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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO THE INSERVICE TESTING PROGRAM, THIRD TEN-YEAR INTERVAL CAROLINA POWER AND LIGHT COMPANY BRUNSWICK STEAM ELECTRIC PLANT UNITS 1 AND 2 DOCKET NUMBERS 50-325 AND 50-324

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a, requires that Inservice testing (IST) of certain ASME Code Class 1, 2, and 3 pumps and valves are performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. NRC guidance contained in Generic Letter (GL) 89-04, Guidance on Developing Acceptable Inservice Testing Programs, provides alternatives to the Code requirements determined to be acceptable to the staff. Alternatives that conform with the guidance in GL 89-04 may be implemented prior to receiving NRC approval, but should be included as relief requests for review by the staff. When alternatives are implemented in accordance with the relevant position in the generic letter, the staff has determined that relief should be granted pursuant to 10 CFR 50.55a(f)(6)(i) on the grounds that it is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest. In making this determination, the staff considers the burden on the licensee that would result if the requirements were imposed.

Section 10 CFP 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to authorizing alternatives and granting or not granting the relief requested as part of the licensee's IST program are contained in this Safety Evaluation (SE).

The licensee based the Brunswick IST program on the requirements of the 1989 Edition of ASME Section XI, Subsections IWP and IWV, which is incorporated by reference in 10 CFR 50.55a. ASME Operations and Maintenance (OM) Standard Part 6, for IST of pumps is referenced by Subsection IWP and OM Standard, Part 10, for IST of valves is referenced by Subsection IWV. The relief requests were reviewed against the requirements of the 1989 Edition of ASME Section XI for pumps and valves. The third ten-year interval for Units 1 and 2 began on May 11, 1998, and ends on May 10, 2008. A summary of the NRC's action on each relief request is provided in Attachment 1. The test deferrals for valves which are in accordance with Part 10 have been reviewed and are summarized in Appendix C of the Technical Evaluation Report (TER) which is included as Attachment 2 to this SE.

2.0 EVALUATION

2.1 Relief Requests

The Mechanical Engineering Branch, with technical assistance from the Idaho National Engineering and Environmental Laboratory (INEEL), has reviewed the information concerning Inservice testing (IST) program requests for relief submitted for the third ten-year interval for Brunswick Steam Electric Plant, Units 1 and 2, in Carolina Power and Light Company (the licensee) letters dated February 25, 1998 and August 6, 1998. The staff adopts the evaluations and recommendations for granting relief or authorizing alternatives contained in the TER prepared by INEEL with the exception of the determination associated with Relief Request VRR-02 which is discussed in Section 2.1.1 of this SE. The following three relief requests were denied:

> Relief Request VRR-07 to modify the inspection requirements for certain rupture disks in the high pressure coolant injection (HPCI) and reactor core isolation cooling systems was denied because the licensee did not demonstrate that the current Code requirements were either a hardship or impractical, and that their proposed alternate testing provided an acceptable level of quality and safety; or otherwise demonstrate that an alternative should be authorized.
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> Relief Request VRR-08 to use an alternative exercise test method in lieu of exercising the HPCI check valves with flow was denied because the proposed alternate test method and acceptance criteria for measuring breakaway force or torque for these check valves did not provide an adequate alternative to the Code requirements; and
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> Relief Request VRR-09 to exercise the manual isolation valves between the residual heat removal and spent fuel pool cooling systems was denied because the licensee did not demonstrate that the quarterly test frequency created an unusual or undue burden.

The granting of relief is based upon the fulfillment of any commitments made by the licensee in its basis for each relief request and the alternatives proposed. Program changes involving new or revised relief requests must be submitted to NRC for review. Program changes that add or delete components from the IST program should also be periodically provided to the NRC.

2.1.1 Relief Request VRR-02

Pursuant to 10 CFR 50.55a(f)(5)(iii), the licensee is requesting relief from the stroke time measurement requirements of OM-10, Paragraph 4.2.1.4(b), for automatic depressurization system (ADS) valves. The licensee proposed to use an alternative test method in lieu of stroke timing the automatic depressurization system (ADS) safety/relief valves. The alternative test method proposed by the licensee is to exercise each valve open and closed, and ascertain proper operation by observing the response and changes in main steam parameters within a specified time period and observation of the outputs of the downstream temperature and acoustic sensors. The alternative also proposes not to measure the stroke times, and observations and incidental measurements will not be subject to evaluation, per OM-10, Paragraph 4.2.1.8.

It is impractical to measure the stroke times of the ADS valves because of their design. Other licensees use methodologies similar to that proposed by the licensee to verify that the ADS valves stroke open and closed. In addition, the licensee's proposed alternate testing is consistent with the guidance in NUREG-1482, Section 4.3.4. It would be a burden for the licensee to meet the Code requirements because the valves would have to be redesigned. Although the licensee's proposed methodology is limited in characterizing the degradation of the component, it does provide a reasonable assurance of operational readiness because these valves are exercised to their safety position, they are subject to extensive periodic maintenance, and also tested in accordance with OM-10. Therefore, relief is granted for the third 10-year interval pursuant to 10CFR 50.55a(f)(6)(i) based on the impracticality of performing testing in accordance with the Code requirements, and in consideration of the burden on the licensee if the Code requirements were imposed on the facility.

Because stroke time measurements will not be taken, the stroke time acceptance criteria requirements of Paragraph 4.2.1.8 of OM-10 are not relevant and therefore would not be required. However, the licensee is expected to adhere to the corrective action requirements of OM-10, Paragraph 4.2.1.9.

2.2 Deferred Test Justifications

The test deferrals of valves, as allowed by OM-10, were reviewed as part of INEEL's evaluation. Results of the review are provided in Appendix C of the TER with recommendations for further review by the licensee for specific deferrals. Results of the review of deferred test justifications do not necessarily constitute final approval and are subject to NRC inspection.

2.3 System Review

INEEL, using the Brunswick Updated Final Safety Analysis Report, conducted a scope review of the HPCI and service water systems against the requirements of Section XI and the regulations. The review revealed several items that did not appear to be in compliance with the Code requirements (see Appendix B of the TER). In addition, editorial comments discovered during the system review are also noted in this Appendix. The licensee should review these items, as well as other systems that might contain similar issues, and revise their program and take any necessary actions as appropriate.

2.4 Relief Requests in Accordance with NRC GL 89-04

For any relief granted based on following the positions stated in GL 89-04, the staff (with technical assistance from INEEL) has reviewed the information submitted by the licensee to determine whether the proposed alternative testing follows the relevant position in the generic letter. The licensee did not include any relief requests related to GL 89-04 positions. However, the licensee had a number of "program remarks" in which disassembly and inspection of several groups of valves were discussed. These program remarks are discussed in Appendix A, Item 7, of the TER.

New or revised relief requests that meet the positions stated in GL 89-04, Attachment 1, should be submitted to NRC but may be implemented prior to staff approval provided the guidance in GL 89-04, Section D, is followed.

2.5 Action Items

For several IST program relief requests, the staff identified certain action items for the licensee to complete. These action items are identified in Appendix A of the TER and should be addressed within one year from the date of this SE or by the end of the next refueling outage, whichever is later. In addition, the licensee should address program scope issues identified in Appendix B of the TER within one year from the date of this SE or by the end of the next refueling outage, whichever is later. Licensee actions to address the action items in this SE are subject to NRC inspection. The licensee is requested to respond to the NRC within one year of the date of this SE describing actions taken, actions in progress, or actions to be taken, to address each of these items.

3.0 CONCLUSION

The Brunswick IST program requests for relief from the Code requirements have been reviewed by the staff with the assistance of its contractor, INEEL. The staff has reviewed the TER and adopts the evaluations and recommendations for granting relief or authorizing alternatives for implementation for the third 10-year interval with the exception of the determination associated with Relief Request VRR-02 which is discussed in Section 2.1.1 of this SE. A summary of the other relief request determinations is presented in Attachment 1.

The authorizing of alternatives or granting of relief is based upon the fulfillment of any commitments made by the licensee in its basis for each relief request and the alternatives proposed. Pursuant to 10 CFR 50.55a(f)(6)(i), the staff has determined that with respect to PRR-02, VRR-02, VRR-03, VRR-05, VRR-11, VRR-12, and RFJ-03, that the requirements of the Code are impractical and relief is granted. It should be noted that the approval of relief request VRR-03 is contingent upon CP&L completing certain action items identified in the TER and summarized in Attachment 1 to the SE. CP&L is requested to respond to the NRC by October 22, 1999, describing actions taken, actions in progress, or actions to be taken to address the staff's concerns. The relief granted is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest giving due consideration to the burden on the licensee if the requirements were imposed.

Pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternatives contained in relief requests PRR-04, VRR-04, and VRR-13 are authorized since they provide an acceptable level of quality and safety. The proposed alternatives in relief requests PRR-01, PRR-03, and VRR-01 are authorized pursuant to the provisions of 10 CFR 50.55a(a)(3)(ii) in that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The relief requests that are granted or alternatives authorized by the NRC are acceptable for implementation for the third 10-year interval. Relief requests VRR-07, VRR-08, and VRR-09 were denied. The staff's bases for denying these relief requests are discussed in this SE. The implementation of the IST program and relief requests is subject to inspection by the NRC.

The licensee should refer to Appendices A and B of the TER for a discussion of recommendations identified during the review. The licensee should address each recommendation in accordance with the guidance therein. The action items identified in Appendices A and B of the TER should be addressed within one year of the date of this SE or by the end of the next refueling outage, whichever is later, unless otherwise specified in the TER.

Principal Contributor: Joseph Colaccino, DE/EMEB

Date:

Attachment 1

SE Table 1
Brunswick Steam Elctric Plant, Units 1 and 2

Summary of Relief Requests

Request No.	*TER Section*	*Test Requirements*	*Equipment Identification*	*Proposed Alternative*	*NRC Action*
PRR-01	3.2.1	OM Code Part 6, Para. 4.6.1.6	1-SLC-P-1A & -1B, 2-SLC-P-2A & -2B	Lower response limit for vibration measurement instruments will be 5 HZ or less based on availability of plant instruments, and the upper limit will be minimum of 1000 HZ.	Alternative authorized in accordance with 10 CFR 50.55a(a)(3)(ii).
PRR-02	3.3.1	Part 6, Paras. 4 and 5	1-HPCI-P-1& 2-HPCI-P-2	During inservice testing of these pumps, the differential pressure of the pump combination will be determined from measurements of the suction and discharge pressures of the booster and main pumps, respectively. This data will be used to evaluate the performance of the pump combination in a manner such that the combination will be treated as a single multi-stage pump.	Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i).
PRR-03	3.4.1	Part 6, Para. 4.6.1.6	1(2)-SW-C-P-1A thru 1(2)-SW-C-P-1C, 1(2)-SW-N-P-1A, & 1(2)-SW-N-P-1B	Vibration levels of the Service Water system pumps will be measured in accordance with the applicable portions of OM Part 6, Paragraph 4.6, with the exception of the lower frequency response limit for the vibration measuring equipment (Paragraph 4.6.1.6). In this case, the lower response limit of the vibration measuring equipment will be 5 Hertz or less, based on the capability of the existing plant vibration measuring equipment, and the upper frequency response limit will be a minimum of 1000 Hertz.	Alternative authorized in accordance with 10 CFR 50.55a(a)(3)(ii).
PRR-04	3.1.1	OM-6 Para 4.6.1.2(a)	1(2)-CS-P-1(2)A/B, 1(2)-HPCI-P-1, 1(2)-HPCI-P-BST-1, & 1(2)-RCIC-P-1	Use permanently installed plant instrumentation to perform in-service testing that will yield readings (i.e. combination of the range and accuracy) which are at least equivalent to the readings achieved from instrumentation that meet the OM Part 6 Code requirements.	Authorized according to 10 CFR 50.55a(a)(3)(i).
VRR-01	4.3.2	Part 10, Para. 4.3.2.4(b)	1(2)-E11-F078	These valves will be exercised with the mechanical exerciser, and the breakaway force (or torque) will be measured, during each refueling that RHR/LPCI loop B is drained for outage work activities. This is anticipated to occur every other refueling outage. When the B loop of the RHR system is not drained, the valve will be manually cycled to the full open position without measurement of the breakaway force.	Authorized to exercise at each refueling outage and measure breakaway force or torque every other refueling outage according to 10 CFR 50.55a(a)(3)(ii).
VRR-02	4.2.3	Part 10, Para. 4.2.1.4(b)	1(2)-B21-F013A thru 1(2)-B21-F013L	Each of these valves will be exercised open and closed, and proper operation will be ascertained, by observing the response and changes in main steam parameters within a specified time period and observation of the outputs of the downstream temperature and acoustic sensors. Specific stroke times will not be measured, and observations and incidental measurements will not be subjected to evaluation, per Part 10, Paragraph 4.2.1.8.	Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i).

Request No.	TER Section	Test Requirements	Equipment Identification	Proposed Alternative	NRC Action
VRR-03	4.5.1	Part 10, Para. 4.3.2.2(a)	1(2)-RNA-V313, 1(2)-RNA-V314, 1(2)-RNA-V350, & 1(2)-RNA-V351	When testing these check valves, the following will be performed to satisfy the requirements for full-stroke open exercising per Part 10, Para. 4.3.2.2(a): (a) A "blow" test by venting, where the flowrate is significant and identified from an open test connection.	Provisional Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i), provided licensee implements reasonable objective acceptance criteria.
VRR-04	4.1.2	Part 1, Para. 4.1.3.4	1(2)-E11-F025A/B, 1(2)-E11-F030A/B/C/D, 1(2)-E11-F029, 1(2)-E11-V20, 1(2)-E11-V21, 1(2)-E41-F020, 1(2)-E41-F050, 1(2)-E21-F012A/B, 1(2)-E21-F032A/B, 1(2)-E51-F017	For safety and relief valves tested under ambient conditions using a test medium at ambient conditions, the valve body temperature will be measured and recorded prior to each series of tests (which may consist of multiple lifts).	Authorized according to 10 CFR 50.55a(a)(3)(i).
VRR-05	4.1.3	Part 10, Para. 4.3.2.1	1(2)-E11- F089, F090, V192, & V193, 1(2)-E21-F029 A & B & 1(2)-E21-F030 A & B, 1(2)-E41-V93 & 1(2)-E41 -V94, 1(2)-E51-V72 & 1(2)-E51-V73	These valves will be closure tested as a pair to verify closure of at least one of the two series valves. In the event that the closure capability of the pair of valves is questionable, then both valves will be declared inoperable and, prior to returning them to service, corrective action will be taken for both valves to ensure both valves are fully operational and capable of performing their safety function (i.e., closure).	Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i).
VRR-07	4.1.1	Part 1, Para. 1.3.4.2	1(2)-E41-PSE-D003, 1(2)-E41-PSE-D004, 1(2)-E51-PSE-D001, & 1(2)-E51-PSE-D002	Each of these rupture disk assemblies will be subjected to a visual inspection at least once every ten (10) years.	Relief Denied.
VRR-08	4.4.1	Part 10, Para. 4.3.2.4	1(2)-E41-V159	Each of these valves will be exercised using the installed lever arms. During this exercising, torque observation during shaft movement prior to engagement of the disk swing arm will verify that the shaft is not bound to the swing arm. In addition, the torque required for exercising each valve through its full stroke will be measured and compared to the associated reference value.	Relief Denied.
VRR-09	4.3.1	Part 10, Para. 4.2.1.1	1(2)-E11-V40	Each of these manual valves will be exercised at least once during each refueling outage.	Relief Denied.
VRR-11	4.6.1	Part 1, Paragraph 1.3.4.3	1(2)-CAC-X20A & 1(2)-CAC-X20B	Each of these primary containment vacuum relief valves will be set pressure tested each refueling in accordance with Technical Specification 3.6.1.5.4 and functionally tested quarterly in accordance with Technical Specification 3.6.1.5.3.	Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i).

Request No.	TER Section	Test Requirements	Equipment Identification	Proposed Alternative	NRC Action
VRR-12	4.2.2	Part 10, Para. 4.3.2.6	1(2)-B21-F010A/B	Exercising of these valves open will only be performed to the extent that adequate reactor feedwater flow is available. Full accident flow through each feedwater injection leg will be confirmed by monitoring A-loop and B-loop flow through feedwater flow venturis 1/2-C32-FE-N001A/B during power operation. Where maintenance or corrective action has been performed on a valve during a shutdown period, the subject valve will not be flow tested (i.e., opened) prior to being placed in service.	Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i).
VRR-13	4.2.1	Part 10, Para. 4.2.1.8(d)	1(2)-B21-F022A thru -F022D &1(2)-B21-F028A thru -F028D	The acceptance criteria for closure stroke time for these valves will be 3-5 seconds, as established by the Brunswick Steam Electric Plant Technical Specifications. An arbitrary reference value will be established at four seconds, and the acceptance values will be set at three and five seconds. These values are more conservative than the values established per the acceptance criteria of Part 10, Paragraph 4.2.1.8(c).	Authorized according to 10 CFR 50.55a(a)(3)(i).
RFJ-03	4.2.3, Appendix C	Para 10, Para. 4.2.1.2(e)	1(2)-B21-F013A thru 1(2)-B21-F013L	Each of these valves will be exercised open and verified to close following refueling outages in accordance with Part 10, Paragraph 4.2.1.2(e), subject to the provision of Part 10, Paragraph 4.2.1.2(h).	Relief Granted in accordance with 10 CFR 50.55a(f)(6)(i).
RFJ-20	4.4.1, Appendix C	Part 10, Para. 4.3.2.1	1(2)-E41-V159	Each of these valves will be exercised manually during each refueling outage or disassembled as permitted per Part 10, Paragraph 4.3.2.4(c).	In accordance with the Code, no action necessary.

INEEL/EXT-98-00910

ATTACHMENT 2

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

Docket Nos. 50-325 and 50-324

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Published October 1998

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Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Under DOE Contract No. DE-AC07-94ID13223
FIN No. J2422, Task Order 4, TAC Nos. MA1115 and MA1116

ABSTRACT

This Lockheed Martin Idaho Technologies Company (LMITCO) report presents the results of our evaluation of the Brunswick Steam Electric Plant, Units 1 and 2, Inservice Testing Program for pumps and valves whose function is safety-related.

