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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO.
TO FACILITY OPERATING LICENSE NO. NPF-49
NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.
MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3
DOCKET NO. 50-423

INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a(g), requires that inservice testing (IST) of ASME Code Class 1, 2, and 3 pumps and valves shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda, except where specific written relief has been requested by the licensee and granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). In requesting relief, the licensee must demonstrate that conformance with certain requirements of the applicable Code edition and addenda is impractical for its facility.

Regulation 10 CFR 50.55a(g)(6)(i) authorizes the Commission to grant relief from these requirements upon making the necessary findings. The Safety Evaluation Report (SER) contains the NRC staff findings with respect to granting or not granting the relief requested as part of the licensee's IST program.

The IST program addressed in this report covers the first ten-year inspection interval starting April 26, 1986. By a letter dated June 25, 1986, Northeast Nuclear Energy Company submitted an IST program for Millstone 3. A revised program was provided by letter dated October 7, 1987 which superseded the previous submittal.

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The program is based on the requirements of the 1983 edition through the Summer of 1983 Addenda of Section XI of the ASME Code and remains in effect until April 26, 1996.

EVALUATION

The IST program, the requests for relief from the requirement of Section XI that have been determined to be impractical to perform and the justification for testing certain valves at cold shutdowns have been reviewed by the staff with the assistance of their contractor, EG&G Idaho, Inc., (EG&G). In addition to the review of the IST program, cold shutdown justifications, and relief requests, EG&G and staff members met with licensee representatives on June 2 and 3, 1987 in a working session to discuss questions resulting from the review. The Technical Evaluation Report (TER) provided in Attachment 1 is EG&G's evaluation of the licensee's inservice testing program and relief requests. The staff has reviewed the TER and concurs with and adopts as part of this SER the evaluations and conclusions contained in the TER. A summary of the relief request determinations is presented in Table 1. 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 alternate proposed testing.

In the TER EG&G also identified one deficiency in the Millstone 3 IST program. This item is discussed in Appendix C of the TER. The licensee is required to address this item by either correcting the IST program in accordance with IWV-3522(a) or by providing the NRC with the appropriate relief requests and supporting bases. This item should be corrected within 3 months of the date of this SER.

CONCLUSION

Based on the review of the licensee's IST program and relief requests, the staff concludes that the IST program as evaluated and modified (see Appendix C) by this SER will provide reasonable assurance of the operational readiness of safety-related pumps and valves to perform their safety-related functions. The staff has determined that, pursuant to 10 CFR 50.55a(g)(6)(i), granting relief where the Code requirements are impractical is authorized by law and will not endanger life or property, or the common defense and security. The staff has also concluded that granting relief is otherwise in the public interest considering the burden that could result if the requirements were imposed on the facility. During the review of the licensee's inservice testing program the staff has not identified any significant misinterpretations or omissions of Code requirements. Thus, the IST program submitted for Millstone 3 dated October 7, 1987, is acceptable for implementation provided the item noted above is corrected promptly. Relief requests contained in any subsec... evisions may not be implemented without prior approval by NRC.

Dated:

Principal Contributor:

Y. Li

MILLSTONE NUCLEAR POWER STATION, UNIT 3
Table 1
Summary of Relief Requests

Relief Request Number	TER Section	Section XI Requirement & Subject	Equipment Identification	Alternate Method of Testing	Relief Action By USNRC
R-1	4.5.1.1	IWV-3520 Quarterly exercising	3RCS*V26 3RCS*V102 3SIL*V27, and 3SIL*V29	Full-stroke exercise valves during refueling outages	Granted
R-1	4.5.1.1	IWV-3520 Quarterly exercising	3SIH*V110 and V112	Partial-stroke quarterly and full-stroke exercising during refueling outages	Granted
R-2	4.1.3.1	IWV-3520 Quarterly exercising	3CHS*V58, V394 V434, V467, and V501	Verify closure during Appendix J leak testing at refueling outages	Granted
R-3	4.8.1.1	IWV-3520 Quarterly exercising	3SIL*V15, V17, V19, and V21	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-4	4.5.1.2	IWV-3520 Quarterly exercising	3SIH*V5	Full-stroke exercise valves during refueling outages	Granted
R-5	4.4.2.1	IWV-3520 Quarterly exercising	3SIL*V982 and, V983	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-6	4.6.1.1	IWV-3520 Quarterly exercising	3RSS*V3, V6, V9, and V12	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted

