

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

1.0 BACKGROUND

The Code of Federal Regulations, 10 CFR 50.54(o), specifies, as a condition of all operating licenses for water-cooled power reactors, that primary reactor containments meet the leakage test requirements set forth in Appendix J of that part (Reference 1). Appendix J, "Primary Reactor Containment Leakage Testing For Water-Cooled Power Reactors," specifies testing requirements that verify the leaktight integrity of the primary reactor containment, and systems and components which penetrate containment, and establishes the acceptance criteria for such tests.

Section 50.12 of Title 10 of Code of Federal Regulations states that the Commission may grant exemptions from the requirements of these regulations provided certain conditions are met. Exemptions may be granted which are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security as specified in 50.12(a)(1). In addition to these general requirements the proposed exemptions must meet at least one of the special circumstances given in 10 CFR 50.12(a)(2).

By letter dated August 13, 1993 (Reference 2), the licensee for the Grand Gulf Nuclear Station, Unit 1, Entergy Operations, Inc. (or the licensee), submitted a request for an exemption to portions of the requirements of 10 CFR Part 50, Appendix J, and a request for changes to the Grand Gulf Nuclear Station Technical Specifications (TSs) necessary to implement the exemption. The licensee requested the proposal be considered as a cost-beneficial licensing action (CBLA). Additional information was provided by the licensee in responses to requests for additional information in letters dated April 15, (Reference 13), May 11, (Reference 6), and July 20, 1994 (Reference 8). The licensee revised the proposed TSs in a letter dated June 24, 1994 (Reference 7) and by letter dated April 18, 1995, the licensee agreed to exemption changes proposed by the staff (Reference 15).

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Improvements to Appendix J requirements have been identified by the nuclear industry, the staff's Marginal-to-Safety program, the Regulatory Review Group, and the CBLA Task Force as an area of potentially significant cost savings to both the NRC and licensees while having a relatively small impact on safety. An expedited rulemaking has therefore been initiated. The NRC issued an Advanced Notice of Proposed Rule Making to revise Appendix J on November 24, 1992 (57 FR 55156)(Reference 3). The staff further notified the Commission of its intent to revise Appendix J in SECY 94-036, dated February 17, 1994 (Reference 4), and discussed the staff's intent to develop a performance-based regulation.

SECY 94-036 also informed the Commission that the staff did not intend to review requests for anticipatory exemptions from Appendix J during the rulemaking period with the exception of the Entergy proposal for Grand Gulf. The reason for this was the usefulness of the Entergy proposal to the rulemaking process because of its scope and the technical information it provides.

The final rule is expected to be published in the fall of 1995. On February 21, 1995, the proposed rule was published for comment (Reference 14). It will establish performance-based requirements for containment leakage rate testing that are very similar to those requested by Entergy. In Entergy's original submittal, the licensee acknowledged that the nuclear power industry and the NRC staff have been working on revisions to Appendix J for many years. However, the licensee stated that due to uncertainties in the rulemaking process and the "potential for extended delays", the "plant-specific needs of Grand Gulf" would best be met by a plant-specific submittal. As a result of several discussions between the NRC staff and the Grand Gulf Nuclear Station staff, it has been mutually agreed that approval of the proposed program for a two operating cycle period pending final rule changes to Appendix J is acceptable. Thus, the exemption will be in effect from the beginning of Refueling Outage 7 to first startup following Refueling Outage 9.

The NRC staff's findings with respect to authorizing the exemption request for a two refueling cycle period and the associated TSs changes are contained in this safety evaluation.

The August 13, 1993, Grand Gulf submittal makes the following proposals:

- . Type A testing would be done on a frequency not to exceed 10 years. Appendix J requires three tests, approximately equally spaced, within 10 years. [Appendix J defines a Type A test as a test to measure the primary reactor containment overall integrated leakage rate.]
- . Type B and C testing would be done on a pre-determined frequency based on the leakage performance history of the component, not to exceed once in 10 years. Appendix J requires testing of each Type B and C component at least once every 2 years. [Appendix J defines a Type B test as a test to detect local leaks and measure local leakage across each pressure-containing or leakage-limiting boundary for specific types of containment penetrations including those with resilient seals, gaskets,

sealant compounds, bellows, as well as air locks and electrical penetrations. Type C tests measure containment isolation valve leakage rates.]

Containment air lock leakage rate testing would be done every 2 years and once every 30 days following entry when containment integrity is required. Appendix J requires the air lock to be tested at 6-month intervals and tested following entry at no greater than 3 days after use during periods when containment integrity is required.