PREFACE

This report is supplied as part of the "Review of the Brunswick Steam Electric Plant, Units 1 and 2, Inservice Testing Program Third Ten-Year Interval and Proposed Alternative Testing and Relief Requests Which Require NRC Review" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Mechanical Engineering Branch, by LMITCO, Nuclear Operations Support Programs.

FIN No. J2422

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by the Carolina Power and Light Company (CP&L) for its Brunswick Steam Electric Plant, Units 1 and 2.

By a letter (Serial: BSEP 98-0008) dated February 25, 1998, CP&L submitted Revision 0 of their IST program for Brunswick Steam Electric Plant, Units 1 and 2. Additional information, program revisions, and an additional relief request were submitted in a letter (Serial: BSEP 98-0137)from CP&L to NRC on August 6, 1998. The program for the Third Ten Year Interval begins for both units on May 11, 1998 and continues to May 10, 2008. The program was reviewed to verify compliance of proposed tests of pumps and valves whose function is safety-related with the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, 1989 Edition.

This technical evaluation report (TER) does not address any IST program revisions subsequent to those noted above. Program changes involving additional or revised relief requests should be submitted to the U.S. Nuclear Regulatory Commission (NRC) under separate cover in order to receive prompt attention, but should not be implemented prior to review and approval by the NRC.

In its IST program, CP&L requests relief from the Code testing requirements for specific pumps and valves. These requests were evaluated individually to determine if the criteria in 10 CFR 50.55a for granting relief or authorizing alternatives are met for the specific pumps and valves. This review was performed utilizing the acceptance criteria and guidance of the following:

- Standard Review Plan, Section 3.9.6
- Draft Regulatory Guide and Value/Impact Statement titled "Identification of Valves for Inclusion in Inservice Testing Programs"
- Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs"
- NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants"
- NUREG/CR-6396, "Examples, Clarifications, and Guidance on Preparing Requests for Relief from Pump and Valve Inservice Testing Requirements"
- Summary of Public Workshops Held in NRC Regions on Inspection Procedure 73756, "Inservice Testing of Pumps and Valves," and Answers to Panel Questions on Inservice Testing Issues

IST Program testing requirements apply only to component testing (i.e., pumps and valves) and are not intended to provide the basis to change the licensee's current Technical Specifications for system test requirements.

Section 2 of this report presents the scope of the Brunswick Steam Electric Plant, Units 1 and 2, review.

Section 3 of this report presents the CP&L bases for requesting relief from the OM Code requirements for the Brunswick Steam Electric Plant, Units 1 and 2, pump testing program and Lockheed Martin Idaho Technologies Company's (LMITCO's) evaluations and conclusions regarding these requests. Section 4 presents similar information for the valve testing program.

Appendix A contains a listing of inconsistencies and omissions in the licensee's program noted during this review. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

Appendix B contains a listing of issues identified during a review of the High Pressure Coolant Injection (HPCI) and Service Water (SW) systems. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

Appendix C provides a brief description of the licensee's justifications for deferring tests to cold shutdowns or refueling outages.

This TER, including all relief requests and component identification numbers, is applicable to Units 1 and 2. The Unit 2 designator has been placed in parentheses, where possible, to minimize repetition, i.e., 1(2)-SLC-P-1A. A zero used as a designator indicates that the component is common to both Units 1 and 2.

2. SCOPE

The LMITCO staff reviewed the Brunswick Steam Electric Plant, Units 1 and 2, inservice testing (IST) program pump and valve relief requests, cold shutdown justifications, refueling outage justifications, and technical positions. The staff specifically reviewed the High Pressure Coolant Injection (HPCI) and Service Water (SW) systems. The staff identified each component in the HPCI and SW systems listed in the IST program on the plant's P&ID(s) and evaluated the test(s) designated in the IST program to assess compliance with the applicable American Society of Mechanical Engineers (ASME) Operations and Maintenance (OM) Code test requirements. Following this review, the staff assessed the designated systems for completeness (to determine if additional components should have been included in the IST program). This review yielded a list of issues that should be addressed by the licensee as summarized in Appendices A and B.

3. PUMP TESTING PROGRAM

The Brunswick Steam Electric Plant, Units 1 and 2, IST program pump relief requests submitted by the Carolina Power and Light (CP&L) Company were examined to determine whether relief should be granted or alternatives authorized according to the requirements of 10 CFR 50.55a and NRC positions and guidance. Each CP&L basis for requesting relief from the pump testing requirements and proposed alternative testing and the reviewer's evaluation of that request is summarized below.

3.1 Selected Pumps in the IST Program

3.1.1 Use of Permanently Installed Instruments

3.1.1.1 Relief Request. Pump relief request, PRR-04, requests relief from the full-scale range requirements specified in Part 6, Para. 4.6.1.2, and proposes to measure the Code required parameters using permanently installed instruments that exceed the full-scale range requirements for the following pumps:

Pump Description	**Identification**
HPCI Main Pumps	1(2)-HPCI-P-1
HPCI Booster Pumps	1(2)-HPCI-BST-1
RCIC Pumps	1(2)-RCIC-P-1
Core Spray Pumps	1(2)-CS-P-1(2)A/B

3.1.1.1.1 Licensee's Basis for Requesting Relief--OM-6 Para. 4.6.1.2(a) requires that the full-scale range of each analog instrument shall be not greater than three times the reference value. The permanently installed plant instrumentation does not meet the requirements of OM-6 Para. 4.6.1.2(a). For this reason, CP&L requested relief during the second IST Interval (BSEP 95-0161).

In accordance with 10 CFR 50.55a(a)(3)(i), CP&L is requesting approval to implement an alternative to the requirements of OM-6 Para. 4.6.1.2(a), CP&L proposes to continue using permanently installed plant instrumentation. The use of permanently installed plant instruments is an acceptable alternative for the following reasons:

1. NUREG-1482 provides guidelines for development and implementation of programs for in-service testing of pumps and valves at nuclear power plants. Section 5.5.1, "Range and Accuracy of Analog Instruments" discusses situations where the range of permanently installed instrumentation is greater than three times the reference value but the accuracy of instrument is more conservative than the OM Code. Under such circumstances, the NUREG indicates the NRC will grant relief when the combination of range and accuracy yields a reading at least equivalent to the reading achieved from the instruments that meet the Code requirements.

2. Pump differential pressure measurements are determined by subtracting a suction pressure from a discharge pressure obtained at locally installed pressure gauges. The range of the plant installed analog instrumentation is greater than three times the reference values, but the accuracy of the instrumentation is ± 1/2 percent of full scale, which is more conservative than OM Part 6 Table 1. Since the differential pressure is the value of concern, the overall accuracy of the installed test equipment was compared to the requirement for a differential pressure gauge for each case.

The comparison found that with the higher accuracy requirements, the total possible error from plant installed equipment was significantly less than a comparable code allowable pressure differential pressure gauge. Readability concerns associated with the higher range gauges were also evaluated for impact on overall test results. The evaluation performed concluded that the combination of range and accuracy of the permanently installed plant instrumentation yields readings which are at least equivalent to the readings achieved from instrumentation that meet the OM Part 6 Code requirements.

3. The installation and removal of temporary test gauges creates a hardship with respect to site personnel radiation exposure. In addition, the use of temporary test gauges is undesirable due to the inherent risks associated with the breaking and re-assembly of mechanical connections, the additional calibration requirements associated with temporary instrumentation, and the additional man-hours required to install and remove the temporary instrumentation.

Proposed Alternate Testing: Use permanently installed plant instrumentation to perform in-service testing that will yield readings (i.e., combination of the range and accuracy) which are at least equivalent to the readings achieved from instrumentation that meet the OM Part 6 Code requirements.

3.1.1.1.2 Evaluation--The purpose of the instrument quality and full-scale range requirements is to ensure that the test measurements provide information that is sufficiently accurate and repeatable to monitor pump condition and detect degradation. Using instruments that do not meet these requirements may inhibit the detection of pump hydraulic degradation. The accuracy of analog instruments is normally a function of the instrument's full-scale range. In addition, the range and size of an instrument determine the number of graduations that can be placed on the instrument face, which affects the operators ability to accurately determine the reading due to the limitations associated with interpolating between the graduations.

Since the accuracy of a test measurement is dependant on both the instrument quality and full-scale range, the combined effect of these elements must be considered to determine the adequacy of an instrument for pump testing. As discussed by the licensee, Para. 5.5.1 of NUREG 1482 indicates that the NRC staff will grant relief for using instruments where the range exceeds 3 times the reference value as long as the accuracy of the instrument is more conservative than the Code, such that the combination of the range and accuracy yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements (i.e., up to $\pm$ 6 percent).

The BSEP third 10-year IST program submittal does not contain specific data for the instruments used for inservice testing of the subject pumps. However, the licensee submitted Engineering Evaluation Report (EER) 94-0243, entitled "ASME Code Relief Request In-service Testing Test Gauge Accuracy," as Enclosure 2 in their submittal dated August 7, 1995. Excerpts from Tables 1 and 2 of EER 94-0243 for the subject pumps are shown below. These tables do not appear to be current because they also contain information for the RHR and RHR SW pumps. The differential pressure instruments for the RHR and RHR SW pumps must have been replaced with different instruments, because relief is no longer requested from the full-scale range requirements of the Code for these pumps. In addition, it is unclear from pump Relief Request PRR-04 if new instruments have been installed on the discharge of the Core Spray (CS) pumps. Table 1 lists the instruments as temporary and does not provide range and accuracy information, however, the alternate testing of PRR-04 states: "Use permanently installed plant instrumentation to perform in-service testing...." If permanent instruments have been installed for the discharge of the CS pumps, EER 94-0243 should be updated and resubmitted to support PRR-04. If temporary instruments are still utilized, the alternate testing of PRR-04 should be revised to clarify this situation.

TABLE 1 ENGINEERING EVALUATION REPORT 94-0243						
SYSTEM	SERVICE	GAUGE	RANGE (PSIG)		ACCURACY	
					(±%)	(±PSI)
HPCI	SUCTION	E41-PI-R004	-14.7	100	0.5%	0.6
HPCI	DISCHARGE	E41-PI-R001	0	1500	0.5%	7.5
RCIC	SUCTION	E51-PI-R002	-14.7	100	0.5%	0.6
RCIC	DISCHARGE	E51-PI-R001	0	1500	0.5%	7.5
CS	SUCTION	E21-PI-R001A(B)	-14.7	30	0.5%	0.2
CS	DISCHARGE	TEMPORARY/NEW				5.0*

* To be controlled by the test procedure unless a new permanent gauge can be installed.

TABLE 2 ENGINEERING EVALUATION REPORT 94-0243				
SYSTEM	REF dP (PSI)	3 x REF (PSI)	ALLOWABLE ERROR [5%] (PSI)	ACTUAL TOTAL ERROR (PSI)
UNIT 1 HPCI	375	1125	18.7	8.1
UNIT 2 HPCI	367	1101	18.3	8.1
UNIT 1 RCIC	275	825	13.7	8.1
UNIT 2 RCIC	283	849	14.1	8.1
UNIT 1 CS A	290.1	870.3	14.5	5.2
UNIT 2 CS A	282.3	846.9	14.1	5.2
UNIT 1 CS B	286.6	859.8	14.3	5.2
UNIT 2 CS B	286.2	858.6	14.3	5.2

The instruments identified in Table 1 of EER 94-0243 have a combination of range and accuracy that yields differential pressure measurements that are more accurate than readings achieved from instruments that meet the minimum Code requirements. Based on the determination that use of these instruments would provide data that is adequate to determine pump condition and detect excessive degradation, using the identified instruments should provide an acceptable level of quality and safety, therefore, the proposed alternate testing should be authorized in accordance with 10 CFR 50.55a(a)(3)(i). However, if the licensee has replaced any of these instruments with others that are significantly less accurate or with full-scale ranges substantially greater than the instruments identified in EER 94-0243, relief would no longer be in effect. To obtain relief to cover other instruments, the licensee must submit a request for those instruments. All pertinent instrument information should be either included in the relief request or in a separate document submitted with the request.

3.2 Standby Liquid Control (SBLC)

3.2.1 Vibration Measurement Frequency Response Range Requirements

3.2.1.1 Relief Request. Pump relief request PRR-01 requests relief from the vibration measurement frequency response range requirements of Part 6, Para. 4.6.1.6 for the SBLC pumps, 1-SLC-P-1A, 1B, 2-SLC-P-2A, and 2B, and proposes to apply a lower response limit of 5 Hertz or less, based on the capabilities of the existing plant vibration measuring equipment, and the upper frequency response limit will be a minimum of 1000 Hertz.

3.2.1.1.1 Licensee's Basis for Requesting Relief--The nominal shaft rotational speed of the Standby Liquid Control system pumps is 385 RPM, which is equivalent to approximately 6.40 Hertz. Based on this frequency and OM Part 6, Paragraph 4.6.1.6 the required frequency response range of instruments used for measuring pump vibration is 2.14 to 1000 Hertz. The instruments currently in use at BSEP (IRD Model 890 with #970 transducer) have a frequency response ranging from 5 to 1000 Hertz. In accordance with 10 CFR 50.55a(a)(3)(ii), CP&L is requesting approval to implement an alternative to the requirement of OM Part 6, Paragraph 4.6.1.6.

These pumps are of a simplified reciprocating (piston) positive displacement design with rolling element bearings (Model Number TD-60, manufactured by Union Pump Corporation). The requirement to measure vibration using instruments with a response range to 1/3 shaft speed stems from the need to detect oil whip or oil whirl associated with pump journal bearings. In the case of these pumps, there are no journal bearings to create these phenomena.

Compliance with the Code requirement would require procurement and calibration of instruments to cover this range to the lower extreme (i.e., 2.14 Hertz). Procurement and calibration of this equipment will result in an unusual difficulty without a compensating increase in pump performance or plant safety. As noted in NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Appendix G, Comment 5.4-3, instruments that can read 2 Hertz may be available, but this frequency is less than what is traceable to the National Bureau of Standards for calibration. Even though the current equipment (i.e., IRD Model 890, with accelerometer) is not calibrated to monitor the low frequency required by OM Part 6, indication of pump degradation will not be masked by the existing instrumentation not being calibrated to collect data at sub-synchronous frequencies.

Satisfying the frequency response range criteria will not provide meaningful information to assess the condition of these pumps. The significant modes of vibration with respect to monitoring these pumps are as follows:

1. 1-Times Crankshaft Speed - An increase in vibration at this frequency may be an indication of rubbing between a single crankshaft cheek and rod end, or cavitation at a single valve, hydraulic instability, or loose machine foot.

2. 2-Times Crankshaft Speed - An increase in vibration at this frequency may be an indication of looseness at a single rod bearing or crosshead pin, a loose valve seat in the fluid cylinder, a loose plunger/crosshead stub connection, or coupling misalignment.

3. Other Multiples of Shaft Speed - An increase in vibration at other frequencies may be indications of cavitation at several valves, looseness at multiple locations, bearing degradation, rubbing, impacting, or binding.

Based on the foregoing discussion, using current vibration measuring instruments with at least a frequency response range of 5 to 1000 Hertz will provide adequate information to evaluate pump condition and ensure continued reliability with respect to the pumps' function.

Proposed Alternate Testing: Vibration levels of the Standby Liquid Control system pumps will be measured in accordance with the applicable portions of OM Part 6, Paragraph 4.6, with the exception of the lower frequency response limit for the vibration measuring equipment (Paragraph 4.6.1.6). In this case, the lower response limit of the vibration measuring equipment will be 5 Hertz or less, based on the capability of the existing plant vibration measuring equipment, and the upper frequency response limit will be a minimum of 1000 Hertz.

3.2.1.1.2 Evaluation--These SBLC pumps are of a simplified reciprocating positive displacement design. The shaft rotational speed for these pumps is low at 385 RPM or approximately 6.40 Hertz. The OM Code requires that the instrument used to measure vibration for these pumps have a frequency response range of 2.14 to 1000 Hertz. The licensee proposes to utilize plant vibration measuring equipment with a lower response limit of at least 5 Hertz.

During the transition from the ASME Section XI pump testing Code to the OM pump testing Code, the OM committee changed the frequency response range requirements from one-half to one-third of the minimum pump shaft rotational speed. This change was made in order to encompass additional noise contributors that could indicate degradation. Instruments with a frequency response range that meets the changed requirements for slow-speed pumps are commercially available. The instruments currently in use at Brunswick have a frequency response ranging from at least 5 to 1000 Hertz. The licensee proposes that compliance with the Code required frequency response range is a hardship without a compensating increase in the level of safety. The licensee will comply with all other testing requirements for these pumps.

Whereas, the unavailability of suitable instruments alone, is not adequate justification for obtaining relief or approval of an alternative, that may be a major element of the justification. Frequencies less than running speed may not be indicative of problems for certain types of bearings; however, sub-harmonic frequencies may be indicative of rotor rub, seal rub, loose seals, and coupling damage. These SBLC pumps do not have journal bearings to create oil whip or oil whirl that would be most effectively detected by instruments meeting the Code requirements. Therefore, the licensee's proposal should provide adequate information to assess the operational readiness of these pumps and provides a reasonable alternative to the Code response range requirements.

Based on the determination that the compliance with the Code vibration measurement response range requirements poses a hardship that is not compensated by a corresponding increase in safety and considering the licensee's proposed alternative to utilize existing plant instrumentation that is calibrated to at least 5 Hertz and comply with all other related Code requirements for vibration testing of the SBLC pumps, the alternative should be authorized according to 10CFR 50.55a(a)(3)(ii).

3.3 High Pressure Coolant Injection

3.3.1 Differential Pressure Measurements Across Pump Combinations

3.3.1.1 Relief Request. Pump Relief Request PRR-02 requests relief from the requirement to run an inservice test according to Part 6, Paras. 4 and 5, individually on the HPCI booster and main pumps, 1-HPCI-P-1 and 2-HPCI-P-2, and proposes to treat the pair as one pump for differential pressure measurement. Differential pressure of the pump combination will be determined from measurements of the booster pump suction pressure and main pump discharge pressure. This data will be used to evaluate the performance of the pump combination in a manner such that the combination will be treated as a single multi-stage pump.