MILLSTONE NUCLEAR POWER STATION, UNIT 3
Table 1
Summary of Relief Requests

Relief Request Number	TER Section	Section XI Requirement & Subject	Equipment Identification	Alternate Method of Testing	Relief Action By USNRC
R-7	4.7.1.1	IWV-3520 Quarterly exercising	3QSS*V4 and V8	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-7	4.7.2.1	IWV-3520 Quarterly exercising	3QSS*V978 and V979	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-8	4.7.2.1	IWV-3520 Quarterly exercising	3QSS*V976 and V977	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-9	4.5.2.1	IWV-3520 Quarterly exercising	3SIH*V13 and V17	Full-stroke exercise valves during refueling outages	Granted
R-10	4.5.2.1	IWV-3520 Quarterly exercising	3SIH*V22, V24, V26, and V28	Full-stroke exercise valves during refueling outages	Granted
R-11	4.3.2.2	IWV-3520 Quarterly exercising	3CHS*V261	Full-stroke exercise valves during refueling outages	Granted
R-12	4.5.2.2	IWV-3520 Quarterly exercising	3SIH*V11	Partial-stroke exercise quarterly and full-stroke exercising during refueling outages	Granted
R-13	4.2.1.2	IWV-3520 Quarterly exercising	3RCS*V29, V70, V106, and V145	Full-stroke exercise valves during refueling outages	Granted

MILLSTONE NUCLEAR POWER STATION, UNIT 3
Table 1
Summary of Relief Requests

Relief Request Number	TER Section	Section XI Requirement & Subject	Equipment Identification	Alternate Method of Testing	Relief Action By USNRC
R-14	4.9.1.1	IWV-3410 Quarterly exercising	3SWP*V25, V27, V58, and V60	Exercise valves and measure stroke times during refueling outages	Granted
R-16	4.1.3.1	IWV-3520 Quarterly exercising	3HCS*V7 and V14	Verify closure during Appendix J leak testing at refueling outages	Granted
R-17	4.3.1.1	IWV-3410 Quarterly exercising	3CHS*V393, V433, V466, and V500	Exercise during cold shutdowns when RCS is drained below RCP seals and during refueling outages	Granted
R-17	4.3.1.1	IWV-3410 Quarterly exercising	3CHS*V532 and V533	Exercise valves during cold shutdowns when RCS pressure < 100# and during refueling outages	Granted
R-18	4.3.2.1	IWV-3520 Quarterly exercising	3CHS*V46, V47, and V48	Partial-stroke exercise quarterly and full-stroke exercise during refueling outages	Granted
R-19	3.1.2.1	IWP-3100 and 3210 Pump bearing vibration amplitude measurement	All pumps in the IST program	Measure pump bearing vibration velocity in accordance with the testing requirement and acceptance criteria of ANSI/ASME OM-6	Granted
R-20	3.1.1.1	IWP-3100 Pump bearing temperature measurement	All pumps in the IST program	Measure pump vibration signatures in velocity units	Granted