The Entergy proposal changes only test frequencies. The licensee did not propose any changes to test methods, acceptance criteria or allowable leakage limits.

Much of the technical justification for the proposed change to Appendix J is contained in Draft NUREG-1493, "Performance-Based Containment Leak-Test Program" (Reference 5) prepared by the NRC staff and NRC contractors. This report also provides some of the justification, in addition to that provided by the licensee, for the staff's acceptance of the Entergy proposal.

The licensee submitted proposed changes to the Grand Gulf TSs in support of this exemption in submittals dated August 13, 1993 (Reference 2), and June 24, 1994 (Reference 7). However, these proposed TSs have been superseded by the licensee's conversion of the Grand Gulf TSs to the boiling water reactor (BWR) 6 Improved Standard Technical Specifications entitled, "Standard Technical Specifications General Electric Plant, BWR/6, NUREG-1434", in Amendment 120 dated February 21, 1995. The latter TSs were used in this review.

2.0 SAFETY EVALUATION

2.1 Type A Tests

Section III.D.1(a) of Appendix J states:

"A set of three Type A tests shall be performed at approximately equal intervals during each 10-year service period. The third test of each set shall be conducted when the plant is shutdown for the 10-year plant inservice inspections."

The licensee proposes an exemption to this section which would require one Type A test in a 10-year interval. There would no longer be any relationship between the Type A test and the 10-year plant inservice inspections as currently required by Appendix J.

The licensee's basis for this request is given in the licensee's August 13, 1993, submittal (Reference 2). The staff has also made use of a draft staff report, NUREG-1493 (Reference 5), which provides the technical justification for the present Appendix J rulemaking effort which also includes a 10-year test interval for Type A tests.

The integrated leakage rate test, or Type A test, measures overall containment leakage. However, operating experience with all types of containments used in this country demonstrates that essentially all containment leakage can be detected by local leakage rate tests (Type B and C). According to results of an NRC study given in NUREG-1493, out of 180 Type A test reports covering 110 individual reactors and approximately 770 years of operating history, only 5 Type A failures were found which local leakage rate testing could not detect. This is 3% of all failures. This study agrees well with previous staff studies which show that Type B and C testing can detect a very large percentage of containment leaks. The Grand Gulf experience has also been consistent with this. The first Grand Gulf Type A test was a failure because of excessive leakage from Type C components.

The Nuclear Management and Resources Council (NUMARC), now the Nuclear Energy Institute (NEI), collected and provided the staff with summaries of data to assist in the Appendix J rulemaking effort. NUMARC collected results of 144 Type A tests from 33 units. Twenty-three Type A tests exceeded $1.0L_a$. Of these, only nine were not due to Type B or C leakage penalties. The NUMARC data also added another perspective. The NUMARC data show that in about one-third of the cases exceeding allowable leakage, the as-found leakage was less than $2L_a$; in one case the as-found leakage was less than $3L_a$; one case approached $10L_a$; and in one case the leakage was found to be approximately $21L_a$. For about half of the failed Type A tests the as-found leakage was not quantified. These data show that, for those Type A tests for which the leakage was quantified, the leakage values are small in comparison to the leakage value at which the risk to the public starts to increase over the value of risk corresponding to L_a (approximately $200L_a$, as discussed in NUREG-1493).

For these reasons, the staff finds the licensee's proposal acceptable, subject to several conditions discussed below.

The licensee has not proposed any preconditions prior to going to the 10-year test interval for Type A tests. The current rulemaking proposes two consecutive successful tests as a condition for going to a 10-year Type A test interval. The staff proposed that the same algorithm apply to Grand Gulf. The licensee disagrees with the staff's position. However, it is the staff's position that the two consecutive successful tests prior to extending the Type A test interval to 10 years add a necessary level of assurance that the integrated leakage rate will not exceed L_a between tests.

The current rulemaking also specifies that if a Type A test is failed, and the failure is not due to a Type B or C component, acceptable performance should be reestablished by performing a Type A test within 48 months of the unsuccessful Type A test. Following a successful Type A test, the surveillance frequency may be returned to once per ten years. While this provision is probably not necessary since the term of this exemption is only for two cycles, it is included for completeness and for any possible future use.

After issuance of this exemption, the licensee will still be required to comply with Sections IV.A and V.A of Appendix J. Section IV.A requires leakage

testing after modifications to the containment boundary. Section V.A requires a general inspection of accessible interior and exterior surfaces of the containment prior to the Type A test. These provisions provide further assurance that the containment remains an "essentially leak-tight boundary" as required by General Design Criterion 16.