3.3.1.1.1 Licensee's Basis for Requesting Relief--In accordance with 10 CFR 50.55a(f)(5)(iii), CP&L is requesting approval to implement an impractical relief request for these components. There are no suitable provisions for measuring the pressure in the cross-over piping between the HPCI booster and main pumps. Since these pumps are driven by a common driver and are connected in tandem, they are necessarily tested together, simultaneously, under the same operating conditions (flow rate and speed). Therefore, measuring the inlet pressure of the booster pump and calculating the differential pressure of the pump combination will effectively verify operability and serve to monitor the performance of the pair.

Proposed Alternate Testing: During inservice testing of these pumps, the differential pressure of the pump combination will be determined from measurements of the suction and discharge pressures of the booster and main pumps, respectively. This data will be used to evaluate the performance of the pump combination in a manner such that the combination will be treated as a single multi-stage pump.

3.3.1.1.2 Evaluation--Pump differential pressure measurements are used in conjunction with the flow rate measurements to evaluate the hydraulic condition of a pump and to detect pump degradation. Generally, this is done for each individual safety related pump. However, in the case of the HPCI booster and main HPCI pumps, the licensee cannot practically measure individual pump differential pressures. The installation does not have a pressure tap between these two pumps, therefore, system modifications would be necessary to permit measurement of the individual differential pressures.

The flow rate through both pumps is essentially identical (there may be a small difference due to seal water flow and leakage) since the booster pump provides suction for the main HPCI pump. Comparing the common flow rate and the combined differential pressure measurement to combined reference values determined in accordance with Para. 4.3 of the Code, should provide the licensee with sufficient information to evaluate the hydraulic performance of the pump pair. A decrease of performance into the alert or required action ranges of the Code indicates that the pair is degraded. Since it is not known which of the pair is the cause of the degradation, the required actions would have to be performed on both pumps.

Based on the determination that it is impractical to measure individual differential pressures for the HPCI main and booster pumps and considering that treating the main and booster pumps as a unit for these measurements and evaluations should allow the licensee the ability to monitor the condition of the pair and to detect degradation, relief should be granted in accordance with 10 CFR 50.55a(f)(6)(i) to treat these pumps as a pair for hydraulic parameter measurement and evaluation. Section 3.1.1.1 of this report contains an evaluation of PRR-04, which requests relief from the full-scale range requirements of the Code for the differential pressure instruments used for the testing of these pumps. All other aspects of this testing should be in accordance with the Code requirements.

3.4 Service Water System

3.4.1 Vibration Measurement Frequency Response Range Requirements

3.4.1.1 Relief Request. Pump Relief Request PRR-03 requests relief from the lower frequency response limit for the vibration measuring equipment of Part 6, Para. 4.6.1.6, for the service water (SW) pumps, 1(2)-SW-C-P-1A thru 1(2)-SW-C-P-1C, 1(2)-SW-N-P-1A, and 1(2)-SW-N-P-1B, and proposed that the lower response limit of the vibration measuring equipment will be 5 Hertz or less, based on the capability of the existing plant vibration measuring equipment.

3.4.1.1.1 Licensee's Basis for Requesting Relief--The nominal shaft rotational speed of these pumps is 885 RPM which is equivalent to approximately 14.75 Hz. Based on this frequency and OM Part 6, Paragraph 4.6.1.6, the required frequency response range of instruments used for measuring pump vibration is 4.91 to 1000 Hertz. The instruments currently in use at BSEP (IRD Model 890 with #970 transducer) have a frequency response range of 5 to 1000 Hertz. Compliance with the Code requirement would require procurement and calibration of instruments to cover this range. In accordance with 10

CFR50.55a(a)(3)(ii), CP&L is requesting approval to implement an alternative to the requirement of OM Part 6, Paragraph 4.6.1.6.

The requirement to measure vibration with instruments with response to 1/3 shaft speed stems from the need to detect oil whip or oil whirl associated with oil-lubricated journal bearings. Specifically, vibration peaks for oil whip typically occur at 40 percent to 48 percent of shaft speed. Since the existing instruments can measure vibration below 40 percent to 48 percent of shaft speed for these pumps (i.e., 5.9 to 7.1 Hertz), their use is consistent with the intent of the Code. Thus, using current vibration measuring instruments with at least a frequency response range of 5 to 1000 Hertz will provide adequate information to evaluate pump condition and ensure continued reliability with respect to the pumps' function.

Proposed Alternate Testing: Vibration levels of the Service Water system pumps will be measured in accordance with the applicable portions of OM Part 6, Paragraph 4.6, with the exception of the lower frequency response limit for the vibration measuring equipment (Paragraph 4.6.1.6). In this case, the lower response limit of the vibration measuring equipment will be 5 Hertz or less, based on the capability of the existing plant vibration measuring equipment, and the upper frequency response limit will be a minimum of 1000 Hertz.

3.4.1.1.2 Evaluation--These SW pumps operate at a shaft rotational speed of 885 RPM or approximately 14.75 Hertz. The OM Code requires that the instrument used to measure vibration for these pumps have a frequency response range of 4.91 to 1000 Hertz. The licensee proposes to utilize existing plant vibration measuring equipment with a lower response limit of at least 5 Hertz.

During the transition from the ASME Section XI pump testing Code to the OM pump testing Code, the OM committee changed the frequency response range requirements from one-half to one-third of the minimum pump shaft rotational speed. This change was made in order to encompass additional noise contributors that could indicate degradation. Instruments with a frequency response range that meets the changed requirements for slow-speed pumps are commercially available.

The instruments currently in use at Brunswick have a frequency response range of from at least 5 to 1000 Hertz. The response range of the instruments in use at Brunswick is just slightly out of compliance (5 versus 4.91 Hertz, or 0.09 off) with the Code. Additionally, the phenomena of interest, oil whip and oil whirl associated with oil-lubricated journal bearings, should be detectable with the existing instruments since they typically occur at 40 percent to 48 percent of shaft speed, which is greater than 5 Hertz. Compliance with the Code required frequency response range would constitute a hardship without a compensating increase in the level of safety for these pumps. The licensee will comply with all other testing requirements for these pumps. The licensee's proposal should provide adequate information to assess the operational readiness of these pumps and provides a reasonable alternative to the Code response range requirements.

Based on the determination that the compliance with the Code vibration measurement response range requirements poses a hardship or undue burden that is not compensated by a corresponding increase in safety and considering the licensee's proposed alternative to utilize existing plant instrumentation that is calibrated on the low end to at least 5 Hertz and comply with all other related Code requirements for vibration testing of the SW pumps, the proposed alternative should be authorized according to 10 CFR 50.55a(a)(3)(ii).

4. VALVE TESTING PROGRAM

The Brunswick Steam Electric Plant, Units 1 and 2, IST program submitted by the CP&L Company was examined to verify that all valves that are included in the program are subjected to the periodic tests required by the ASME Code, Section XI, 1989 Edition, and the NRC positions and guidelines. The reviewers found that, except as noted in Appendix C or where specific relief from testing has been requested, these valves are tested to the Code requirements and the NRC positions and guidelines. Each CP&L Company basis for requesting relief from the valve testing requirements and the reviewers' evaluation of that request is summarized below and grouped according to the system and valve Category.

4.1 General Valve Relief Requests

4.1.1 Rupture Disks

4.1.1.1 Relief Request. Valve Relief Request VRR-07 requests relief from replacement of rupture disks every five years as required by Part 1, Para. 1.3.4.2, for Category D HPCI and RCIC turbine exhaust line rupture disks 1(2)-E41-PSE-D003, 1(2)-E41-PSE-D004, 1(2)-E51-PSE-D001, and 1(2)-E51-PSE-D002, and proposes to visually inspect each of these disks at least once every ten (10) years.

4.1.1.1.1 Licensee's Basis for Requesting Relief--In accordance with 10 CFR 50.55a(a)(3)(i), CP&L is requesting approval to implement an alternative test. These rupture disks retain the integrity of the HPCI and RCIC steam exhaust piping during system operation, and open (destructively) to prevent damage to the steam discharge piping and turbines in the event that the exhaust piping pressure becomes excessive. In each case, there are two disks in series with a vent between, to prevent steam exhaust into the reactor building in the event of pre-mature opening (failure) or leaking of the respective inboard disk. The cavities between the disks are also provided with pressure sensing devices that will automatically shutdown the system in the event of an opening of the inboard rupture disks.

These disks are of the "reverse buckling style" (MFG. Black, Sivalls, and Bryson), where the disk material is concave into the pressure side of the assembly, and an over-pressure condition deflects the "membrane" outward onto a cutter edge that breaks the material causing rapid opening. This design is somewhat unique in that the disk membrane is not scored or materially weakened, as others are, and the concave form eliminates fatigue failure as a realistic failure mode.

The disk membranes are made of corrosion resistant Inconel 600 material. The service of these lines is low pressure clean steam (typically less than 25 psig), and each of the systems runs for an average of approximately 20 hours per year. Considering these mild service conditions, and that the disk membranes are made of corrosion resistant Inconel 600 material, there is a low probability of service- related failure. Based on the design and construction of these units and the minimal service conditions under which they operate, significant degradation is unlikely. It is expected that the most likely result of aging of these units is a reduction of the deflection pressure with an associated reduction in the burst pressure. This is conservative with respect the safety requirement associated with over-pressure protection. In addition, since the outboard disk sees essentially no pressure, service failure of the inboard disk due to aging is not significant with respect to system integrity and personnel safety.

Although there have been several cases where these disks have opened at various facilities, there are no instances where these disks failed to open under over-pressure conditions, nor are there indications that these disks did not perform as designed.

Given the low failure rate and intrinsic reliability of these rupture disks, along with the redundancy (i.e., two disks in series) that provides high reliable system integrity, the effort and cost associated with replacement at five year intervals is not commensurate with any associated improvement in plant safety that would be achieved due to replacement of these rupture disks on a more frequent basis.

Proposed Alternate Testing: Each of these rupture disk assemblies will be subjected to a visual inspection at least once every ten (10) years.

4.1.1.1.2 Evaluation--These rupture disks are designed to open to provide a vent path for the relief of excessive pressure in the steam exhaust lines for both the HPCI and RCIC turbines. Failure of these rupture disks to operate at their set pressures could allow the piping to be damaged by excessive pressure. Pressure sensing elements in the exhaust line between the disks would detect an increased line pressure caused by the opening of the system-side rupture disk and would then shut down the associated system HPCI or RCIC. Premature opening of these disks may inadvertently shut down the associated system. The rupture disks themselves are of a newer design that are not prone to the types of degradations affecting prior models. They are concave to the system side and deflect into a cutter element as opposed to being scored or materially weakened.

The Code requires replacement of these disks every five years, or more frequently if indicated by failure data. That requirement has remained essentially the same through the current version of the ASME OM Code. The licensee proposes to deviate from the Code requirement in two significant respects; 1) the rupture disks would be visually inspected as opposed to replaced, and 2) the inspection would be conducted every ten years as opposed to replacement every five years or less. The licensee has proposed this as an alternative according to 10 CFR 50.55a(a)(3)(i). First, we will address the proposed test method, that is, visual examination. The licensee has not provided details regarding the attributes of the visual inspection process to allow an adequate assessment of the inspection method and determination of equivalency as required to recommend authorizing the alternative according to 10 CFR 50.55a(a)(3)(i). The number of these rupture disks that have been placed in service in similar environments is also unclear, as are the effects of aging on these materials, even in such a mild environment. As previously discussed, premature rupture of the system-side disc is conservative from a pipe protection perspective, but non-conservative from a system function perspective. Changes in the relief setpoint of these discs, in either direction, may not be detected if the discs are never tested, even on a sampling basis.

The second issue is frequency. The interval would be doubled, from once every five years to once every ten, under the licensees proposal. Even if the discs were to be replaced, as opposed to inspected once every ten years, this is a significant extension of an already long interval. Given the limited information regarding the effects of aging on these discs and the fact that degradation in either direction from the design setpoint may have a negative impact on system operability, it may be more prudent to approach an increase in the interval in a step-wise manner periodically assessing some of the discs for degradation.

To obtain relief from the Code requirements, the licensee must support one of the following requirements: 1) the proposed alternative provides an acceptable level of quality and safety; 2) compliance with the specified requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety; and 3) the Code requirements are impractical.

The licensee has not shown that the proposed alternative provides an acceptable level of quality and safety, compliance with the specified requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety; or the Code requirements are impractical to support granting relief or authorizing an alternative as required by 10 CFR 50.55a. Therefore, relief should not be granted or the alternative authorized as requested.

4.1.2 Relief Valves

4.1.2.1 Relief Request. Valve relief request VRR-04 requests relief from the relief valve temperature stability requirements of Part 1, Para. 4.1.3.4, for the following Category A/C relief valves, and proposed to test the valves under ambient conditions.

1(2)-E11-F025A	1(2)-E11-F029	1(2)-E21-F032A
1(2)-E11-F025B	1(2)-E11-V20	1(2)-E21-F032B
1(2)-E11-F030A	1(2)-E11-V21	1(2)-E41-F020
1(2)-E11-F030B	1(2)-E21-F012A	1(2)-E41-F050
1(2)-E11-F030C	1(2)-E21-F012B	1(2)-E51-F017
1(2)-E11-F030D		

4.1.2.1.1 Licensee's Basis for Requesting Relief--In accordance with 10 CFR 50.55a(a)(3)(i), Carolina Power, and Light (CP&L) is requesting approval to implement an alternative to OM-1, Para. 4.1.3.4. For valves tested under normal ambient conditions with test medium at approximately the same temperature, there is little or no consequence of minor changes in ambient temperature.

This has been identified by the OM-1 Code Working Group and the ASME Code Committees, and is reflected in the latest version of the Code (OM Code-1995) Paragraphs 1.4.1.3(d) and 1.4.1.3(e).

Proposed Alternate Testing: For safety and relief valves tested under ambient conditions using a test medium at ambient conditions, the valve body temperature will be measured and recorded prior to each series of tests (which may consist of multiple lifts).

4.1.2.1.2 Evaluation--The temperature of a pressure relief device can affect the set pressure of the device. Therefore, the Code requires that the ambient temperature of the operating environment of a relief valve be simulated during set pressure testing. The valve may be tested at an ambient temperature different than the operating ambient temperature if the effect of ambient temperature on the set pressure can be established and the correlation between the operating and testing ambient temperatures be determined and applied in compliance with the requirements of Part 1, Paras. 4.3.2 and 4.3.3. To ensure compliance with the ambient temperature requirements, Para. 4.1.3.4, states: "The test method shall be such that the temperature of the valve body shall be known and stabilized before commencing set pressure testing, with no change in measured temperature of more than 10°F (5°C) in 30 min." The purpose of stabilizing the valve temperature is to provide a known, unchanging, test environment for the relief valve such that temperature variations do not decrease the accuracy and repeatability of the testing.

Valves that are tested at the ambient temperature of the test laboratory using a test medium at the same ambient conditions should have a stable temperature, since there should be no condition that could cause the temperature to change significantly. Therefore, if the measurement of the valve body temperature prior to the test indicates that the valve is at the ambient temperature of the test laboratory, the temperature should remain stable during the testing. This is in agreement with a provision added to the ASME OM Code, Appendix I, Para. 1.8.1.3(d), which states: "Verification of thermal equilibrium is not required for valves which are tested at ambient temperature using a test medium at ambient temperature." When testing safety/relief valves at ambient temperature using a test medium at ambient temperature, there should be no significant change in valve temperature, therefore, the temperature would be stabilized and need not be verified to be in thermal equilibrium prior to testing.

Based on the determination that the licensee's proposed alternate testing is essentially equivalent to the Code required testing for safety/relief valves tested at ambient temperature using a test medium at ambient temperature and would provide an acceptable level of quality and safety, relief should be granted in accordance with 10 CFR 50.55a(a)(3)(i) from the temperature stability requirements of the Code for these valves. This does not exempt the licensee from establishing and applying correlations in accordance with OM-1987 Part 1, Paras. 4.3.1, 4.3.2, and 4.3.3, or from complying with any other Code requirement, except where specific relief has been requested and granted.

4.1.3 Keep Fill Check Valves

4.1.3.1 Relief Request. Valve relief request VRR-05 requests relief from the test method requirements of Part 10, Para. 4.3.2.1, for keep fill check valves, 1(2)-E11-F089, F090, V192, V193, 1(2)-E21-F029 A & B, 1(2)-E21-F030 A & B, 1(2)-E41-V93, 1(2)-E41-V94, 1(2)-E51-V72, and 1(2)-E51-V73, and proposes to verify their closure capability as pairs.

4.1.3.1.1 Licensee's Basis for Requesting Relief--In accordance with 10 CFR50.55a(f)(5)(iii), CP&L is requesting approval to implement an impractical relief request. These valves open to ensure that the associated system piping is maintained filled to prevent water hammer. This function is non-safety related. They close to establish Code boundaries and prevent diversion of main line flow into the condensate or other connected systems. These are simple check valves with no means of manual exercising or determining valve disk position; thus, the only way closure can be determined is by performing a backflow test. These valves are installed in series with no intermediate test connection; thus, backflow testing these valves individually is impractical.

Note that only one of these valves needs to function (closed) to perform the isolation function.

Proposed Alternate Testing: These valves will be closure tested as a pair to verify closure of at least one of the two series valves. In the event that the closure capability of the pair of valves is questionable, then both valves will be declared inoperable and, prior to returning them to service, corrective action will be taken for both valves to ensure both valves are fully operational and capable of performing their safety function (i.e., closure). This testing alternative is in accord with NUREG-1482, Paragraph 4.1.1.

4.1.3.1.2 Evaluation--These are series keep-fill check valves. There is no provision for verifying that either of these series valves is capable of closing. There are no installed test taps or other provisions for individual valve tests. The only indication of a problem would be the failure of both valves in the series. The Code requires that check valves with a closure function be individually verified to close. However, these keep-fill valves are a special case in that they are redundant valves in redundant systems and only one valve of a series is actually necessary to perform the system's intended function.