MILLSTONE NUCLEAR POWER STATION, UNIT 3
Table 1
Summary of Relief Requests

Relief Request Number	TER Section	Section XI Requirement & Subject	Equipment Identification	Alternate Method of Testing	Relief Action By USNRC
R-21	4.1.2.1	IWV-3421 thru 3425 Leak rate test Category A	All containment isolation valves	Leak rate test valves to Appendix J and IWV-3426 & 3427 requirements	Granted
R-22	4.4.1.1	IWV-3520 Quarterly exercising	3SIL*V26, V28, 3RCS*V69, and V142	Full-stroke exercise valves during refueling outages	Granted
R-23	4.9.2.1	IWV-3520 Quarterly exercising	3SWP*V705, V706, V707, and V708	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-24	4.2.1.1	IWV-3520 Quarterly exercising	3RCS*V30, V71, V107, and V146	Disassemble, inspect, and manually exercise valves on a sampling basis at refueling outages	Granted
R-25	4.10.1.1	IWV-3413 Stroke time measurement	3EGF*V25, V26, V51, and V52	Diesel generator start times will be used to verify valve operation and monitor valve degradation	Granted
R-26	3.2.1.1	IWP-3100 Pump inlet pressure measurement	3SWP*P1A, P1B, P1C, and P1D	Measure water level and calculate pump inlet pressure.	Granted
R-27	4.1.1.1	IWV-3417(a) Stroke time measurements	All power operated valves in the IST program	Base the corrective actions for stroke times on deviations from reference values	Granted
R-28	3.3.1.1	IWV-3100 Pump inlet and differential pressures measurement	3EGF*P1A, P1B, P1C, and P1D	Measure pump discharge pressure and verify storage tank level> 88%	Granted
R-29	4.2.2.1	IWV-3520 Quarterly exercising	3RCS-V175	Full-stroke exercise valves during refueling outages	Granted

ABSTRACT

This EG&G Idaho, Inc., report presents the results of our evaluation of the Millstone Nuclear Power Station, Unit 3, Inservice Testing Program for pumps and valves whose function is safety related.

FOREWORD

This report is supplied as part of the "Review of Pump and Valve Inservice Testing Programs for Operating Reactors (III)" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Mechanical Engineering Branch, by EG&G Idaho, Inc., Mechanical Systems Evaluations Section.

The U.S. Nuclear Regulatory Commission funded the work under the authorization B&R 20-19-10-11-2, FIN No. A6812.

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
MILLSTONE NUCLEAR POWER STATION, UNIT 3

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by the Northeast Nuclear Energy Company for its Millstone Nuclear Power Station, Unit 3.

The working session with Northeast Nuclear Energy Company and Millstone Nuclear Power Station, Unit 3 representatives was conducted on June 2 and 3, 1987. The licensee's IST program, Revision 2, dated October 7, 1987, was reviewed to verify compliance of proposed tests of pumps and valves whose function is safety-related with the requirements of the ASME Boiler and Pressure Vessel Code (the Code), Section XI, 1983 Edition through Summer 1983 Addenda. Any IST program revisions subsequent to those noted above are not addressed in this technical evaluation report (TER). The NRC staff position is that required program changes, such as additional relief requests or the deletion of any components from the IST program, should be submitted to the NRC under separate cover in order to receive prompt attention, but should not be implemented prior to review and approval by the NRC.

In their IST program, Northeast Nuclear Energy Company has requested relief from the ASME Code testing requirements for specific pumps and valves and these requests have been evaluated individually to determine if the required testing is indeed impractical for the specified pumps or valves. This review was performed utilizing the acceptance criteria of the Standard Review Plan, Section 3.9.6, and the Draft Regulatory Guide and Value/Impact Statement titled, "Identification of Valves for Inclusion in Inservice Testing Programs." The 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 this review.

Section 3 of this report presents the Northeast Nuclear Energy Company bases for requesting relief from the Section XI requirements for the Millstone Nuclear Power Station, Unit 3 pump testing program and the EG&G reviewer's evaluations and conclusions regarding these requests. Similar information is presented in Section 4 for the valve testing program.

Category A, B, and C valves which are exercised at cold shutdowns and refueling outages and meet the requirements of the ASME Code, Section XI, are addressed in Appendix A.

A listing of P&IDs and Figures used for this review is contained in Appendix B.

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

2. SCOPE

The EG&G Idaho review of the Millstone Nuclear Power Station, Unit 3, inservice testing (IST) program for pumps and valves was begun in February of 1987. The program initially examined was Revision 1, dated June 25, 1986, which identified the licensee's proposed testing of safety-related pumps and valves in the plant systems listed in Appendix B.