It is the staff's position that general inspections of the type required by Section V.A of Appendix J be continued at the frequency currently required by Appendix J, that is, three times, approximately equally spaced, in a 10-year interval even though two of the inspections during the 10-year interval will no longer precede a Type A test. The licensee disagrees with this position. However, the staff considers that these inspections, though limited in scope, provide an important added level of confidence in the continued integrity of the containment boundary.

Based on generic and plant-specific data, the staff finds the licensee's proposed exemption to allow Type A testing on a 10-year interval to be acceptable with the conditions discussed above. The licensee's April 18, 1995, letter agreed to the conditions proposed by the NRC staff.

STATEMENT OF EXEMPTION:

Exemption from Section III.D.1(a):

Type A tests shall be performed on a 10-year interval provided that the two previous consecutive Type A tests, performed on the test interval specified in Appendix J (three tests, at approximately equal intervals, in a 10-year period), have been successful.

If a Type A test is failed, and the failure is not due to a Type B or C component, acceptable performance shall be reestablished by performing a Type A test within 48 months of the unsuccessful Type A test. Following a successful Type A test, the surveillance frequency may be returned to once per 10 years.

In addition, the licensee must perform general inspections of the accessible interior and exterior surfaces of the containment structures, as specified in Section V.A of Appendix J, at the Type A test interval specified in Appendix J, even when no Type A test is required during that outage.

There is no relationship between Type A testing and the inservice inspection (ISI) service period.

This exemption shall be valid from the beginning of Refueling Outage 7 to the first startup following Refueling Outage 9.

2.2 Type B Tests (Other Than Air Locks) and Type C Tests

Section III.D.2 of Appendix J states:

"(a) Type B tests. Type B tests, except for air locks, shall be performed during reactor shutdown for refueling, or other convenient intervals, but in no case at intervals greater than 2 years."

Section III.D.3 of Appendix J states:

"Type C tests. Type C tests shall be performed during each reactor shutdown for refueling but in no case at intervals greater than 2 years."

Air locks are addressed in Section 2.3 of this safety evaluation report.

The licensee has proposed exemptions to these two sections of Appendix J to allow Type B and C tests "at intervals based on the performance of the component. The test intervals will be established for each component by evaluating testing history and adjusting the testing intervals based on certain defined criteria, including engineering judgment" (Reference 2). The licensee proposes the following algorithm for determining the test interval for Type B and C tests other than air locks:

- Every 2 years for components which have passed only one test or have failed the previous test
- Every 5 years for components which have passed the last two consecutive tests
- Every 10 years for components which have passed the last three consecutive tests

The licensee proposes to establish test intervals for each component by reviewing the results of the last three consecutive Type B or C tests and determining if the Type B or C component passed or failed. (In this context, failure refers to exceeding the licensee's administrative leakage limit for that component, and does not necessarily mean failure to satisfy the Appendix J or TSs criteria.)

The staff does not agree with an extension of the test interval to 10 years for Type B components and Type C components. This is discussed further below.

To be considered consecutive, the licensee proposes that Type B and C leakage rate tests must be performed in sequence at least 12 months apart with a minimum of 12 months inservice time prior to the test. This is acceptable.

The licensee will assign an allowable leakage rate to each Type B and Type C component. This allowable leakage rate will be the administrative leakage rate limit and will be "specified to be indicative of the potential onset of valve degradation" (Reference 2). This is an important aspect of performance-based testing since if the limit is set arbitrarily high, the outcome will not be an accurate reflection of performance.

The licensee stated that "under this approach, penetrations and containment isolation valves that do not demonstrate excessive leakage will have surveillance intervals that reflect their reliable performance. Any valves or penetrations that demonstrate excessive leakage and require repair or replacement will be tested during the next scheduled refueling outage to monitor the effectiveness of the corrective action." It is the staff's position that a component whose leakage rate exceeds the administrative limit should pass two consecutive tests before the component is once again tested on an extended interval. Technical studies which include consideration of common cause failures support this position (Reference 5). In discussions with the licensee, the licensee has stated that it is the licensee's intention to require two tests prior to returning to the extended interval. The guidance accompanying the proposed Appendix J rule change states that the two tests should be separated by at least 12 months which is consistent with the licensee's proposal.

While the above algorithm is the main element of the licensee's proposal, there are other aspects which are discussed below.