The NRC has previously determined (see NUREG 1482, Section 4.1.1) that both keep-fill valves must be included in the IST program and operationally tested as a pair to prevent reverse flow. Upon observing leakage, the licensee must disassemble, inspect, and repair or replace both valves as necessary before the return to service.

Based on the determination that it is impractical to individually exercise these keep-fill valves according to the Code exercising requirements at any frequency, the burden on the licensee of making system modifications to permit this testing, and considering that verifying their closure as a pair and repairing or replacing both valves upon evidence of leakage through the pair should provide reasonable assurance that they are capable of performing their safety function in the closed position, relief should be granted in accordance with 10 CFR 50.55a(f)(6)(i) from the Code requirement to individually exercise these valves to the closed position. The licensee's proposal comports with the guidance in NUREG 1482 and provides a reasonable alternative to the Code requirements.

4.2 Nuclear Steam Supply System

4.2.1 Category A Valves

4.2.1.1 Relief Request. Valve Relief Request VRR-13 requests relief from the stroke time reference value requirements of Part 10, Para. 4.2.1.8(d), for the main steam isolation valves (MSIVs), 1(2)-B21-FO22A thru -FO22D and 1(2)-B21-FO28A thru -FO28D, and proposes to set the reference value for these valves at four seconds, and the acceptance criteria at three and five seconds.

4.2.1.1.1 Licensee's Basis for Requesting Relief–In accordance with 10CFR50.55a(a)(3)(i), Carolina Power & Light is requesting approval to implement an alternative test. The stroke times of these valves are adjusted within an acceptable band of 3-5 seconds by adjusting orifices associated with hydraulic dashpots attached to each operator. Thus, the stroke time performance of each valve operator is more a function of the dashpot setting than the material condition of the valve.

The acceptable band of ±1 second is restrictive enough to ensure that each of the valves remains operable within the established limits of the plant safety analyses.

Elimination of the 50 percent limit on deviation will have no significant impact on the reliability of these valves nor on the health and safety of the public.

Proposed Alternate Testing: The acceptance criteria for closure stroke time for these valves will be 3-5 seconds, as established by the Brunswick Steam Electric Plant Technical Specifications. An arbitrary reference value will be established at four seconds, and the acceptance values will be set at three and five seconds. These values are more conservative than the values established per the acceptance criteria of Part 10, Paragraph 4.2.1.8(c).

4.2.1.1.2 Evaluation--The purpose for establishing reference values of full-stroke times is to provide a stroke time value that represents proper valve operation that can be used to evaluate subsequent stroke time test measurements. Test measurements that deviate from the reference value indicate either a change in valve condition or a problem with the test method. When the deviation is of sufficient magnitude, the valves is considered to be degraded and corrective action is required. The licensee indicated that the stroke times of the subject valves are controlled by adjusting orifices to keep the stroke within the Technical Specification limit of 3 to 5 seconds. Therefore, the stroke times for these valves is a controlled parameter that does not necessarily reflect the condition of the valves. Since the Technical Specification required band (3 to 5 seconds) is fairly restrictive, the licensee's proposal to use the median value of four seconds for the reference value is a reasonable alternative to the requirements for establishing reference values of full-stroke times.

Only a one second deviation is allowed between the licensee's proposed reference value of four seconds and both the proposed upper stroke time limit (five seconds) and the lower stroke time limit (three seconds). Applying the ±50% change criteria of Part 10, Para. 4.2.1.8(d) to the four second reference value yields an allowable change of ±2 seconds, which would make the upper and lower limits six and two seconds, respectively. Therefore, the licensee's proposal is conservative as far as the required action limits are concerned for the subject valves. Utilizing stroke time limits as prescribed by the Code would yield two sets of limits and could cause situations where the valves could be operable in accordance with the Code limits, but be inoperable because they do not meet the more restrictive Technical Specification limits. The licensee's proposal to use the Technical Specification stroke time limits for these valves instead of the limits prescribed by the Code is conservative and provides a reasonable alternative to the Code requirements.

A common situation encountered with MSIVs is that, due to the tight band prescribed for stroke times in the Technical Specifications, reference values cannot be established in accordance with Part 10, Para. 3.3, but must be controlled near the center of the operating band to reduce the likelihood of violating a limit. The licensee indicated that when deviations occur in the measured stroke times that are within the required action limits, that the stroke times may be adjusted to maintain them near four seconds by changing the orifices. Periodically adjusting the stroke times back to the reference value prevents a gradual change of the stroke times, which could be indicative of valve degradation. Since the adjustments would prevent the limits from being exceeded, corrective actions may not be taken to repair the degraded valve. Therefore, if frequent orifice adjustments are needed to maintain the stroke times near the reference value, it would be prudent for the licensee to recognize this situation and to perform an evaluation to determine the cause of the changes and ensure that the valve has not being subjected to a slow degradation.

Based on the determination that the alternate testing proposed by the licensee is conservative in comparison to the Code requirements and would provide an acceptable level of quality and safety, the alternative should be approved in accordance with 10 CFR 50.55a(a)(3)(i). However, if frequent orifice adjustments are required for a valve, an analysis should be performed to determine the cause of the frequent changes in the measured stroke times.

4.2.2 Category A/C Valves

4.2.2.1 Relief Request. Valve Relief Request VRR-12 requests relief from the requirement of OM-10, Para. 4.3.2.6, to retest prior to returning to service following corrective actions, the main feedwater header to the reactor vessel check valves, 1(2)-B21-F010A and B, and proposes to full-stroke exercise these valves by observing that sufficient feedwater flow reaches the reactor during plant operation and to flow test any of these valves that has received maintenance or corrective action during a shutdown period after the valve has been placed in service.

4.2.2.1.1 Licensee's Basis for Requesting Relief–In accordance with 10 CFR 50.55a(f)(5)(iii), Carolina Power & Light is requesting approval to implement an impractical relief request. These valves open to provide flowpaths for HPCI and RCIC flow into the reactor vessel as well as normal reactor feedwater makeup.

These are simple check valves, with no external means of exercising nor for determining disk position; thus, the only practical method of exercising these valves to their open position and confining full open operation per the guidance of NRC Generic Letter 89-04 and NUREG-1482 is with flow from the reactor feedwater system, or from the HPCI or RCIC systems themselves. The HPCI accident flow requirement is 4250 gpm., and RCIC accident flow requirement is 400 gpm. Injecting water directly from either the HPCI or RCIC systems to the reactor is impractical during plant operation due to the possibility of creating an unacceptable reactor vessel water level transient, thermal shock to reactor vessel nozzles, a reactivity excursion, or upsetting reactor water chemistry. Under normal shutdown conditions, steam is unavailable to operate the HPCI and RCIC turbines and there is a potential for over-pressurizing the reactor vessel. Thus, the only practical way of exercising these valves is with reactor feedwater flow during power (steaming) operation.

During normal plant operation, the feedwater flow is approximately 12,500 g.p.m. per loop. Normal plant operation exceeds 12,500 g.p.m., which is greater than the maximum accident flow of either HPCI or RCIC through these check valves. The reactor feedwater system arrangement is such that flow indication can be obtained for each of the individual feedwater loops. Thus, flow measurement through each check valve can be made to verify proper opening of the subject check valve.

Proposed Alternate Testing: Exercising of these valves open will only be performed to the extent that adequate reactor feedwater flow is available. Full accident flow through each feedwater injection leg will be confirmed by monitoring A-loop and B-loop flow through feedwater flow venturis 1/2-C32-FE-N001A/B during power operation. Where maintenance or corrective action has been performed on a valve during a shutdown period, the subject valve will not be flow tested (i.e., opened) prior to being placed in service.

4.2.2.1.2 Evaluation--GL 89-04, Position 1, states that a check valve's full-stroke to the open position may be verified by passing the maximum required accident condition flow through the valve. The maximum required accident condition flow for these valves is the HPCI and RCIC accident flow requirement of 4250 and 400 g.p.m., respectively. During normal plant operation, the feedwater flow is approximately 12,500 g.p.m. per loop, which is greater than the maximum accident flow of HPCI and RCIC through these valves and meets the GL 89-04, Position 1, criteria for a full-stroke exercise open. Therefore, relief is not required from the exercising requirements of the Code.

OM-10, Para. 4.3.2.6, requires a retest showing acceptable performance of valves that have failed tests prior to returning them to service. The licensee proposes to not perform an exercise test of these valves prior to returning them to service following corrective actions, therefore, this proposed alternate testing is a deviation from the Code. When corrective actions are performed on these valves during shutdowns, it is impractical to establish design flow through them prior to startup because steam is not available to drive the HPCI and RCIC turbines. In addition, establishing flow into the reactor vessel during shutdowns using HPCI, RCIC, or the feedwater system could cause or contribute to a low-temperature overpressurization of the reactor vessel.

Since it is impractical to exercise these valves open with flow prior to reactor startup, the first chance that an exercise to the open position can be verified is when normal feedwater flow is established into the reactor following startup. Even though the valve would already have been placed in service to allow reactor startup, this is the earliest practicable time that the post maintenance testing can be performed.

Based on the determination that it is impractical to perform the post maintenance testing of these valves prior to reactor startup, the burden on the licensee of making system modifications to permit this testing, and considering that performing the post maintenance testing as soon as feedwater flow is established into the reactor vessel following startup should provide reasonable indication that they are capable of performing their safety function in the open position, relief should be granted in accordance with 10 CFR 50.55a(f)(6)(i) from the Code requirements for these valves.

4.2.3 Category B/C Valves

4.2.3.1 Relief Request. Refueling interval justification RFJ-03 addresses exercising at a refueling interval in accordance with Part 10, Para. 4.2.1.2(e) and Valve relief request VRR-02 requests relief from the stroke time measurement requirements of Part 10, Para. 4.2.1.4(b), for the automatic depressurization system (ADS) valves, 1(2)-B21-F013A thru H, J, K, and L, and proposed to monitor proper valve operation by observing indirect indication of valve actuation during the power ascension from each refueling outage. Since RFJ-03 does not clearly comply with Part 10, Para. 4.2.1.2(e), and since RFJ-03 and VRR-02 are interrelated, they are both evaluated below.

RFJ-03

4.2.3.1.1 Licensee's Basis for Requesting Relief--The functions of these valves are to: (1) open upon receipt of an ADS signal to blow down the reactor vessel (for the ADS valves only), (2) act as primary system safety valves actuating on high system pressure or by manual actuation from the Control Room, and (3) to close to maintain the primary system pressure boundary and prevent uncontrolled de-pressurization of the reactor (stuck open relief valve). The function of the associated solenoid valves is to energize upon receipt of a manual or ADS actuation signal and, in so doing, vent the associated poppet valve assembly causing the main valve to open.

Due to the potential for plant transients, these valves can only be tested at low reactor power level with primary system pressure greater than 175 psig. Each relief valve actuation transmits hydrodynamic loading to the torus, and quarterly testing of each of these valves could result in exceeding the torus design basis. Also, failure of any relief valve to close would cause an uncontrolled rapid depressurization of the primary system and plant shutdown.

Testing during cold shutdown contradicts the recommendation of reducing the number of challenges to safety/relief valves as discussed by NUREG-0737 and the BWR Owners Group Evaluation of NUREG-0737, Item II.K.3.16, Reduction of Challenges and Failures of Relief Valves."

Proposed Alternate Testing: Each of these valves will be exercised open and verified to close following refueling outages in accordance with Part 10, Paragraph 4.2.1.2(e), subject to the provision of Part 10, Paragraph 4.2.1.2(h). This is consistent with the NRC position stated in NUREG-1482, Section 3.1.1.3.

VRR-02

4.2.3.1.2 Licensee's Basis for Requesting Relief--In accordance with 10 CFR50.55a(f)(5)(iii), CP&L is requesting approval to implement an impractical relief request. The functions of these valves are to: (1) open upon receipt of an ADS signal to blow down the reactor vessel (for the ADS valves only), (2) act as primary system safety valves actuating on high system pressure or by manual actuation from the Control Room, and (3) to close to maintain the primary system pressure boundary and prevent uncontrolled de-pressurization of the reactor (stuck open relief valve). The function of the solenoid valves is to energize upon receipt of a manual or ADS actuation signal and, in so doing, vent the associated poppet valve assembly causing the associated main valve to open.

There are no remote position indicators related to the position of these valves that signal full-open positioning of the valves. The only positive means of providing valve position indication is by temperature sensors and acoustic monitors downstream of the valves' discharge nozzles, each of which is not sensitive to the extent of opening of the valves. For this reason, measuring the stroke time of these valves has no significance other than the fact that they actuated. The proposed alternate testing, together with the extensive preventative maintenance requirements for these valves, gives adequate assurance that these valves will perform satisfactorily and reliably. This position and alternate testing conforms with the recommendations presented in NUREG-1482, Paragraph 4.3.4.

Proposed Alternate Testing: Each of these valves will be exercised open and closed, and proper operation will be ascertained, by observing the response and changes in main steam parameters within a specified time period and observation of the outputs of the downstream temperature and acoustic sensors. Specific stroke times will not be measured, and observations and incidental measurements will not be subjected to evaluation, per Part 10, Paragraph 4.2.1.8.

4.2.3.1.3 Evaluation–There are two areas where the licensee has requested to deviate from the Code in regard to testing the ADS valves, the test frequency and the test method. The test frequency is addressed by refueling interval justification RFJ-03 while relief request VRR-02 requests relief from the requirement to measure and evaluate the stroke times of these valves. Part 10 of the OM Code, Section 4.2.1.2(e), permits the deferral of valve exercising until "during refueling outages" if exercising is not practicable during plant operation or cold shutdowns. In NUREG 1482, Section 3.1.1, the staff states that relief need not be requested for testing valves during refueling outages when it is impractical during power operation and cold shutdowns. In these cases a refueling outage justification may be included in the IST program. However, the licensee has proposed to exercise these valves "following refueling outages" instead of "during refueling outages" as specified in Part 10, Section 4.2.1.2(e). Because of this discrepancy, the test frequency issue will also be evaluated in this section. The evaluation will address the frequency issue first and will then address the test method.

Test Frequency

Testing the power operated function of the ADS valves during power operation is impractical because opening these valves releases reactor coolant from the reactor recirculation system, which would result in a perturbation in the reactor water level control, power fluctuations, and heating of the suppression pool and torus air space. Testing these valves open during cold shutdowns is impractical because they can be exercised only when sufficient reactor steam pressure is available. The NRC discussed concerns for these valves in NUREG-0123, "Standard Technical Specifications for General Electric Boiling Water Reactors (BWR/5)," and NUREG-0626, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near-Term Operating License Applications." In these documents, the staff recommends reducing the number of challenges to the ADS valves in order to reduce their failure rate, because failure in the open position is a small break LOCA. The frequency and method of testing the ADS valves are addressed in Section 4.3.4 of NUREG 1482, which states: "... the period between refueling outages is a reasonable alternate frequency for verifying the Category B function of these valves." The licensee's proposed frequency for this testing, as documented in RFJ-03, is following each refueling outage, which is in accordance with the NRC staff position.

Based on the determination that it is impractical to exercise these valves during power operation and during cold shutdowns and considering that the licensee's proposal to exercise them during startup from each refueling outage should provide an acceptable level of quality and safety and is in accordance with the staff's recommendation for test frequency from Section 4.3.4 of NUREG 1482, relief should be granted in accordance with 10 CFR 50.55a(f)(6)(i).

Test Method

One of the requirements for Category B (power operated) valves is to measure the full-stroke time of each valve and compare these times to the valve's reference stroke time and to its limiting value of full-stroke time. This testing is performed to detect degradation of a valve so it can be corrected prior to the valve degrading to the point where it is incapable of performing its safety function if it were demanded. It is difficult to measure the stroke times for these ADS valves because they do not have direct valve position indication. The only existing indications of valve operation are the downstream temperature and acoustic monitors. The ADS valves generally stroke rapidly (their stroke times are on the order of 100 milliseconds), however, the slow response time of the indirect indicators could make it difficult to obtain representative stroke time measurements that can be evaluated as required by OM-10, Para. 4.2.1.8.

The licensee's proposal to verify the operability of these valves following each refueling outage by passing reactor steam through the valves and to verify they stroke open by observing indirect indication from downstream temperature and acoustic monitors, may be a practical test method for these valves. However, the licensee indicated that the stroke times will not be measured and that the observations will not be subjected to evaluation per Part 10, Paragraph 4.2.1.8. The licensee referenced NUREG 1482, Para 4.3.4, in their relief request, however, it does not appear that they meet the acceptable practices identified in this NUREG position. The NUREG allows indirect measurement of stroke times, but individual stroke times must be measured and corrective actions performed if they exceed the specified limit. The licensee's proposed testing does not measure the individual times or evaluate them against limits. Another acceptable method identified in NUREG 1482 is performing enhanced maintenance of the ADS and pilot valves with stroke time measurement of the pilot valves. The licensee mentions enhanced maintenance, but does not identify what additional maintenance is being performed.

In their August 6, 1998, submittal, the licensee included excerpts from a NRC letter dated January 4, 1990, for the Brunswick second ten-year IST program. The excerpt included an evaluation of a relief request for the ADS valves that is similar to request VRR-02 being evaluated herein. The supplied evaluation granted relief for the subject valves as requested. However, there are some major differences between the second 10-year period request and the current VRR-02 request. The primary difference is that the second 10-year period request did have an acceptance criteria/required action limit specified for the test. In the "Basis for Relief," the licensee states: "Steam flow measurements and/or turbine bypass valves position will verify that the ADS valves have performed their function in less than five seconds. Time "zero" for this stroke time measurement corresponds to the instant the ADS hand switch is aligned in the "open" position." The "Alternate Testing" further states: "No stroke time measurements will be performed. An abrupt change in turbine bypass valve position or steam line flow (per Technical Specification 4.5.2.b) within five seconds will be adequate to demonstrate valve operability." In contrast, the current "Alternate Testing" states: "Specific stroke times will not be measured, and observations and incidental measurements will not be subjected to evaluation, per Part 10, Paragraph 4.2.1.8." Since VRR-02 is different than the second 10-year period request and lacks a vital element from the earlier request, the approval of the earlier request has no bearing on this evaluation.