To review the licensee's proposed testing of certain pumps and valves in these systems, they were first located and highlighted on the appropriate system P&IDs. After identifying the components and determining their function in the system, the proposed testing was evaluated to determine if it was in compliance with the ASME Code requirements, based on the component type and function. For pumps, it was verified that each of the seven inservice test quantities of Table IWP-3100-1 are measured or observed as appropriate. For those test quantities that are not being measured or observed quarterly in accordance with the Code, it was verified that a request for relief from the Code requirements had been submitted. If the testing was not being performed in accordance with the Code and a relief request had not been submitted, the licensee was requested to explain the inconsistency in the Request for Additional Information (RAI) document that served as the agenda for the working meeting between the licensee, the NRC, and the EG&G reviewers. The relief requests were individually evaluated to determine if the licensee clearly demonstrated that compliance with the Code required testing is impractical for the identified system components, and to determine if their proposed alternate testing provided a reasonable indication of component condition and degradation considering the burden to the licensee if the Code requirement were imposed. Where the licensee's technical basis or alternate testing was insufficient or unclear, the licensee was requested to clarify the relief request. The system P&ID was also examined to determine whether the instrumentation necessary to make the identified measurements is available. If, based on the unavailability of adequate instrumentation or the reviewers experience and system knowledge, it was determined that it may not be possible or practical to make the measurements as described by the licensee in his IST program, a question or comment was generated requesting the licensee to clarify his position.

The review of the proposed testing of valves verified that all appropriate ASME Code testing for each individual valve is performed as required. The proposed testing was evaluated to determined if all valves that were judged to be active category A, B, and/or C, (other than safety and relief valves) are exercised quarterly in accordance with IWV-3410 or -3520, as appropriate. If any active safety-related valve is not full-stroke exercised quarterly as required, then the licensee's justification for the deviation, either in the form of a cold shutdown justification or a relief request, was examined to determine its accuracy and adequacy. The proposed alternate testing was also evaluated to determine if all testing was being performed that can reasonably be performed on each particular valve to bring its testing as close to compliance with the Code requirements as practical.

For valves having remote position indication, the reviewer confirmed that the valve remote position indication is verified in accordance with IWV-3300. The reviewer verified that the licensee had assigned limiting values of full-stroke times for all power operated valves in the IST program as required by IWV-3413. The assigned limits were examined to determine if they are reasonable for the size and type of valve and the type of valve operator. It was also verified that the valve full-stroke times are being measured every time that the valves are full-stroke exercised for the IST program. For valves having a fail-safe actuator, the reviewer confirmed that the valve's fail-safe actuator is tested in accordance with IWV-3415.

It was confirmed that all category A and A/C valves are leak rate tested to either the 10 CFR 50, Appendix J, and Section XI, IWV-3426 and -3427 requirements, for those valves that perform a containment isolation function, or to the Section XI, IWV-3421 through -3427, requirements for those valves that perform a pressure boundary isolation function. It was also verified that valves that perform both a containment isolation and a pressure isolation function are leak rate tested to both the Appendix J and the Section XI requirements. Furthermore, if any valve appeared to perform a containment isolation and/or a pressure isolation function but was not categorized A or A/C and being leak rate tested, the licensee was asked to verify that those valves had not been categorized improperly in the IST program.

Each check valve was evaluated to determine if the licensee's proposed testing verifies the valve's ability to perform its safety-related function or functions. Extensive system knowledge and experience with other similar facilities were used to determine whether the proposed tests would full-stroke the check valve disks open or verify their reverse flow closure capability. If there was any doubt about the adequacy of the identified testing, questions were included in the RAI which required the licensee to address these concerns.

A further evaluation was performed on all valves in the program to determine that the identified testing could practically and safely be conducted as described. If the ability to perform the testing was in doubt, a question was formulated to alert the licensee to the suspected problem.

Safety-related safety valves and relief valves, excluding those that perform only a thermal relief function, were confirmed to be included in the IST program and are tested in accordance with IWV-3510. Safety-related explosively actuated valves were verified to be included in the IST program and being tested in accordance with IWV-3610.