The licensee states in Reference 2 that the responsible engineer will review all consecutively passed tests "to determine if the leakage was high, erratic or indicative of a degrading trend." Such behavior could indicate the possibility of failure prior to the next scheduled Type B or C test. If the licensee determines that the trend of the leakage rate is exhibiting such a trend, the licensee will take action to correct the situation. Page 12 of Reference 2 lists information the responsible engineer will use to evaluate the probability of failure. The staff considers the review of all passed tests to be a positive aspect of performance-based testing which should be maintained as part of the licensee's program.

The licensee stated that operating experience is reviewed to identify any generic problems with components subject to Appendix J testing. The licensee states that "[i]f the problem could affect test performance, an evaluation will be done and the test interval will be adjusted to an appropriate interval. The problem will be monitored until it is resolved or until the problem is corrected." The staff considers such monitoring of operating experience to be an important aspect of performance-based testing which should be maintained as part of the licensee's program.

The licensee also stated that a review will be performed of each failure to determine if the failure was generic or isolated. "If it is determined that the failure is generic, all other components which are subject to the same failure mechanism will be adjusted to an appropriate interval. All components located in a penetration of a failed component will be evaluated for placement in the same interval as the failed component" (Reference 2). The staff considers this an important aspect of performance-based testing which should be maintained as part of the licensee's program.

The licensee also stated that a portion of the components that are on extended test intervals will be scheduled for testing each outage to assist in identifying common mode failures. The licensee asserts that this staggered

testing will help ensure that problems associated with valves of similar design, age or usage are identified on a reasonable frequency.

In order to track component performance, the licensee also proposed to perform as-found Type B or C testing, as appropriate, prior to any maintenance or modification activity performed on a component that could affect the component's leak tightness. Components remaining on 2-year intervals will not require as-found testing during outages when Type A testing is not performed. The staff considers testing prior to maintenance or modification to be a necessary condition of a performance-based approach.

The licensee states that following maintenance on or modification of a component that could affect the component's leak tightness, a Type B or C test will be performed. The licensee proposes that if the post work Type B or C test leakage rate for extended interval components is not greater than 5% of the Type B or C test leakage rate performed prior to maintenance or modification, and other applicable retests (such as tests required for motor operated valve testing) are acceptable, re-establishment of component performance will not be required and the component will remain on its current test interval. If the post-work Type B or C test leakage rate for extended interval components was greater than 5% of the Type B or C test leakage rate performed prior to maintenance or modification, or other applicable retests were unacceptable, re-establishment of component performance will be required and the test interval will be adjusted to a two-year interval. The test interval may then be extended once satisfactory performance is re-established in accordance with the requirements of the licensee's program. As stated above, it is the staff's position that two consecutive tests must be passed before the component is placed on an extended test interval of 5 years. The licensee has assured the staff that this is consistent with its proposed program.

There appears to be no special significance to the 5% criterion, but the staff considers it to be acceptably conservative.

The licensee has proposed that components which are known to be relatively poor performers and which are major contributors to containment leakage (and are therefore especially safety significant) will remain on a fixed 2-year (maximum) interval. The licensee proposes to put the main steam line isolation valves and main feedwater valves in this category. The licensee proposes that a change to the fixed interval will only be done if evaluation under 10 CFR 50.59 determines that the change is acceptable from a risk perspective, which includes leakage probability and consequence considerations. The staff position, which is consistent with the proposed Appendix J rulemaking, is that MSIVs, main feedwater valves and containment purge supply and exhaust isolation valves should be leakage rate tested on the current Appendix J interval of 2 years and that a change in this interval should require prior staff review and approval. The licensee does not agree with this position, but has stated, in discussions with the staff, that there are no plans for extending the test intervals for any of these valves. The staff will include this position as a condition of the exemption.

The licensee proposed that a Type B or C component that passed two consecutive tests would be tested every 5 years and that a Type B or C component that passed three consecutive leakage rate tests would be tested on an interval not to exceed 10 years. The current experience base is for valves which are leakage rate tested every outage, since this is the Appendix J requirement. Based on an analysis of leakage rate data from North Anna (a pressurized water reactor) and Grand Gulf, as documented in Reference 5, and a review of a summary of operating reactor data submitted to the staff by NEI (Reference 11), all based on the Appendix J 2-year testing interval, the staff concludes that the licensee's proposal to extend the test interval to 5 years after two successful tests is acceptable. The staff considers a valve which passes two consecutive leakage rate tests to have a reasonable likelihood of not exceeding the Appendix J limit during the 5-year interval. This is based on a statistical analysis of the North Anna and Grand Gulf data reported in Reference 5 and on engineering judgment. However, the data are not sufficient to reach the same conclusion about a 10-year interval. In addition, a valve on a 10-year leakage rate testing interval that fails could remain failed for a much longer period of time. Since Type B and C components are presently tested every 2 years, maintenance is performed often enough so that there is little data to demonstrate that degradation effects from longer service do not become important. The licensee has submitted some data on Type C components, in response to a staff question, to demonstrate that these components had a low leakage rate after many years without maintenance (Reference 8). However, the amount of data is insufficient to provide the same level of confidence that exists for the 5-year interval after two successful tests. Therefore, the staff finds the 10-year interval following three successful tests unacceptable at this time. The staff considers it prudently conservative to gain experience with a 5-year maximum interval before increasing the present testing interval by a factor of five.