The reviewers recognize that it is impractical to directly measure the stroke times of these valves and that the acceptance criteria of Part 10, Paragraph 4.2.1.8 cannot be directly applied. However, if measurements are not made and compared to appropriate acceptance criteria, the test doesn't provide information about the condition of the valves and is essentially meaningless. Measuring the time to stroke each of these valves, based on indirect indication of the valves being open, and comparing these measurements to an appropriate acceptance criteria may allow the detection of valve degradation prior to it degrading to the point where its capability to perform its safety function is questionable.

The licensee's proposed alternate testing does not have adequate provisions to monitor for valve degradation. Therefore, relief should not be granted as requested for the test method. However, since it is impractical to directly measure the valve stroke times and apply the Code acceptance criteria, relief should be granted from the requirements of OM-10, Paras. 4.2.1.4 and 4.2.1.8 in accordance with 10 CFR 50.55a(f)(6)(i) with the following provision: until a revised relief request is submitted and approved by the NRC staff, the alternate testing approved by the SE transmitted in the NRC letter dated January 4, 1990, for the Brunswick second ten-year IST program, shall be continued for ADS valves, 1(2)-B21-F013A thru H, J, K, and L.

4.3 Residual Heat Removal System

4.3.1 Category B Valves

4.3.1.1 Relief Request. Valve relief request VRR-09 requests relief from the test frequency requirements of Part 10, Para. 4.2.1.1, for the manual RHR to spent fuel pool valves, 1(2)-E11-V40, and proposes to exercise them during refueling outages.

4.3.1.1.1 Licensee's Basis for Requesting Relief--In accordance with 10 CFR 50.55a(a)(3)(i), CP&L is requesting approval to implement an alternative test. These normally closed manual valves are required to open to align the fuel pool cooling system to the RHR system for augmented cooling in the event that the normal fuel pool cooling system is inoperable. Note that this function is not strictly included in the scope statement of Part 10, Paragraph 1.1 in that the function of these valves is not related to the safety of the reactor plant (other than their passive function of maintaining the integrity of the RHR system while closed). The requirement for including these valves in the IST Program came about as a result of an informal agreement with the NRC during prior inspection intervals.

Exercising these valves on a quarterly basis is practical but undesirable. Opening these valves requires entry into radiation areas; the quarterly tests would not be consistent with ALARA policies. In addition, when any of these valves are open, the associated RHR system is placed in an LCO Action statement. Exercising these valves on a cold shutdown basis would use resources and time that could be better utilized in completing cold shutdown testing of more safety significant components.

There is minimum value in performing quarterly or cold shutdown testing of these valves since the chance of failure of manual valves under these service conditions is remote. Taking into consideration this and previously discussed issues, manual exercising these valves on a refueling schedule is adequate to verify the continued capability provided by these valves and to ensure plant safety.

NOTE: Currently the ASME OM-10 Working Group is considering extending the test interval for manual valves to as much as 5 years.

Proposed Alternate Testing: Each of these valves will be exercised at least once during each refueling outage.

4.3.1.1.2 Evaluation--These manual valves align the fuel pool system flow through the RHR system as an augmented method for cooling spent fuel. The licensee proposes to exercise these valves according to the Code test method requirements each refueling outage. The licensee stated that testing these valves quarterly is not impractical, therefore, relief cannot be granted based on impracticality. To use an authorized alternative, the licensee must support one of the following requirements: 1) the proposed alternative provides an acceptable level of quality and safety; or 2) compliance with the specified requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The Code of record does not differentiate between manual valves and other Category A and B valves with regard the exercising frequency. The Code requires that these valves be exercised quarterly if practical, or during cold shutdowns or refueling outages, when justified by the licensee. Manual valves are of a simple design. Testing these valves is also generally simple. The testing simply consists of the valve being manually cycled either open or closed and then being returned to its original position.

Regarding quarterly testing of these valves, the licensee has stated that opening these valves requires entry into radiation areas; however, the licensee has not indicated the specific radiation levels or dose rates associated with the quarterly test. The licensee has not shown that quarterly testing creates any unusual or undue burden. Additionally, entry into an LCO Action statement, for the short time of this test, is not adequate justification to extend the test frequency. Regarding testing of these valves each cold shutdown, the licensee has stated that exercising these valves would use resources and time that could be better utilized in completing testing of more safety significant components. However, there is no discussion of the relative safety implications of these valves as compared to others.

Therefore, relief should not be granted or the alternative authorized to test these valves at the proposed refueling outage frequency. The licensee should continue to test these valves at the frequency specified in the Code.

4.3.2 Category C Valves

4.3.2.1 Relief Request. Valve relief request VRR-01 requests relief from the test method requirements of Part 10, Para. 4.3.2.4 (b), for the RHR injection isolation check valves, 1(2)-E11-F078, and proposed to exercise these valves with the mechanical exerciser and measure the breakaway force (or torque) during refueling outages when loop B of the RHR system is drained. During refueling outages when the B loop is not drained, the valve will be manually cycled to the full open position without measurement of the breakaway force.

4.3.2.1.1 Licensee's Basis for Requesting Relief--This 16 inch isolation check valve is the cross connect header from Division II RHR Service Water to the RHR/LPCI loop B injection line. This normally closed check valve opens to allow sea water flow to the reactor vessel as a last resort means of core cooling. RFJ-17 was written to justify testing of this check valve on a refueling frequency in accordance with Part 10, Para. 4.3.2.2(e). In accordance with 10CFR 50.55a(a)(3)(ii), CP&L is requesting approval to implement an alternative to the requirement of Part 10, Para. 4.3.2.4(b).

RHR/LPCI loop B is required to be drained to measure the breakaway force or torque required to initiate obturator movement. Draining RHR/LPCI loop B requires that shut down cooling and fuel pool cooling features of the RHR B loop be rendered inoperable, thereby reducing the defense in depth capabilities for shutdown risk management. Draining RHR/LPCI loop B, when no other system work is scheduled during a refuel outage, can be considered a hardship as it requires approximately 50 man-hours and has the potential to extend the length of the refueling outage. Additionally, general area background dose rates are elevated without the water shield within the RHR piping, and an additional 300 mrem exposure is estimated for draining, testing and refilling the loop to perform this specific task.

Proposed Alternate Testing: These valves will be exercised with the mechanical exerciser, and the breakaway force (or torque) will be measured, during each refueling that RHR/LPCI loop B is drained for outage work activities. This is anticipated to occur every other refueling outage. When the B loop of the RHR system is not drained, the valve will be manually cycled to the full open position without measurement of the breakaway force.

4.3.2.1.2 Evaluation--These normally-closed RHR injection isolation check valves are in the cross connect header from RHR service water. They open to allow sea water flow to the reactor vessel for core cooling. The licensee proposes to exercise these valves using a mechanical exerciser because it is impractical to exercise them open with flow at any frequency. Establishing flow through these check valves would result in supplying sea water to the suction of the RHR pumps. This could result in seawater being injected into the reactor recirculation system and the suppression pool. The Code requires measurement of the breakaway force or torque whenever valves are exercised by a manual mechanical exerciser. The licensee proposes to cycle these valves manually without measurement of force or torque during refueling outages when the RHR B-loop is not drained. During outages when the loop is drained, these valves will be tested according to the Code test method requirements. This is expected to occur every other refueling outage. Justification for the refueling outage test frequency is discussed in RFJ-17.

The licensee states that a portion of the RHR system must be drained to measure breakaway force or torque as required by the Code. Draining the system is a time-consuming (approximately 50 man-hours) and complex activity and could extend the length of the refueling outage. When the system is drained, general area background dose rates are elevated, which would result in an additional approximately 300 mrem exposure for this task. Draining the loop also renders a portion of the RHR system unavailable, which has a negative impact on shutdown risk. Therefore, requiring draining of the system each refueling outage would pose a hardship or unusual difficulty on the licensee.

The licensee's proposal states that the breakaway force or torque to exercise these valves will be measured during those refueling outages when the RHR loop-B is drained for outage work activities, which they indicate "is anticipated to occur every other refueling outage." Relief cannot be granted for an unspecified test frequency as requested, since this could permit indefinite deferral of the required test measurements for these valves. Manually cycling these valves without measurements each refueling outage and measuring breakaway force or torque during every other refueling outage should allow an adequate assessment of operational readiness of these valves and provides a reasonable alternative to the Code test requirements.

Based on the determination that compliance with the Code test requirements poses a hardship or undue burden that is not compensated by a corresponding increase in safety and considering that the alternative of manually exercising these valves every refueling outage and measuring the breakaway force or torque every other refueling outage should provide an adequate assessment of operational readiness and is a reasonable alternative to the Code requirements, the alternative should be authorized according to 10 CFR 50.55a(a)(3)(ii). The authorized alternative requires measurement of the force or torque required to initiate movement of the subject valves at least once every other refueling outage.

4.4 High Pressure Coolant Injection System

4.4.1 Category C Valves

4.4.1.1 Relief Request. Refueling justification RFJ-20 requests deferral of testing until refueling outages and valve relief request VRR-08 requests relief from the test method requirements of Part 10, Para. 4.3.2.4, for the high pressure coolant injection (HPCI) discharge check valves 1(2)-E41-V159 and proposes to exercise these valves using the installed lever arms and to measure the running torque when exercising the valves or to disassemble and inspect them every refueling outage.

RFJ-20

4.4.1.1.1 Licensee's Basis for Requesting Relief--These valves open for HPCI System injection into the main feedwater headers. There are two possible methods of exercising these valves. The HPCI pump can be aligned to pump full accident flow directly into the reactor coolant system. Under steaming conditions at power, this would result in severe thermal stresses on the reactor vessel feedwater nozzles and possibly unacceptable transients in reactor vessel water level. During cold shutdown periods, there is insufficient steam pressure for pump operation. An alternate means of exercising utilizes the manual level arm installed on each valve. Manual exercising requires access to the MSIV pit. During power operation, radiation levels prohibit access to the MSIV pit; during cold shutdown periods, the level of effort and resources required to remove the pit shield plug to provide access are prohibitive.

Proposed Alternate Testing: Each of these valves will be exercised manually during each refueling outage or disassembled as permitted per Part 10, Paragraph 4.3.2.4(c).

VRR-08

4.4.1.1.2 Licensee's Basis for Requesting Relief--In accordance with 10 CFR 50.55a(f)(5)(iii), CP&L is requesting approval to implement an impractical relief request. Testing these valves with flow from the HPCI system to the reactor vessel on a routine basis is not desirable due to the inherent complexity of the test procedures required, and the potential for impurity contamination of the reactor coolant system. These check valves are provided with external operating arms and disk position indication. The external operating arms are pinned to operating shafts that also serve as the hinge pins for the valve disks. The design of the hinge pin/lever arm assembly is such that the lever arm and shaft rotate independently with respect to the disc assembly until a pull on the shaft engages a mating lug on the disk arm that, in turn, causes the shaft to then move the disk. The primary element of force experienced by the operating arm is a result of the packing drag in the operating shaft until the shaft engages the disk arm lug, then it is a combination of the packing drag and the weight and moment of the disk. The actual friction between the disk arm and the shaft is expected to be a small fraction of the total force applied and, thus, is not easily discernible or measurable. Based on this arrangement, there is no mechanism whereby the breakaway force of the disk can be accurately and reliably determined.

Proposed Alternate Testing: Each of these valves will be exercised using the installed lever arms. During this exercising, torque observation during shaft movement prior to engagement of the disk swing arm will verify that the shaft is not bound to the swing arm. In addition, the torque required for exercising each valve through its full stroke will be measured and compared to the associated reference value.

4.4.2.1.3 Evaluation--These normally-closed check valves are in the discharge piping of the HPCI system. They allow the flow of high pressure coolant injection into the feedwater header under accident conditions. To exercise these check valves open with flow it would be necessary to establish flow through them into the main feedwater injection header and into the reactor vessel. This would result in the injection of relatively cold water into the feedwater and reactor, which could thermal shock the system piping and cause a reduction of the feedwater temperature and fluctuations of reactor power and water level. In addition, the water injected is not reactor grade water and may contain impurities which could result in the reactor chemistry going out of the prescribed control bands. Therefore, it is impractical to exercise these valves open with flow during power operations. It is impractical to exercise the valves open with flow during cold shutdowns and refueling outages because steam would not be available to operate the HPCI turbine.

Part 10, Para. 4.3.2.4(b), states in part: "If a manual mechanical exerciser is used to move the obturator, the force or torque required to initiate movement (breakaway) shall be measured and recorded." Part 10 does not address measurement and assessment of running torque. The shafts of these valves serve as the hinge pins and are not connected to the valve disks during normal valve operation. To mechanically exercise the valves, the shaft has to be pulled, which engages a mating lug on the disk arm and allows the shaft to move the disk. Because of the construction of these valves, it is not practical to measure the breakaway torque when exercising the valves with the swing arms.

The licensee proposes to exercise the valves using the swing arms and to measure the torque required to move the shafts during the exercise, both when the shafts are not moving the disks and when the shafts move the disks through their full travel, or to disassemble and inspect the valve internals during refueling outages in accordance with Part 10, Para. 4.3.2.4(c). If a manual exercise test is performed, the acceptance criteria is based on 200% of the torque that was measured to open the valve when the valve was new and known to be in good operating condition, which is the method specified by the previous version of the code (Section XI, IWV-3522). The issue with this approach is whether the proposed testing provides a reasonable assurance of operational readiness.

The components of measured running torque include the resistance of the packing and the resistance caused by degradation of the valve internals. The licensee has stated that the actual friction between the disk arm and the shaft is expected to be a small fraction of the total force applied. Given that the actual friction between the disk arm and the shaft is expected to be a small fraction of the total force applied, valve disk performance could degrade by a significant amount while still meeting the 200% acceptance criteria. Therefore, the proposed acceptance criteria may inhibit the detection of valve degradation prior to the valve degrading to the point where its ability to perform its safety related function is questionable.

Based on the preceding determination that the licensee's proposed method and acceptance criteria for measuring breakaway force or torque for these check valves does not ensure a reasonable assessment of operational readiness or provide an adequate alternative to the Code requirements, relief should not be granted as requested in VRR-08. The OM Code , Part 10, Para. 4.3.2.4(c), allows disassembly and inspection of valve internals during refueling outages, which is the licensee's proposed alternate method of assessing the condition of these valves as indicated in RFJ-20.

4.5 Instrument Air System

4.5.1 Category A/C Valves

4.5.1.1 Relief Request. VRR-03 requests relief from the full-stroke open exercise requirements for instrument air supply check valves to air-operated valves, 1(2)-RNA-V313, 1(2)-RNA-V314, 1(2)-RNA-V350, and 1(2)-RNA-V351, in accordance with the requirements of Part 10, Para. 4.3.2.2(a), and proposed to test these valves by blowing or venting gas through the valves.

4.5.1.1.1 Licensee's Basis for Requesting Relief--In accordance with 10 CFR 50.55a(f)(5)(iii), CP&L is requesting approval to implement an impractical relief request. The check valves used are of a simplified design with no external means of exercising, nor for determining obturator position. Thus, the only method of exercising is to establish air or nitrogen flow through the valves. This typically is no problem procedurally; however, in-situ quantification of the flow is not practical. Furthermore, for these small valves, non-intrusive testing is also not practical.

The valves in question are used in systems that provide operating gas to pneumatically-operated valves. The gas flow to the valve operators is minimal compared to system capacity and is itself not quantified.

Disassembly of these small specialty valves is not recommended by the manufacturers due to their design and re-assembly requirements. Performing a "blow" test by venting will adequately exercise these valves and ensure continued operational readiness of these components.

Proposed Alternate Testing: When testing these check valves, the following will be performed to satisfy the requirements for full-stroke open exercising per Part 10, Para. 4.3.2.2(a):

A "blow" test by venting, where the flowrate is significant and identified from an open test connection.

4.5.1.1.2 Evaluation--These are small (0.75 inch) self-actuated check valves in the non-interruptible instrument air lines that open on demand to supply air or gas to various pneumatically-operated valves and valve accumulators. The flow rate through these valves varies with the downstream demand. These are simple check valves without any external provisions for exercising the disk or determining valve disk position. There are no flow meters or other instruments installed in the lines to determine the flowrate through these valves, therefore, it is impractical to test these valves using existing system provisions. The Code requires that these valves be exercised or examined in a manner that verifies obturator travel to the full-open or partial-open position required to fulfill its function. The licensee proposes to perform a "blow" test through the valve by venting through a test connection. The flowrate through this valve will be verified to be significant. The licensee's justification for an extended frequency (refueling outages) for testing these valves is included in RFJ-22.

During refueling outages when portions of the air system can be shut down, these valves can be tested. This can be done by isolating the system downstream of these valves and opening a test connection. Gas or air flow is then directed through these valves and out the open connection. This test offers a reasonable alternative to the Code open exercising method requirements, provided the licensee employs objective acceptance criteria to the test to ensure that the flow rate through these valves is above a reasonable level. The licensee has stated that the flow rate through these valves will be significant and identified, however, has not stated the acceptance criteria that will be applied. Objective criteria should be applied to the result of the test to ensure that significant degradation is detected.

Based on the determination that compliance with the Code requirements for open exercising is impractical, and considering the adequacy of the licensee's proposed alternate testing method, relief should be granted according to 10CFR50.55a(f)(6)(i), provided the licensee implements reasonable objective acceptance criteria to help to ensure that significant degradation of these valves is detected and corrective action is taken when needed.

4.6 Containment Atmospheric Control

4.6.1 Category A/C Valves

4.6.1.1 Relief Request. VRR-11 requests relief from the test frequency requirements for set pressure testing of the primary containment vacuum relief valves, 1(2)-CAC-X20A & 1(2)-CAC-X20B, in accordance with the requirements of OM Code, Part 1, Paragraphs 1.3.4.3 and 3.3.2.3, and proposes to functionally test these valves quarterly and set pressure test them each refueling outage with in accordance Technical Specifications.

4.6.1.1.1 Licensee's Basis for Requesting Relief--Carolina Power & Light (CP&L) Company is requesting approval from the impractical requirements of the OM Code, Part 1, Paragraphs 1.3.4.3 and 3.3.2.3 with respect to the set pressure testing of the primary containment vacuum relief valves every six months. This request for relief is being made in accordance with 10 CFR 50.55a(f)(5)(iii).

Maintenance on the subject valves would require a Local Leak Rate Test (LLRT), in accordance with 10 CFR Part 50, Appendix J, to verify satisfactory leak tightness subsequent to the maintenance activities. The adjacent inboard containment isolation valves (i.e., CAC-V16 and CAC-V 17) do not perform a reliable seal to use as an LLRT boundary valve.

The CAC-V16 and CAC-V17 valves are Posi-Seal butterfly valves with offset discs and stems. Although the valves are considered to be capable of by-directional sealing, maximum sealing is achieved when the valve disc seal ring is located on the lower pressure side of the valve stem. In this "preferred" orientation, the seat ring retaining ring is also located on the outboard face of the valve and the valve packing is subjected to containment side pressure only. The valves were originally installed in this orientation. LLRTs were performed by pressurizing the volume between the inboard and outboard valve (i.e., Primary Containment Vacuum Breaker and CAC-V16/V17). This mode of testing excluded the inboard valve packing from the LLRT. In 1985, in response to NRC Inspection Report 50-325,324/85-31, inboard valve (i.e., CAC-V16/V17) orientation was reversed in order to place the valve packing within the LLRT boundary. As a result, the inboard valves were installed with the retaining ring located on the containment side (inboard) valve face. In this orientation, the valves no longer offer maximum disc sealing in the loss-of-coolant accident (LOCA) direction, and difficulties were encountered in achieving satisfactory ILRT results, in spite of satisfactory LLRT results. The valves were subsequently reversed again, and are in their current orientation with the retaining ring located on the outboard face of the valve. When the valves were reversed, a flanged connection was added to the torus to allow testing in the LOCA direction.

Post-maintenance testing associated with the Primary Containment Vacuum Breakers would require an LLRT. Performance of the LLRT would require shutdown the unit and de-inerting in order to enter the torus for test flange installation. To perform the LLRT between the Primary Containment Vacuum Breaker and the CAC-V 16/V 17 would require design and installation of a valve capable of sealing in both directions against the LLRT.

In addition, in accordance with Technical Specification 3.6.1.5.3, a functional test is performed on these valves every 92 days and the full open setpoint test is performed every 24 months in accordance with Technical Specification 3.6.1.5.4. The Technical Specification Bases for the 24 month setpoint test frequency states "The 24 month frequency has been demonstrated acceptable, based upon operating experience, and is further justified because of other Surveillances performed more frequently that convey proper functioning status of each vacuum breaker."

Proposed Alternate Testing: Each of these primary containment vacuum relief valves will be set pressure tested each refueling in accordance with Technical Specification 3.6.1.5.4 and functionally tested quarterly in accordance with Technical Specification 3.6.1.5.3.

4.6.1.1.2 Evaluation--These valves open to relieve vacuum in the primary containment. The OM Code, Part 1, Paragraphs 1.3.4.3 and 3.3.2.3, require set pressure testing of these valves every six months, ". . . valves shall be actuated to verify open and close capability, set pressure, . . .". The licensee requests to defer set pressure testing of these valves from once every six months to during Technical Specification set pressure testing at refueling outages.

Set pressure testing of these valves requires installation of a test flange to achieve an adequate leak-tight boundary. Installing the test flange requires shutting down the plant, de-inerting containment, and entering the torus. Therefore, this set pressure test is impractical to perform once every six months. The licensee proposes to perform a functional test on these valves every three months and a full-open setpoint test each refueling outage. Testing these valves according to the OM Code requirements every six months, with the exception of setpoint testing, coupled with testing according to the Code requirements during each refueling outage, including set pressure testing, should allow an adequate assessment of operational readiness of these vacuum breaker valves and provides a reasonable alternative to the Code set pressure testing frequency.

An additional consideration is that in recent editions of the ASME OM Code, the Code Committee has changed the requirement to perform an operability test on primary containment vacuum relief valves from once every 6 months to "at each refueling outage or every 2 years, whichever is sooner, unless historical data requires more frequent testing" (see ASME OMc Code-1994, Appendix I, Para. I-1.3.7(a) and equivalent paras. from more recent Code editions).

Based on the determination that compliance with the Code test frequency requirements for set pressure testing is impractical, and considering the adequacy of the licensee's proposed alternate testing, relief should be granted in accordance with 10 CFR 50.55a(f)(6)(i).

APPENDIX A

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

APPENDIX A

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

Inconsistencies and omissions in the licensee's program noted during the course of this review are summarized below. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

1. Valve relief request VRR-01 (see section 4.3.2.1 of this report) requests relief from the test method requirements of Part 10, Para. 4.3.2.4(b), for the RHR injection isolation check valves, 1(2)-E11-F078, and proposes to exercise these valves with the mechanical exerciser and measure the breakaway force (or torque) during refueling outages when loop B of the RHR system is drained. During refueling outages when the B loop is not drained, the valve will be manually cycled to the full open position without measurement of the breakaway force. Requiring the licensee to drain the RHR loop-B during each refueling outage would be a hardship without a compensating increase in the level of quality and safety. The licensee's proposal states that outages when the RHR loop-B is drained for work activities "is anticipated to occur every other refueling outage." Relief cannot be granted for an unspecified test frequency as requested, since this could permit indefinite deferral of the required test measurements for these valves. Therefore, the alternative should be authorized according to 10 CFR 50.55a(a)(3)(ii), however, measurement of the force or torque required to initiate movement of the subject valves must be performed at least once every other refueling outage.

2. Valve Relief Request VRR-02 (see section 4.2.3.1 of this report) requests relief from the stroke time measurement requirements of OM-10, Para. 4.2.1.4, for the automatic depressurization system (ADS) valves and proposes to ascertain valve condition by observing the response and changes in main steam parameters within a specified time period and observation of the outputs of the downstream temperature and acoustic sensors. Specific stroke times will not be measured for the ADS valves and measurements will not be subjected to evaluation per Part 10, Paragraph 4.2.1.8. Since the proposed alternate testing of Valve Relief Request VRR-02 differs from the previously approved request and the current request does not provide a viable method to detect and take corrective actions for degradation of these valves, relief should not be granted as requested in VRR-02.

   Since it is impractical to directly measure the valve stroke times and apply the Code acceptance criteria, relief should be granted from the requirements of OM-10, Paras. 4.2.1.4 and 4.2.1.8 in accordance with 10 CFR 50.55a(f)(6)(i) with the following provision: until a revised relief request is submitted and approved by the NRC staff, the alternate testing approved by the SE transmitted in the NRC letter dated January 4, 1990, for the Brunswick second ten-year IST program, shall be utilized for ADS valves, 1(2)-B21-F013A thru H, J, K, and L.

3. Valve Relief Request VRR-03 (see section 4.5.1.1 of this report) requests relief from the full-stroke open exercise requirements of Part 10, Para. 4.3.2.2(a), for instrument air supply check valves to air-operated valves, 1(2)-RNA-V313, 1(2)-RNA-V314, 1(2)-RNA-V350, and 1(2)-RNA-V351. The Code requires that these valves be exercised or examined in a manner that verifies obturator travel to the full-open or partial-open position required to fulfill its function. The licensee proposes to perform a "blow" test through each valve by venting through a test connection. Relief should be granted according to 10CFR50.55a(f)(6)(i), provided the licensee implements reasonable objective acceptance criteria to help to ensure that significant degradation of these valves is detected and corrective action is taken when needed.

4. Valve Relief Request VRR-07 (see section 4.1.1.1 of this report) requests relief from replacement of rupture disks every five years for Category D HPCI and RCIC turbine exhaust line rupture disks and proposes to visually inspect each of these disks at least once every ten (10) years. The licensee proposes to deviate from the Code requirement in two significant respects; 1) the rupture disks would be visually inspected as opposed to replaced, and 2) the inspection would be conducted every ten years as opposed to replacement every five years or less. The licensee has not shown that the proposed alternative provides an acceptable level of quality and safety, compliance with the specified requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety; or the Code requirements are impractical to support granting relief or authorizing an alternative as required by 10 CFR 50.55a. Therefore, relief should not be granted or the alternative authorized as requested.

5. Valve Relief Request VRR-08 (see section 4.4.1.1 of this report) requests relief from the valve full-stroke exercising requirements of OM-10, Para. 4.3.2.4 (b), for the HPCI injection check valve and proposes to exercise the valve using installed lever arm and to measure the torque before the lever arm engages the disk and then measure the torque required to move the disk through a full stroke. The licensee didn't address how the reference torque value and the required action point will to be determined for this test. The Code of record requires the measurement of breakaway torque, while running torque is being measured by the proposed alternate testing. Therefore, the method specified in the Code for determining reference and required action torque values may not be appropriate for this application. Measuring running torque should be acceptable, however, since insufficient information has been provided on how reference and required action values will be determined, relief cannot be granted as requested. Before relief can be granted, the licensee must provide a detailed description of how they determine the reference value for the torque and how the action point will be calculated.

6. Valve relief request VRR-09 requests relief from the test frequency requirements of Part 10, Para. 4.2.1.1, for the manual RHR to spent fuel pool valves, 1(2)-E11-V40, and proposes to exercise them during refueling outages. The Code of record does not differentiate between manual valves and other Category A and B valves with regard the exercising frequency. The Code requires that these valves be exercised quarterly if practical, or during cold shutdowns or refueling outages, when justified by the licensee. Relief should not be granted or the alternative authorized to test these valves at the proposed refueling outage frequency. The licensee should continue to test these valves at the frequency specified in the Code.

7. The licensee submitted several program remarks for check valves that were having their full-stroke exercise requirements verified by disassembly and inspection (Program Remarks V-03, V-06, V-07, V-08, V-09, V-10, V-11, V-12, V-13, V-17, and V-19). OM-10 allows check valve disassembly and inspection as an alternative to exercising check valves with flow or with manual actuators. Generic Letter 89-04 grants relief to use sample disassembly and inspection of check valves if it is performed in accordance with the requirements of Position 2. Generic Letter 89-04, Position 2, states: "The sample disassembly and inspection program involves grouping similar valves and testing one valve in each group during each refueling outage. The sampling technique requires that each valve in the group be the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions including valve orientation." The licensee has not clearly identified in their IST program which valves are included in each sampling group or how frequently a valve from each group is being disassembled and inspected. Several of the Program Remarks refer to Engineering Procedure 0ENP-16.7, Procedure for Administrative Control of the Check Valve Disassembly Program. This procedure was submitted as Enclosure 2 of the submittal dated August 6, 1998. The reviewers have the concern that information that could affect the testing frequency of

safety-related valves is only documented in an engineering procedure that does not receive the same level of control or regulatory reviews and approval as the IST program. In addition, the reviewers have identified the following issues with regard to Engineering Procedure 0ENP-16.7:

a. Para. 5.1.3 states: "Valves that are disassembled to verify closure capabilities are not required to a partial flow performed after re-assembly." The NRC staff response to question #11 of the minutes of public meetings on GL 89-04, Position 2, states: "Additionally, partial stroke exercise testing with flow is expected to be performed after the disassembly and inspection is completed but before returning the valve to service." This partial-stroke requirement is not limited to those check valves that are disassembled and inspected to verify their full-stroke open capability, but is also intended for valves that are disassembled and inspected to verify their closure capability. The partial-stroke exercise is intended to verify that the valve disk swings at least to its partial open position which provides a degree of assurance that there is no binding and that the valve has been properly reassembled following the disassembly and inspection.

   Although disassembly and inspection can provide a great deal of information about the condition of a check valve, because of its intrusive nature, the staff considers it to be a maintenance procedure. Part 10, Para. 3.4, requires that valves that have undergone maintenance that could affect their performance be tested prior to returning them to service. Since it is impractical to full-stroke exercise with flow many of the valves that are disassembled and inspected, the staff requires a partial-flow test, where practical, be performed prior to returning to service the check valves that have been disassembled. Para. 5.1.3 of Engineering Procedure 0ENP-16.7 does not conform to Part 10, therefore, the licensee should comply with the Code and GL 89-04 when performing check valve disassembly and inspections.

b. Para. 5.3.3 states: "A frequency, other than once each refueling outage or interval longer than once every six years, may be established provided an evaluation is performed to demonstrate that the proposed frequency will not effect plant safety and the applicable information listed below is provided and supported by plant data." GL 89-04, Position 2 states: "Extension of the valve disassembly/inspection interval to one valve every other refueling outage or expansion of the group size above four valves should only be considered in cases of <u>extreme</u> hardship..." Para. 5.3.3 does not address the hardship issue for interval extension or expansion of group size.

   The staff's response to Question #20 in the meeting minutes for GL 89-04, Position 2, reads: "the burden is on the licensee to demonstrate the extreme hardship necessary to comply with the identified sample disassembly/inspection schedule. The staff considers the sampling aspect of the position to provide assurance of the continued operability of the valves that are not inspected during any given outage. Therefore, the licensee should justify through the provisions listed in Position 2, any deviation from the stated schedule. That justification should be provided in the IST program submitted to the NRC staff..." Valve groups SDG-1O/P and SDG-2O/P both list 5 valves in the group. This group expansion is not addressed or justified in the IST program as required. To bring the program into compliance with GL 89-04 and the published staff positions, the licensee should reduce the number of valves in valve groups SDG-1O/P and SDG-2O/P or provide the justification in the IST program for staff review. The licensee should also modify Engineering Procedure 0ENP-16.7, Para. 5.3.3, to address the extreme hardship and IST program documentation issues.

c. One of the requisite conditions for grouping valves for sample disassembly and inspection as specified in GL 89-04, Position 2, is that they must have the same service conditions. Valve groups SDG-1Q and SDG-2Q both have valves that are listed as "Condensate" and valves that are listed as "Demin. Water" in the Service Condition column. These valves do not appear to meet the grouping criteria of GL 89-04. Valves subjected to different water chemistry, temperature, flow conditions, etc. will degrade differently and should not be grouped for sampling purposes. The licensee should change these valve groups or provide additional justification in the IST program to support the proposed groups.

d. Engineering Procedure 0ENP-16.7 should not be used as the sole mechanism for identifying check valve sample groups, test intervals, or group sizes that deviate from the criteria specified in Generic Letter 89-04, Position 2. Since relief is not granted by Generic Letter 89-04 for check valve sample disassembly and inspection that does not meet all of the criteria of Position 2 of the Generic Letter, any deviation from the grouping and frequency criteria specified in Position 2 should be specifically addressed and justified in the IST program.

APPENDIX B

IST PROGRAM ISSUES IDENTIFIED DURING THE SYSTEMS REVIEW

APPENDIX B

IST PROGRAM ISSUES IDENTIFIED DURING THE SYSTEMS REVIEW

The INEEL staff reviewed the High Pressure Coolant Injection (HPCI) and Service Water (SW) systems. The staff identified each component in these systems listed in the Inservice Testing (IST) program on the appropriate plant P&ID and evaluated the test(s) designated in the IST program to assess compliance with the applicable American Society of Mechanical Engineers (ASME) Operations and Maintenance (OM) Code test requirements. Related extended test interval justifications, technical positions and relief requests were also assessed. Following this review, the staff assessed the system for completeness (to determine if additional components should have been included in the IST program). This review yielded the following list of issues that should be addressed by the licensee.

High Pressure Coolant Injection

1. There appears to be an error on Drawing (Dwg.) D-02523, Sh-1, Unit 2, at coordinates (Coord.) B-6. Check valve 2E41-F005 on the discharge of the HPCI pump is drawn in reverse.

2. It appears that valve E41-F004 performs a safety function in the open position. The downstream check valve, E41-F019, is indicated in the valve table to perform a safety function in the open and closed position.

3. There appears to be a test frequency discrepancy between the IST program valve table and Program Remark V-07. Valves 1(2)E41-F022 on valve table pages 83 of 128 and 85 of 147, respectively, are addressed in V-07, which provides a deferred test justification for exercising the valves to the closed position at cold shutdown using the handwheel. In the valve tables, valve 1E41-F022 on page 83 of 128, is indicated to be tested at "C" or cold shutdown, whereas valve 2E41-F022 on page 85 of 147 is indicated to be tested "Q" or quarterly.

4. The Brunswick "Pump and Valve Tables - Descriptions and Abbreviations" table defines a test frequency, "SP" as "Special test interval, the frequency will be specified in the applicable relief request or procedure." The "SP" frequency is assigned to many of the valves identified to receive a disassembly and inspection "DA" test in the valve tables, however, in many of these cases there are no "relief requests or procedures" identified in the IST program. OM-10 specifies the allowable frequencies for testing valves. The only frequency allowed by OM-10 for disassembly and inspection is each refueling outage.

5. Valves 1(2)-E41-F040 on valve table pages 85 of 128 and 87 of 147, respectively, perform safety function(s) in both the open and closed positions. Under the "Test Type" column in the valve tables there are two tests indicated; "CV-C" and "DA". "CV-C" is for closed verification and "DA" is for disassembly and visual inspect, which is performed in lieu of the open exercise. Both tests are related to refueling justification RFJ-18. There are two issues with this.

   - RFJ-18 addresses only the closure or "CV-C" test. RFJ-18 states that the valves will be closure tested each refueling outage. RFJ-18 does not address the open test for these valves. Therefore, the reference to RFJ-18 is incorrect for the "DA" or open capability verification.

   - The valve tables indicate in the "Frequency" column that the "DA" test will be done at frequency "SP." However, the only frequency allowed by the Code for "DA," is each refueling outage or "R." Therefore, the frequency reference in the column should be "R" instead of "SP." The licensee should review the IST program to ensure that frequencies are in accord with OM-10, except where relief is requested.

6. Valves 1(2)-E41-F057 on valve table pages 86 of 128 and 88 of 147, respectively, perform a safety function in the open position. The valve tables indicate that a "CV-P" or check valve partial open test will be performed quarterly and a "DA" will be performed at "SP." However, there is no reference under the "Relief Requests" column to a deferred test justification or relief request. The licensee should ensure that the test frequency for the "DA" test complies with the requirements of OM-10 or submit a relief request justifying an extended frequency beyond those authorized by the Code.