The licensee has also used the arguments that the risk, even with a 10-year test interval, is low. This is discussed further in Section 3.0, RISK CONSIDERATIONS.

In addition to Appendix J required testing, the licensee stated in Reference 6 (response to Question 37) that:

each valve that is Type C tested is pressure tested and inspected for leakage as required by the ASME Code, Section XI, Paragraph IWA-5211. Class 1 components are pressure tested every refueling outage per Table IWB-2500 and Class 2 components are pressure tested per Table IWC-2500 every 40 months. These inspections detect any external leakage such as through-wall pressure boundary leaks, leaks from mechanical joints including body-to-bonnet leaks, and packing leaks.

In response to a staff question, the licensee discussed in Reference 6 (response to Question 33) the relationship between Appendix J required valve leakage rate testing and the inservice leakage rate testing required by Section XI of the ASME Code. Section XI of the ASME Code requires leakage rate testing on a two year interval. By letter dated October 19, 1990, the staff confirmed that the Grand Gulf licensee's inservice testing program met

the guidelines of Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." Therefore, the program is acceptable. As part of this inservice testing program, containment isolation valves are leakage rate tested according to the requirements of Appendix J. The licensee stated, in response to Question 33 (Reference 6) that the Grand Gulf relief request will be revised to account for the proposed test intervals. The staff will review the licensee's proposed revision to the relief request using the findings of this safety evaluation report for guidance. The licensee's April 18, 1995, letter agreed to the conditions proposed by the NRC staff.

STATEMENT OF EXEMPTION:

Exemption from III.D.2(a) and III.D.3:

Type B and C testing shall be performed according to the following algorithm. After two successful consecutive tests, performed at the present Appendix J test interval of no more than 2 years, a Type B or C component may be tested once every 5 years. If this test or a subsequent test is a failure, the test interval for this component shall revert to a 2-year interval until the component passes two consecutive tests. The 5-year interval may then be resumed.

Main steam isolation valves, main feedwater valves and containment purge supply and exhaust isolation valves shall remain on a 2-year test interval. Any change will require prior review and approval by the NRC.

This exemption shall be valid from the beginning of Refueling Outage 7 to the first startup following Refueling Outage 9.

2.3 Containment Air Locks

Appendix J, Section III.D.2 specifies the following leakage rate testing requirements for airlocks:

"(b)(i) Air locks shall be tested prior to initial fuel loading and at 6 month intervals thereafter..."

"(b)(iii) Air locks opened during periods when containment integrity is required by the plant's Technical Specifications (TS) shall be tested within 3 days after opening. For airlock doors opened more frequently than once every 3 days, the air lock shall be tested at least once every 3 days during the period of frequent openings. For air lock doors having testable seals, testing the seals fulfills the 3 day test requirements."

In lieu of these Appendix J requirements, the licensee proposes to perform Type B tests on each containment air lock every 2 years and proposes to perform the leakage rate test of the air lock seals every 30 days following opening during periods when containment integrity is required. Note that

these intervals are fixed and not performance-based. The licensee stated in Section 5.4 of Reference 2 that a performance-based approach would not work because of the 5 year replacement life of the air lock door seals.

The licensee presented data showing that air locks at Grand Gulf, between 1986 and 1993, passed 97% of the required Appendix J tests and 100% of the air lock door seal tests. The licensee also claims that reduced testing will also reduce the possibility of human error during restoration of the air lock to its operational configuration. While this performance justifies the licensee's request to extend the test intervals, it does not address the issue of a remedial action in case there is a decline in performance. It is the staff's position that the air lock testing intervals should be established with contingencies such as those for the Type A, other Type B, and Type C tests. If an air lock fails a leakage rate test, the interval should be re-established at a 6-month interval. Two successful tests would be required to re-establish the 2-year test interval. Similarly, following opening of air lock doors, if an air lock door fails a leakage rate test, the test interval should be changed to 72 hours. Two successful tests would be required to re-establish the 30-day test interval. The licensee disagrees with the staff's position. However, since the extended intervals proposed by the licensee are based on good performance, the staff considers it reasonable to reduce the test interval until good performance has been re-established. This position will be included in the exemption.