7. There appears to be a test frequency discrepancy between the IST program valve tables and relief request VRR-07. Devices (rupture disks) 1(2)-E41-PSE-D003 and -D004 on valve table pages 87 and 88 of 128 and 89 and 90 of 147, respectively, perform a safety function in the open position. The valve tables indicate that these devices will receive a "DA" test every 5 years and refers to VRR-07. VRR-07 proposes to visually inspect these devices once every 10 years. The licensee should correct this discrepancy. VRR-07 is evaluated in Section 4.1.1.1 of this report.

8. There is an apparent discrepancy between the valve tables and the plant P&IDs regarding the safety function position for the following valves. Valves 1(2)-E41-SV1218D, -SV1219D, -SV1220D, and -SV1221D on valve table pages 88 of 128 and 90 of 147, respectively, are indicated to perform a safety function in the closed position. Their fail-safe position is also indicated to be closed. However, the plant P&IDs, D-25023, Sh-2 and D-02523, Sh-2, which show these valves at coordinates, B -7, indicate that the fail safe position of these valves is open. The licensee should review the IST program valve tables and plant P&IDs to determine if any changes are needed.

9. Valves 1(2)-E41-V159 on valve table pages 89 of 128 and 91 of 147, respectively, perform a safety function in both the open and closed positions. The valve tables indicate that the "SP" test frequency may apply to "DA" of these valves. The licensee should ensure that the test frequency for the "DA" test complies with the requirements of OM-10 or submit a relief request justifying an extended frequency beyond those authorized by the Code.

10. It appears that valves 1(2)- E41-V9, turbine control valves, or 1(2)-E41-V8, turbine stop valves, (see plant P&IDs D-25023, Sh-2 and D-02523, Sh-2, that show these valves at coordinates, F-4) may perform a safety function in the closed position (e.g., to protect the HPCI turbine from overspeed). If valves 1(2)-E41-V9 are skid-mounted they might be satisfactorily tested as part of the quarterly HPCI test. The licensee should review the safety function of valves 1(2)-E41-V9 to determine if they should be included in the IST program and tested to the Code requirements.

11. The barometric condenser condensate pump discharge check valve, 1(2)-E41-F052, (see plant P&IDs, D-25023, Sh-2 and D-02523, Sh-2, that show these valves at coordinates, B-2) is in line with valve 1(2)-E41-F048 that performs a safety function in the open position. The -F052 valve is shown on the P&ID to be within the Code Class 2 boundary and appears to perform a safety function in the open and/or closed position. The licensee should review the function of this valve to determine if the valve should be included in the IST program and tested to the Code requirements.

12. The licensee should review the safety function of valves 1(2)-E41-V79, -F054, and F029 on plant P&IDs D-25023, Sh-2 and D-02523, Sh-2, at coordinates, B-2, E-2, and D-3, respectively, to determine if they perform a safety function(s) and should be included in the IST program and tested

to the Code requirements. It appears to the reviewers that unless these valves function correctly, the drain pot may not remove adequate moisture from the steam line, which could render the system inoperable.

13. Comment: Class 1, 2, and 3 manual valves in any plant system that perform an active safety function should be included in the IST program and be tested in accordance with the Code requirements.

<u>Service Water System</u>

1. The OM Code, Part-10, Para. 4.1, Valve Position Verification, requires that remote position indicators be observed locally at least every two years for accuracy. From the review of P&IDs D-02537, Sh-2, Coordinates D-7 and B-6, 1(2)-SW-V123 and -V124, it appears that these valves are equipped with remote position indication. However, the valve table entries for these valves do not indicate that a remote valve position indication test is being performed. This applies to all valves in the IST program with remote position indication. The licensee should ensure that these valves are receiving position verification according to the Code if required.

2. There is an apparent discrepancy between the valve tables and valve position V-12 for the following valves. Valves 1(2)-SW-V144 and -V148 are indicated in the valve tables to be tested "DA" each "R." However, the applicable valve position, V-12, indicates that these valves will be tested according to a sample disassembly and inspection program. Therefore, the frequency should be "SP" in the IST program valve tables.

3. There is an apparent discrepancy between the valve tables and valve position V-06 for the following valves. Valves 1(2)-SW-V21, -V22, -V23, -V24 and -V25 are indicated in the valve tables to be tested "DA" each "R." However, the applicable position, V-06, indicates that these valves will be tested according to a sample disassembly and inspection program that comports with GL 89-04, Position 2. Therefore, the frequency should be "SP" in the IST program valve tables. Additionally, the generic letter allows the grouping of up to four similar valves and does not allow groups of 5 valves.

4. There is an apparent discrepancy between the valve tables and valve position V-13 for the following valves. Valves 1(2)-SW-V683, -V684, -V685, and -V686 are indicated in the valve tables to be tested "DA" each "R." However, the applicable position, V-13, indicates that these valves will be tested according to a sample disassembly and inspection program that comports with GL 89-04, Position 2. Therefore, the frequency should be "SP" in the IST program valve tables.

5. The P&IDs D-20041 and -02041, Shs-1 and 2, for the conventional and nuclear header service water pumps, 1(2)-SW-C-P-1A, -1B, and -1C and 1(2)-SW-N-P-1A and -1B, do not show instruments for measuring pressure at a point in the inlet pipe of the pump. If inlet pressure is calculated for use with discharge pressure to determine differential pressure, the method of determining the inlet pressure using a calculational method should meet the quality assurance (QA) requirements and be included in the implementing procedures as discussed in NUREG-1482, Section 5.5.3. Similar issues may apply to other IST test parameters (e.g., flow rate or vibration) that are measured or determined indirectly and subjected to calculation or reduction.

6. The licensee should review the safety function of 20" manual butterfly valve 1(2)-SW-V146 to determine if it performs an active safety function in the closed direction to prevent diversion of flow to non-essential loads. If so, it should be included in the IST program and be tested to the applicable Code requirements.

7. The licensee should review the safety function of check valves 1(2)-SW-V192 (P&IDs D-25037 and -02041, Sheets 1 and 2, Coordinates. B-7) to determine if they perform an active safety function in the closed direction to prevent diversion of flow. If so, they should be included in the IST program and be tested to the applicable Code requirements.

APPENDIX C

DEFERRED TEST JUSTIFICATIONS

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DEFERRED TEST JUSTIFICATIONS

The INEEL staff reviewed the licensee's IST program to assess compliance with the applicable American Society of Mechanical Engineers (ASME) Operations and Maintenance (OM) Code requirements for deferred test justifications. The following section summarizes the licensee's proposed test interval extension and justification for extension to cold shutdowns or refueling outages and is organized by plant system. Inconsistencies or omissions related to deferred test justifications are addressed in Appendices A and B.

MULTIPLE SYSTEMS

Submittal **CSJ-09** provides justification to extend the test frequency for Category C HPCI and RCIC valves, 1(2)-E41-F021 and 1(2)-E51-F001. Each of these valves will be exercised closed (handwheel operation) during cold shutdown periods.

Basis: These are simple stop-check valves with no external means of determining disc position or for manually manipulating the disc (other than maintaining closure by handwheel operation).To verify closure requires shaft operation via the handwheel that physically locks and restrains the disc in the closed position. This configuration causes the related system (HPCI or RCIC) to be inoperable. Based on the foregoing discussion, testing of these valves during cold shutdown satisfies the criteria of NUREG-1482, Paragraph 3.1.1 for test deferral.

Submittal **CSJ-10** provides justification to extend the test frequency for Category C HPCI and RCIC valves, 1(2)-E41-F076, 1(2)-E41-F077, 1(2)-E51-F063, and 1(2)-E51-F064. Each of these valves will be exercised open and closed during cold shutdown periods.

Basis: These simple check valves have no external means of exercising or for determining disc position, thus, the only practical method of exercising is to perform forward and backflow tests using compressed air. During performance of this test, the upstream and downstream MOVs (MOV's) are closed and the associated test/vent connection valves are opened. In this configuration, in the event HPCI or RCIC operation is required, both MOV's must open to ensure system operation. If one of the two valves failed to open, system availability would be questionable. Furthermore, if they did open and the associated system did initiate operation, operator response would be required to isolate the test/vent connections to prevent the release of radioactive steam into the reactor building and ensure containment isolation. Based on the foregoing discussion, testing of these valves satisfies the criteria of NUREG-1482, Paragraph 3.1.1 for test deferral.

Submittal **RFJ-01** provides justification to extend the test frequency for the Category A/C reactor instrument isolation valves listed in the IST program. Each of these valves will be full-stroke exercised during refueling outages.

Basis: These valves are installed on instrument sensing lines leading from the reactor coolant system to sensing instruments located outside the primary containment. Their function is to close and limit leakage from the reactor coolant system in the event of an instrumentation piping failure outside primary containment. Exercising of these valves (except for 1(2)-B21-F008) during normal plant operation is impractical since it requires isolating instrumentation downstream of the excess flow check valves. Much of this instrumentation is related to safety functions and isolation is undesirable due to the potential for creating a plant transient or trip. In addition, if a valve were to fail with the plant at operating pressure, there may be a significant personnel hazard associated with the potential leakage of high pressure radioactive steam. Normally, testing of these valves is performed during the shutdown evolution period when the reactor plant cooldown is halted and an elevated reactor pressure is available to close the valves. If this were done at each cold shutdown per Part 10, Para. 4.3.2.2 it would result in a severe negative impact on outage time and plant availability.

These valves experience little or no flow, and these valves function essentially only during the exercise testing. Also, significant internal components are fabricated from corrosion-resistant materials that are not expected to degrade during the plant lifetime. For these reasons, general seat and internals degradation is highly unlikely. The 1(2)-B21-F008 valves isolate the reactor vessel flange leak tell-tail drain/sensing line from the pressure switch outside containment. This line is unlikely to see reactor coolant system pressure, and testing these two valves on a quarterly frequency would add little with respect to plant safety benefits. Although remote position indication (RPI) of these valves is performed each refueling, in the event of improper excess flow check valve position indication, satisfactory completion of 0144, "Excess Flow Check Valve Position Indication Evaluation," is sufficient to verify the operability of these valves.

MAIN STEAM

Submittal **CSJ-01** provides justification to extend the test frequency for Category A main steam isolation valves (MSIVs), 1(2)-B21-F022A, 1(2)-B21-F022B, 1(2)-B21-F022C, and 1(2)-B21-F022D, 1(2)-B21-F028A, 1(2)-B21-F028B, 1(2)-B21-F028C, and 1(2)-B21-FO28D. Each of these valves will be partial-stroke exercised quarterly and full-stroke exercised during cold shutdowns.

Basis: During normal plant steaming operation, these valves remain open to provide flow paths for steam from the reactor vessel to the main turbine generator. Full closure of one of these valves during steaming operations would result in transients in reactor power, reactor vessel level, and reactor pressure with the potential of creating an unstable condition ultimately resulting in a reactor shutdown or trip. In addition, per NUREG-0626, system transients resulting from full-stroke testing of main steam isolation valves can increase the chances of actuating primary system safety/relief valves.

INSTRUMENT AIR SYSTEM

Submittal **CSJ-02** provides justification to extend the test frequency for Category C instrument air supply valves, 1(2)-B21-F029A thru 1(2)-B21-F029D, and 1(2)-B21-V29A thru 1(2)-B21-V29D. Each of these valves will be exercised open and closed during cold shutdown periods.

Basis: These valves open to provide flow paths for supplying instrument air to the outboard main steam isolation valve (MSIV) operating system. They close to isolate the respective air accumulator to ensure an adequate supply of air to maintain the MSIV open, and provide closure air in the event of the loss of air pressure in the common supply headers. These are simple check valves with no external means of exercising or determining obturator position. Testing these valves in the open and closed directions requires isolation of the uninterruptable instrument air system, removal of the MSIV vault shield plug, and entry into the MSIV vault for valve manipulation and pressure monitoring - impractical during steaming operations due to environmental conditions and disruption of the main steam line radiation monitors. Partial-stroke exercising of these valves has the same impact and potential problems as does full closure, thus it is also not practical during steaming operations.

Submittal **RFJ-05** provides justification to extend the test frequency for Category C instrument air supply valves, 1(2)-B21-F024A thru 1(2)-B21-F024D, 1(2)-B21-V28A thru 1(2)-B21-V28D. Each of these valves will be closure verified during refueling outages.

Basis: These valves open to provide flow paths for supplying instrument air to the inboard main steam isolation valve (MSIV) operating system. They close to isolate the respective air accumulator to ensure an adequate supply of air to maintain the MSIV open, and provide closure air in the event of the loss of air pressure in the common supply headers. These are simple check valves, with no external means of exercising or determining obturator position. Testing these valves in the open and closed directions requires isolation of the uninterruptable instrument air system and entry into the drywell for valve manipulation and pressure monitoring. During cold shutdown periods, entry into the drywell would require de-inerting the drywell. Partial-stroke exercising of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming operations.

Submittal **RFJ-06** provides justification to extend the test frequency for Category C instrument air supply to ADS valves, 1(2)-B21-F036A thru 1(2)-B21-F036L, 1(2)-B21-V27A thru 1(2)-B21-V27L. Each of these valves will be exercised and verified to open and close during refueling outages.

Basis: These valves open to provide flowpaths for supplying instrument air to the automatic de-pressurization system (ADS) valves operating system. They close to isolate the respective air accumulator to ensure an adequate supply of air to provide closure air in the event of the loss of air pressure in the common supply headers. These are simple check valves, with no external means of exercising or determining obturator position. Testing these valves in the open and closed directions requires isolation of the uninterruptable instrument air system and entry into the drywell for valve manipulation and pressure monitoring. During cold shutdown periods entry into the drywell would require de-inerting the drywell. Partial-stroke exercising of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming operations.

Submittal **RFJ-21** provides justification to extend the test frequency for Category C instrument air supply valves, 1(2)-RNA-V313, 1(2)-RNA-V314, 1(2)-RNA-V315, 1(2)-RNA-V316. Each of these valves will be exercised, and verified to open and close, during refueling outages.

Basis: These valves open to provide flow paths for supplying instrument air and backup nitrogen to the automatic de-pressurization system (ADS) valves operating system. They close to isolate the respective supply headers, and provide independent supply paths. These are simple check valves, with no external means of exercising or determining obturator position. Testing these valves in the open direction requires isolation of the individual headers and entry into the drywell for valve manipulation and pressure monitoring. Furthermore, testing valves RNA-V315 and RNA-V316 to the closed position also requires entry into the drywell for valve manipulation and pressure monitoring. During cold shutdown periods, entry into the drywell would require de-inerting. Partial-stroke exercising of these valves requires the same plant conditions and access requirements as does full stroke exercising; thus, partial stroke exercising is also not practical during steaming operations or cold shutdown periods.

Submittal **RFJ-22** provides justification to extend the test frequency for Category A/C instrument air supply valves, 1(2)-RNA-V350 and 1(2)-RNA-V351. Each of these valves will be exercised, and verified to open and close, during refueling outages.

Basis: These valves open to provide flow paths for supplying instrument air to various components inside the drywell and close for containment isolation. These are simple check valves with no external means of exercising or determining obturator position. Testing these valves in the open direction requires entry into the drywell for valve manipulation and pressure monitoring. Testing in the closed direction also requires entry into the drywell and performance of a leak rate test. Partial-stroke exercising of these valves requires the same plant conditions and access requirements as does full stroke exercising; thus, partial stroke exercising is also not practical during steaming operations or cold shutdown periods.

NUCLEAR STEAM SUPPLY SYSTEM

Submittal **CSJ-03** provides justification to extend the test frequency for Category A/C nuclear steam supply valves, 1(2)-B21-F032A and 1(2)-B21-F032B. Each of these valves will be exercised closed during cold shutdown periods.

Basis: During plant steaming operations, closure of either of these valves would severely disrupt feedwater makeup to the reactor vessel, resulting in reactor water level transients and the potential for a plant shutdown. The effect of partial stroking these valves is essentially the same as full stroking, thus it also is impractical.

Submittal **RFJ-02** provides justification to extend the test frequency for Category A/C nuclear steam supply valves, 1(2)-B21-F010A and 1(2)-B21-F010B. Each of these valves will be closure verified during refueling outages.

Basis: These valves open to provide flow paths for HPCI and RCIC flow into the reactor vessel as well as normal reactor feedwater makeup. They close for reactor vessel and containment isolation. These are simple check valves, with no positive indication of disk position; thus, the only means of determining closure of these valves is by performing a back flow or leak test. Such a test requires drywell and steam tunnel entry plus extensive preparations of the feedwater system including draining approximately 2000 gallons of water. Furthermore, testing of 1/2-B21 -F01 OB requires shutdown of the reactor water cleanup system, which is undesirable during operations or cold shutdown. Performance of these closure tests is impossible during plant operation, as it would require securing one-half of the feedwater makeup flow to the reactor vessel and is impractical at cold shutdown due to the unreasonable burden it would place on the plant staff.

Submittal **RFJ-03** provides justification to extend the test frequency for Category B/C nuclear steam supply valves, 1(2)-B21-F013A thru 1(2)-B21-F013L. Each of these valves will be exercised open and verified to close following refueling outages. This refueling justification is evaluated in Section 4.2.3.1 of this report along with valve relief request VRR-02.

Basis: The functions of these valves are to: (1) open upon receipt of an ADS signal to blow down the reactor vessel (for the ADS valves only), (2) act as primary system safety valves actuating on high system pressure or by manual actuation from the Control Room, and (3) to close to maintain the primary system pressure boundary and prevent uncontrolled de-pressurization of the reactor (stuck open relief valve). The function of the associated solenoid valves is to energize upon receipt of a manual or ADS actuation signal and, in so doing, vent the associated poppet valve assembly causing the main valve to open. Due to the potential for plant transients, these valves can only be tested at low reactor power level with primary system pressure greater than 175 psig. Each relief valve actuation transmits hydrodynamic loading to the torus, and quarterly testing of each of these valves could result in exceeding the torus design basis. Also, failure of any relief valve to close would cause an uncontrolled rapid depressurization of the primary system and plant shutdown.