In addition to the performance history, the licensee provided the following as justification for the exemption request (Reference 2). Each test for the air locks is evaluated and trended by the licensee to assist in the prediction of seal failure. Also, a systems engineer will provide oversight and act as a focal point for all containment air lock matters, which should assure consistency and knowledgeable review of all work concerning air locks.

Based on the present performance of the air locks at Grand Gulf, and the requirement to adjust the leakage rate testing interval should this performance deteriorate, the staff finds the licensee's exemption request acceptable when modified as discussed above. The licensee's April 18, 1995, letter agreed to the conditions proposed by the NRC staff.

STATEMENT OF EXEMPTION:

Exemption from III.D.2 (b)(i) and (b)(iii) :

Air locks may be leakage rate tested at intervals of no more than 2 years. If an air lock fails a leakage rate test, the air lock shall then be required to pass two consecutive leakage rate tests at a test interval of 6 months prior to returning to the 2-year test interval. Following opening of an air lock door when containment integrity is required, the air locks shall be tested at least every 30 days. If an air lock fails a leakage rate test following opening of an air lock door when containment integrity is required, the air lock shall be required to pass two consecutive leakage rate tests at a test interval of 72 hours prior to returning to the 30-day interval. Since the

Grand Gulf air lock doors have testable seals, testing the seals fulfills the 30-day test requirement.

This exemption shall be valid from the beginning of Refueling Outage 7 to the first startup following Refueling Outage 9.

3.0 RISK CONSIDERATIONS

Since the containment is one of the principal barriers to the release of radiation, it is important to consider the effect of the proposed changes on risk.

This was addressed by the licensee in Reference 2 and in response to staff questions in References 6 and 8. In addition, the staff addressed the risk associated with using a performance-based approach to containment leakage rate testing in Reference 5. The Electric Power Research Institute (EPRI) reported the results of its study of the risk of increasing containment leakage rate test intervals in Reference 9. The safety concern with performance-based testing is that reducing the test frequency will increase the time during which a leakage rate could exist which is greater than the allowable value. However, all three studies concluded that there is an insignificant increase in risk due to a conversion to performance-based containment leakage rate testing.

The EPRI analysis addressed the issue most directly. It considered the risk due to change in leakage rate testing frequency for a pressurized water reactor (PWR) and a BWR (not Grand Gulf). The EPRI analysis combined the IPE containment isolation system models for the PWR and the BWR with the respective NUREG-1150 (Reference 10) population dose models. The IPE containment isolation system models were modified to derive a failure-to-seal failure mode. The NEI containment leakage rate performance data provided by the licensees of 33 nuclear power plants were used to derive this failure-to-seal model. The results of the EPRI calculations show that the change in risk is insignificant. While the EPRI study did not use Grand Gulf as the BWR model, the staff is confident that there would be no change in the overall conclusion had Grand Gulf served as the model.

The licensee did not utilize risk in the determination of test intervals. In response to a staff question, the licensee stated in Reference 6 that "an assessment of...the IPE and shutdown PRA was done to support the conclusion that the impacts on risk of the proposed changes are small and safety neutral." The intervals appear to have been chosen using engineering judgment based on the performance of Grand Gulf components. Thus, the proposal is not risk-based. However, the licensee presented a reasonable argument, using risk insights which have been corroborated by other studies, as mentioned above, that there is an insignificant increase in risk when applying the proposed performance-based testing scheme. In fact, the licensee showed that some components of the risk would be decreased by using the performance-based approach.

The licensee found that the proposed changes do not alter the frequency of interfacing system LOCAs since the changes proposed by the licensee are independent of the testing done to assure the integrity of the high/low pressure interface.

The probability of a LOCA outside containment was examined. Failure of the main feedwater and main steam isolation valves to close on demand will not be impacted by the proposed changes but the possibility of leakage after closure could be affected. However, the licensee stated that "changes to the testing frequency of these valves are not anticipated." In fact, as discussed above, this exemption will require that these valves remain on a fixed 2-year interval. The licensee did perform a calculation conservatively assuming that the test frequency for these valves was increased to once every 10 years and that the leakage was significant enough to be classified as a small or a small-small LOCA. The licensee stated that the resulting probability of core damage was negligible.