Testing during cold shutdown contradicts the recommendation of reducing the number of challenges to safety/relief valves as discussed by NUREG-0737 and the BWR Owners Group Evaluation of NUREG-0737, Item II.K.3.16, Reduction of Challenges and Failures of Relief Valves."

Submittal **CSJ-15** provides justification to extend the test frequency for Category A nuclear steam supply valves, 1(2)-B21-F022A thru 1(2)-B21-F022D and 1(2)-B21-F028A thru 1(2)-B21-F028D. During cold shutdown periods, the electrical fail-safe feature of these valves will be observed in conjunction with testing performed per CSJ-01, and at each refuel outage each valve will be observed to operate properly in the fail-safe mode upon loss of the operating air supply pressure.

Basis: As described in Cold Shutdown Justification CSJ-01, these valves can only be exercised (full-stroke) during cold shutdown periods. During normal valve stroking, the fail-safe feature related to loss of electric power is verified; however the fail-safe performance of the valves on loss of operating air pressure is not typically tested. To do so requires realignment of the main steam line isolation valve operating air supply system and, in the case of the B21-F022 valves, access to the drywell. The extent of the effort needed to perform this testing is beyond the normal scope of activities performed during short outages and would consume plant resources needed elsewhere for higher priority activities.

Submittal **RFJ-07** provides justification to extend the test frequency for Category C nuclear steam supply valves, 1(2)-B21-F037A thru 1(2)-B21-F037L. Each of these valves will be exercised open and closed during refueling outages.

Basis: These valves close to prevent venting steam into the drywell (bypassing the torus) in the event that the associated ADS valve opens. They open to prevent drawing a vacuum in the ADS tailpipes that could result in partial filling of the tailpipe with water from the torus. Excess quantities of water in a tailpipe could result in unacceptable forces generated on the piping and torus during blowdown. These are exposed, spring-loaded check valves located in the drywell. These valves are typically exercised manually. Testing these valves requires plant shutdown and entry into the drywell. During cold shutdown periods, entry into the drywell would require de-inerting the drywell. Partial-stroke exercising of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming or cold shutdown conditions.

REACTOR RECIRCULATION SYSTEM

Submittal **CSJ-04** provides justification to extend the test frequency for Category B reactor recirculation valves, 1(2)-B32-FO31A and 1(2)-B32-FO31B. Each of these valves will be full-stroke exercised during cold shutdowns.

Basis: These normally-open MOVs provide recirculation flow paths from the recirculation pumps through the reactor core. Closing either of these valves during plant operation places the recirculation system in a "single loop" configuration. Although single-loop operation is possible, routinely entering into this configuration is undesirable, contrary to the prudent and safe operation of the reactor plant, and is restricted by BSEP Technical Specifications. In addition, operation in a single loop configuration requires a severe power reduction. Partial closure of these valves has the same impacts as does full closure, thus it is also not practical during steaming operations.

Submittal **CSJ-05** provides justification to extend the test frequency for Category B reactor recirculation valves, 1(2)-B32-FO32A and 1(2)-B32-FO32B. Each of these valves will be full-stroke exercised during cold shutdowns.

Basis: During normal plant steaming operations, these valves remain open to eliminate undesirable thermal stresses across the valves. (Reference General Electric SIL No. 104). If during testing, either of these valves were to fail in the closed position, a plant shutdown would be required to correct the problem and reopen the valve(s). Partial closure of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming operations.

Submittal **CSJ-06** provides justification to extend the test frequency for Category A reactor recirculation pump seal water supply valves, 1(2)-B32-V22 and 1(2)-B32-V30. Each of these valves will be full-stroke exercised during cold shutdowns.

Basis: During normal plant steaming operations, these valves remain open to provide seal water injection to the recirculation pump seals. If during testing, either of these valves were to fail in the closed position, the associated pump seal could suffer damage leading to premature seal failure and a potential plant shutdown. Partial closure of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming operations.

Submittal **RFJ-12** provides justification to extend the test frequency for Category A/C reactor coolant recirculation valves, 1(2)-B32-V24 and 1(2)-B32-V32. Each of these valves will be closure verified during refueling outages.

Basis: These check valves open to provide flow paths for seal water flow to the recirculation pumps and close for containment isolation. They are simple check valves, with no positive indication of disk position; thus, the only means of determining closure of these valves is by performing a back flow or leak test. Such a test requires drywell entry plus extensive system re-alignment. Furthermore, testing requires shutdown of the respective recirculation pump, which is impossible during operations and undesirable during cold shutdown periods.

RESIDUAL HEAT REMOVAL

Submittal **CSJ-07** provides justification to extend the test frequency for Category A RHR valves, 1(2)-E11-F008 and 1(2)-E11-F009. Each of these valves will be full-stroke exercised during cold shutdowns.

Basis: During power operations, these normally-closed valves protect the low pressure rated RHR system piping from the high pressure of the reactor recirculation system. Under normal conditions, these valves could experience a differential pressure in excess of 900 psid. Opening these valves under these conditions could result in valve or actuator damage. In addition, with one of these valves in the open position, pressure isolation protection for the RHR system is limited to a single valve. These valves are electrically interlocked to prevent opening with reactor pressure greater than 137 psig. Partial closure of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming operations.

Submittal **CSJ-08** provides justification to extend the test frequency for Category A/C RHR valves, 1(2)-E11-F050A and 1(2)-E11-F050B. Each of these valves will be exercised open during cold shutdown periods.

Basis: During power operations, these normally-closed valves isolate the RHR system piping from the high pressure reactor recirculation system. These are simple check valves with no external means of operation or position indication; thus, the only method of exercising is to them is to observe system parameters during system operation where flow is directed and measured through each valve. With the reactor plant at normal steaming pressure, the RHR pumps cannot develop sufficient discharge pressure to fully or partial stroke open these valves.

Submittal **RFJ-15** provides justification to extend the test frequency for Category A/C RHR valves, 1(2)-E11-F050A and 1(2)-El I-F050B. Each of these valves will be verified closed during refueling outages.

Basis: During power operation, these normally-closed valves isolate the RHR system piping from the high pressure reactor recirculation system. These are simple check valves, with no external means of operation or position indication; thus, the only method of exercising is to them is to observe system parameters during system operation. The normal means of verifying closure of these valves requires entry into the drywell. Such an entry is not practical during plant operation or under inerted containment conditions due to personnel safety concerns. Verification of closure by back leakage methods at operating pressure would expose test personnel to a possible release of high pressure radioactive steam.

Submittal **RFJ-16** provides justification to extend the test frequency for Category B RHR valves, 1(2)-E11-F073 and 1(2)-E11-F075. At each reactor refueling outage, these will be full-stroke exercised open.

Basis: These valves open to provide flow paths to the RHR system from the RHR service water headers for backup emergency core cooling capability. They close to prevent diversion of LPCI flow into a presumed de-pressurized RHRSW piping leg. While closed, they ensure isolation between the RHR and RHRSW systems to prevent cross contamination. Leakage from the RHR system to the RHRSW system could lead to an unmonitored release of radioactive material, and leakage into the RHR system from the RHRSW system would result in upsetting the chemistry of the RHR system with the potential for chloride contamination of the various reactor systems. For this reason, exercising these valves requires draining or other isolation means to ensure complete isolation. This, in turn, requires significant modification of the RHR and RHR service water system alignment. Both of these evolutions are outside the scope of activities practical during plant steaming operation and short or moderate duration cold shutdowns.

Submittal **RFJ-17** provides justification to extend the test frequency for Category C RHR valves, 1(2)-E11-F078. During quarterly testing, these valves will be verified to be closed without exercising and at each reactor refueling outage they will be full-stroke exercised open and closed.

Basis: These valves open to provide flow paths to the RHR system from the RHR Service Water headers for backup emergency core cooling capability. They close to prevent diversion of LPCI flow into a presumed depressurized RHRSW piping. These are simple check valves, with the capability of manual exercising using an externally mounted operating lever. During normal system standby and operating conditions, the pressure in the RHR headers establishes a differential pressure across the valve discs that prevents opening with the lever. Thus, exercising a valve requires either draining the associated RHR header or applying a pressure to the upstream side of the check valves. This, in turn, requires modifying the RHR service water system alignment and the installation of a blocking flange. Both of these evolution's are outside the scope of activities practical during plant steaming operation and short or moderate duration cold shutdowns. Note that, per NUREG-1482, Appendix A, Question Group 24, these valves must be exercised open and closed to verify proper closure.

SERVICE WATER SYSTEM

Submittal **CSJ-11** provides justification to extend the test frequency for Category B service water valves, 1(2)-SW-V3 and 1(2)-SW-V4. Each of these valves will be exercised closed during cold shutdown periods.

Basis: These normally-open MOVs provide flow paths for cooling water from the service water system to the main turbine generator auxiliaries. They close in the event of an accident to direct full service water flow to critical safety equipment. Closure of these valves during plant steaming operations secures cooling water to the turbine generator support equipment and will result in over-heating and damage to associated plant equipment.

Submittal CSJ-12 provides justification to extend the test frequency for Category B service water valves, 1(2)-SW-V36 and 1(2)-SW-V37. Each of these valves will be exercised closed during cold shutdown periods.

Basis: These normally-open MOVs provide flow paths for lubricating water from the service water system to the main circulating water pump seals. They close in the event of an accident to direct full service water flow to critical safety equipment. Closure of these valves during plant operation secures seal water to the main circulating water pumps. This will automatically trip the circulating pumps which would, in turn, result in a plant trip on high condenser pressure.

REACTOR BUILDING CLOSED COOLING WATER SYSTEM

Submittal **CSJ-13** provides justification to extend the test frequency for Category A reactor building closed cooling water valves, 1(2)-RCC-V28 and 1(2)-RCC-V52. Each of these valves will be full-stroke exercised during cold shutdowns.

Basis: During plant operation, these valv are open to provide flowpaths for supply and return of cooling water to and from reactor recirculation pur omponents and drywell coolers. Closing either of these valves interrupts cooling water flow and could r in damage to recirculation pump and motor components. If a valve were to fail to re-open, elevated temperatures in the drywell and of recirculation pump components would require an expedited plant shutdown and cooldown to preclude equipment damage.

TRAVERSING INCORE PROBE (TIP)

Submittal **RFJ-08** provides justification to extend the test frequency for Category A/C TIP valves, 1(2)-C51-TIP-CHV. Each of these valves will be verified to close during refueling outages.

Basis: These are simple check valves with no external means of exercising, nor for determining disk position; thus, the only practical method of verifying closure is by performing a leak test. The method of leak testing this valve requires separation of the nitrogen supply tubing inside containment and, thus, is not practical during plant operation. During cold shutdown periods, entry into the drywell would require de-inerting the drywell. Partial-stroke exercising of these valves has the same impact and potential problems as does full closure; thus, it is also not practical during steaming operations.

CONTROL ROD DRIVE (CRD)

Submittal **RFJ-09** provides justification to extend the test frequency for Category C CRD valves, 1(2)-C 11-114 (137 Valves). Each of these valves will be exercised as required by BSEP Technical Specifications, Section 4.1.3.2, as follows:

a. For all control rods prior to thermal power exceeding 40 percent of rated thermal power following core alterations or after a reactor shutdown that is greater than 120 days,

b. For specifically affected individual control rods following maintenance on or modification to the control rod or rod drive system which could affect the scram insertion time of those specific control rods, and

c. For 10 percent of the control rods, on a rotating basis, at least once per 120 days of operation.

This is consistent with the NRC position stated in Generic Letter 89-04, Position 7.

Basis: These valves open to provide flow paths from each of the control rod drives (CRDs) to the scram discharge header in the event of a scram. They are simple check valves, with no external means of exercising or verifying obturator position, and can only be tested by verifying control rod drive performance while scramming each individual control rod. Due to the obvious operational restraints and extensive effort associated with scram testing, this is impractical to perform other than during a refueling outage.

Submittal **RFJ-10** provides justification to extend the test frequency for Category C CRD valves, 1(2)-C11-115 (137 Valves). Each of these valves will be exercised closed during refueling outages consistent with the NRC position stated in Generic Letter 89-04, Position 7.

Basis: These valves open to provide flow paths from the control rod drive (CRD) pumps to the accumulators and drive water headers. They close to retain accumulator pressure in the event that the CRD pumps are shut down. They are simple check valves, with no external means of exercising or verifying obturator position, and can only be tested by de- pressurizing the charging water headers and performing a pressure decay test of the accumulators. During power operation, securing CRD flow will result in loss of control rod drive cooling water and probable seal damage. Additionally, this test should not be performed during cold shutdown periods with the recirculation pumps operating. The CRD pumps supply seal water to the recirculation pumps and securing seal water will require securing recirculation pumps. In addition, it is desirable to maintain CRD flow during cold shutdown periods to ensure flushing of the CRD's and prevent the accumulation of deposits of foreign matter in the drive mechanisms.

Submittal **RFJ-11** provides justification to extend the test frequency for Category B CRD valves, 1(2)-C11-CV-126 and 1(2)-C11-CV-127 (274 Valves). Each of these valves will be exercised in conjunction with control rod drive tests performed in accordance with BSEP Technical Specifications, Section 4.1.3.2. Proper valve operation will be determined by acceptable control rod operation, and no individual valve stroke times will be measured. Each of these valves will be exercised to the open position as required by BSEP Technical Specifications, Section 4.1.3.2 as follows:

A. For all control rods prior to thermal power exceeding 40 percent of rated thermal power following core alterations or after a reactor shutdown that is greater than 120 days,

B. For specifically affected individual control rods following maintenance on or modification to the control rod or rod drive system which could affect the scram insertion time of those specific control rods, and

C. For 10 percent of the control rods, on a rotating basis, at least once per 120 days of operation.

This is consistent with the NRC position stated in Generic Letter 89-04, Position 7.

Basis: These valves open on a scram signal to provide flow paths to and from each of the CRD's to direct drive pressure under the piston and vent the top of the drive piston to effect rod insertion. They are fast-acting, normally-closed, air-operated valves that are not equipped with indications for both open and closed positions-, therefore, measuring individual stroke times in accordance with the Code is impractical. The only practical method of verifying proper valve operation is to confirm that control rod insertion performance and scram insertion times are within the limits defined in the Technical Specifications.

CORE SPRAY SYSTEM

Submittal **RFJ-13** provides justification to extend the test frequency for Category A/C core spray valves, 1(2)-E21-F006A and 1(2)-E21-F006B. Each of these valves will be exercised open and closed during refueling outages.

Basis: These check valves open to provide flow paths for core spray to the reactor vessel. They close to isolate the low pressure-rated core spray system components from the reactor vessel. These are simple check valves, with no external means of exercising nor for determining disk position; thus, the only means of determining closure of these valves is by performing a back flow or leak test. Such a test requires drywell entry plus extensive valve lineup alterations.

In order to full-stroke open these valves, the core spray pumps must be operated at rated flow discharging directly into the reactor vessel. This cannot be done during normal operation because the core spray pumps are not capable of overcoming reactor pressure. Core spray injection during cold shutdown with the reactor head in place is impractical due to the difficulty of controlling reactor vessel water level. Core spray injection at rated flow would result in a vessel level increase of approximately 30 inches per minute. With injection going into the vessel shroud region, the high rate of change in water level, and a possible difference in level between the shroud region and the main vessel, it would be possible to inadvertently flood the main steam lines or over-pressurize the reactor vessel if this test were performed at cold shutdown with the head in place. In addition, the extensive scope of preparations required to inject water via the core spray pumps would result in a significant burden on the plant operating staff.

STANDBY LIQUID CONTROL (SBLC)

Submittal **RFJ-14** provides justification to extend the test frequency for Category A/C SBLC valves, 1(2)-C41-F006 and 1(2)-C41-F007. Each of these valves will be full-stroke exercised to the open position at least once every 18 months. They will be closure verified during refueling outages in conjunction with 10 CFR 50, Appendix J leak rate testing.

Basis: These check valves provide flow paths for borated water from the SBLC header to the reactor vessel, and close for containment isolation. These are simple check valves, with no positive external means of determining disk position; thus, the only means of verifying closure of these valves is by performing a leak test. Such a test requires drywell access and extensive preparations, and is impractical during plant operations or at cold shutdown due to the burden on the plant staff. The only practical means of exercising these valves to the open position requires operation of the SBLC pumps discharging into the reactor vessel. This cannot be done during normal operation or cold shutdown since the SBLC system must be drained and flushed to prevent contamination of the reactor coolant with sodium pentaborate. In addition, in order to initiate flow from the pumps to the reactor vessel, the explosive isolation valves must be opened thereby requiring extensive testing and maintenance to replace the explosive charges after firing.

HIGH PRESSURE COOLANT INJECTION (HPCI)

Submittal **RFJ-18** provides justification to extend the test frequency for Category C HPCI exhaust drain pot valves, 1(2)-E41-F040. Each of these valves will be verified closed during refueling outages.

Basis: These valves close for containment isolation and open to provide a flow path for draining the HPCI steam exhaust drain pot to the torus. Testing these valves to the closed position requires system realignment and set up of leak testing or similar equipment. To perform this testing quarterly or during cold shutdown outages would constitute a significant burden on staff resources with no commensurate benefit in plant safety.

Submittal **RFJ-20** provides justification to extend the test frequency for Category C HPCI injection to feedwater valves, 1(2)-E41-V159. Each of these valves will be exercised manually during each refueling outage or disassembled as permitted per Part 10, Paragraph 4.3.2.4(c).

Basis: These valves open for HPCI System injection into the main feedwater headers. There are two possible methods of exercising these valves. The HPCI pump can be aligned to pump full accident flow directly into the reactor coolant system. Under steaming conditions at power, this would result in severe thermal stresses on the reactor vessel feedwater nozzles and possibly unacceptable transients in reactor vessel water level. During cold shutdown periods, there is insufficient steam pressure for pump operation. An alternate means of exercising utilizes the manual level arm instalied on each valve. Manual exercising requires access to the MSIV pit. During power operation, radiation levels prohibit access to the MSIV pit; during cold shutdown periods, the level of effort and resources required to remove the pit shield plug to provide access are prohibitive.