The licensee studied the effect on shut down risk of system configuration changes (such as draining and refilling piping in various systems) necessary to perform the leakage rate tests. The licensee calculated that the reduction in core damage risk from implementing the Grand Gulf scheme would be 1.5% and the reduction in the "boiling risk impact" would be 0.4% for Refueling Outage 6. Both numbers represent reductions from already very small numbers.

The licensee has used the low value of calculated risk as justification for extending test frequencies. While the low calculated risk is a necessary condition for any change to containment leakage rate testing, it is not sufficient. Appendix J is an adequate protection rule. The rule is meant to assure that GDC 16, which requires an "essentially leak tight containment," and the siting criteria of 10 CFR Part 100 are satisfied. The standard for these regulations is a containment leakage rate below L_a , which is specified in the TSs. The staff's justification for approving the licensee's exemption request is that the amount of testing, even when reduced based on good performance, will still provide adequate assurance that L_a will not be exceeded.

4.0 TECHNICAL SPECIFICATIONS

In order to implement the exemption request, the licensee, in References 2 and 7 proposed changes to the Grand Gulf TSs. However, the licensee has since converted to the BWR-6 Improved Standard Technical Specifications of NUREG-1434 (Reference 12). Because of this conversion, the staff review and approval is based on these TSs (Amendment 120) rather than on those proposed in References 1 and 7.

Surveillance Requirement 3.6.1.1.1

This TSs surveillance requires containment leakage rate testing, except for primary containment air lock testing, in accordance with 10 CFR Part 50, Appendix J and approved exemptions. Sections 2.1, 2.2, and 2.3 of this safety

evaluation state the exemptions to Appendix J which the staff is approving as part of this review.

This TSs surveillance requirement also requires visual examinations to be performed in accordance with 10 CFR Part 50, Appendix J and approved exemptions. As discussed in Section 2.1 of this safety evaluation, Section V.A of Appendix J requires a general examination of the containment accessible interior and exterior surfaces on the same schedule as the Type A leakage rate test. This exemption will change the Type A test interval to 10 years, but retain the general examination of the containment on an interval of three times, approximately equally spaced, in a 10-year interval.

Surveillance requirement 3.6.1.2.1

Surveillance requirement 3.6.1.1.1 specifically excludes air locks. Surveillance requirement 3.6.1.2.1 addresses air locks. It also requires leakage rate testing of air locks in accordance with Appendix J as modified by approved exemptions. Section 2.3 of this safety evaluation provides the exemption which the staff is approving as part of this review.

5.0 EXEMPTION REQUEST

Section 50.12 of Title 10 of the Code of Federal Regulations, "Specific Exemptions" delineates the conditions which must be satisfied in order for the Commission to grant an exemption from the regulations of 10 CFR Part 50. The proposed exemption must not violate applicable law, it must not "present an undue risk to the public health and safety," and must be "consistent with the common defense and security." The licensee in Reference 2 states that these conditions are satisfied. The staff concurs. A discussion of risk considerations is given in Section 3.0 of this safety evaluation.

In addition, 10 CFR 50.12 states that the Commission will not consider granting an exemption unless special circumstances are present. The licensee, in Section 6.0 of Reference 2 presented its discussion on why this exemption request meets several of the special circumstances specified in 10 CFR 50.12. It is the staff's opinion that the licensee's proposal discussed in this safety evaluation satisfies special circumstance 50.12(a)(2)(iv). Special circumstance (iv) states that

The exemption would result in benefit to the public health and safety that compensates for any decrease in safety that may result from the grant of the exemption.

It is the staff's view that there is a public benefit to be derived from granting the licensee's exemption request to 10 CFR Part 50 Appendix J. The licensee's proposal is detailed and well-thought out and considered the effect on safety of the proposed changes. Reviewing this exemption request was beneficial to the staff's Appendix J rulemaking effort. In addition, granting the exemption will assist the staff in assessing the implementation of a performance-based containment leakage rate testing rule. The staff considers any decrease in safety that may result from granting the exemption to be very

small. This was confirmed by the risk studies discussed in Section 3.0 of this safety evaluation.

6.0 CONCLUSION

The Grand Gulf licensee presented the staff with an innovative proposal for using the previous performance of structures, systems and components covered by Appendix J as a basis for determining future test intervals. In addition, the licensee has presented discussions of the factors which affect the risk of containment leakage and how these factors will be controlled as a result of the proposed changes.

The staff grants the following exemptions from 10 CFR Part 50 Appendix J:

Exemption from Section III.D.1(a):

Type A tests shall be performed on a 10-year interval provided that the two previous consecutive Type A tests, performed on the test interval specified in Appendix J (three tests, at approximately equal intervals, in a 10-year period), have been successful.

If a Type A test is failed, and the failure is not due to a Type B or C component, acceptable performance shall be reestablished by performing a Type A test within 48-months of the unsuccessful Type A test. Following a successful Type A test, the surveillance frequency may be returned to once per 10 years.

In addition, the licensee must perform general inspections of the accessible interior and exterior surfaces of the containment structures, as specified in Section V.A of Appendix J, at the Type A test interval specified in Appendix J, even when no Type A test is required during that outage.

There is no relationship between Type A testing and the ISI service period.

This exemption shall be valid from the beginning of Refueling Outage 7 to the first startup following Refueling Outage 9.

Exemption from Sections III.D.2 and III.D.3 of Appendix J:

Type B and C testing shall be performed according to the following algorithm. After two successful consecutive tests, performed at the Appendix J test interval of no more than two years, a Type B or C component may be tested once every 5 years. If this test or a subsequent test is a failure, the test interval for this component shall revert to a 2-year interval until the component passes two consecutive tests. The 5-year interval may then be resumed.

Main steam isolation valves, feedwater valves and containment system supply and exhaust isolation valves shall remain on a 2-year test interval. Any change will require prior review and approval by the NRC.

The exemption shall be valid from the beginning of Refueling Outage 7 to the first startup following Refueling Outage 9.

Exemption from Section III.D.2 (b)(i) and (b)(iii):

Air locks may be leakage rate tested at intervals of no more than 2 years. If an air lock fails a leakage rate test, the air lock shall then be required to pass two consecutive leakage rate tests at a test interval of 6 months prior to returning to the 2-year test interval. Following opening of an air lock door when containment integrity is required, the air lock shall be tested at least every 30 days. If an air lock fails a leakage rate test following opening of an air lock door when containment integrity is required, the air lock shall be required to pass two consecutive leakage rate tests at a test interval of 72 hours prior to returning to the 30-day interval. Since the Grand Gulf air lock doors have testable seals, testing the seals fulfills the 30-day test requirement.

This exemption shall be valid from the beginning of Refueling Outage 7 to the first startup following Refueling Outage 9.

7.0 REFERENCES

1. 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors."
2. Letter from C.R. Hutchinson, Vice President Operations, Grand Gulf Nuclear Station, Entergy Operations, Inc. to U.S. NRC, August 13, 1993.
3. Advanced Notice for Proposed Rulemaking 57 Federal Register 55156 November 24, 1992.
4. "Staff Plans for Revising 10 CFR Part 50 Containment Leakage Testing, and for Handling Exemption Requests," SECY 94-036, February 17, 1994.
5. M. Dey, et.al., "Performance-Based Containment Leak-Test Program," Draft Report for Comment, U.S. NRC, NUREG-1493, January 1995.
6. Letter from C.R. Hutchinson, Vice President Operations, Grand Gulf Nuclear Station, Entergy Operations, Inc., to U.S. NRC, May 11, 1994.
7. Letter from C.R. Hutchinson, Vice President Operations, Grand Gulf Nuclear Station, Entergy Operations Inc., to U.S. NRC, June 24, 1994.
8. Letter from C.R. Hutchinson, Vice President Operations, Grand Gulf Nuclear Station, Entergy Operations Inc., to U.S. NRC, July 20, 1994.
9. Giscoln, J.M., "Risk Impact Assessment of revised Containment Leak Rate Testing Intervals," EPRI TR-104285, August 1994.
10. Severe Accident Risks: An Assessment of Five U.S. Nuclear Power Plants, U.S. NRC, NUREG-1150, December 1990.

11. Letter from Warren J. Hall, NUMARC, to Dr. Moni Dey, U.S. NRC, February 18, 1994.
12. Letter from Paul W. O'Connor, U.S. NRC to C. R. Hutchinson, Entergy Operations, Inc., February 21, 1995.
13. Letters from C.R. Hutchinson, Vice President, Operations, Grand Gulf Nuclear Station, Entergy Operations, Inc. to U.S. NRC, April 15, 1994.
14. 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Federal Register, Volume 60, No. 34, February 21, 1995.
15. Letter from CR Hutchinson, Vice President, Operations, Grand Gulf Nuclear Station, Entergy Operations, Inc. to U.S. NRC, April 18, 1995.

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