After all of the valves in the licensee's IST program had been identified on the P&IDs and evaluated as described above, the P&IDs were examined closely by at least two trained and experienced reviewers to determine if any pumps or valves that may perform a safety-related function were not included in the licensee's program. The licensee was asked to reconcile any valves that were identified by this process which had been omitted from the IST program. Also, the list of systems included in the licensee's program was compared to a system list in the Draft Regulatory Guide and Value/Impact Statement titled, "Identification of Valves for Inclusion in Inservice Testing Programs". Systems that appear in the Draft Regulatory Guide list but not in the licensee's program were evaluated and, if appropriate, questions were added to the RAI concerning safety related pumps and valves in those systems.

Additionally, if the reviewers suspected a specific or a general aspect of the licensee's IST program based on their past experiences, questions were written for inclusion in the RAI to clarify those areas of doubt. Some questions were included for the purpose of allowing the reviewers to make conclusive statements in this TER.

At the completion of the review, the questions and comments generated during the review were transmitted to the licensee. These questions were later used as the agenda for the working meeting with the licensee on June 2 and 3, 1987. At the meeting, each question and comment was discussed in detail and resolved as follows:

a. The licensee agreed to make the necessary IST program corrections or changes that satisfied the concerns of the NRC and their reviewers.

b. The licensee provided additional information or clarification about their IST program that satisfied the concerns of the NRC and their reviewers, and no program change is required.

c. The item remained open for the licensee to further investigate and propose a solution to the NRC.

d. The item remained open for further investigation by the NRC.

e. The item remained open for further investigation and discussion by both the NRC and the licensee.

The licensee provided a written response to the RAI in their correspondence dated July 10, 1987, identified by the licensee as A06401. This transmittal revised much of the licensee's IST program and was compared to the previous submittal to identify any changes. The changes were evaluated to determine whether they were acceptable and if not, they were added to the items that remained open from the meeting. Several conference calls were held between the licensee, the NRC, and the reviewers to clarify the NRC positions on the open items and discuss the licensee's proposed resolutions.

Further changes and refinements of the licensee's IST program were transmitted from the licensee to the NRC by letter No. B12644, dated September 2, 1987. This transmittal was received by the reviewers and compared to the previous submittal to identify any changes. The program changes were then compared to the proposed changes from the conference calls to identify any deviations. A conference call was held between the licensee, the NRC, and the reviewers to discuss these deviations and the items that were still not satisfactorily resolved in the Millstone Nuclear Power Station, Unit 3 IST program.

By letter B12701, dated October 7, 1987, the licensee submitted Revision 2 of the Millstone Nuclear Power Station, Unit 3 IST program. Revision 2 was received by the reviewers and compared to the previous submittal to identify any changes. The program changes were compared to the proposed changes from the conference calls and the requests for relief were evaluated and this TER prepared based on this program submittal.

This TER is based on information contained in the submittals, and on information obtained in the meetings and conference calls which took place during the review process.

3. PUMP TESTING PROGRAM

The Millstone Nuclear Power Station, Unit 3 IST program submitted by Northeast Nuclear Energy Company was examined to verify that all pumps that are included in the program are subjected to the periodic tests required by the ASME Code, Section XI, except for those pumps identified below for which specific relief from testing has been requested. Each Northeast Nuclear Energy Company basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request are summarized below.

3.1 All Pumps in the IST Program

3.1.1 Pump Bearing Temperature Measurements

3.1.1.1 Relief Request. The licensee has requested relief from the bearing temperature measurement requirements of Section XI, Paragraph IWP-3100, for all pumps listed in their IST program and proposed to measure the required pump hydraulic parameters and vibration to determine pump operability and mechanical degradation.

3.1.1.1.1 Licensee's Basis for Requesting Relief--Bearing metal temperature monitoring can be effective in detecting bearing problems. However, none of the tabulated pumps have adequate design provisions to allow meaningful bearing temperatures to be taken. The annual measurement of bearing housing temperature is far less effective in detecting bearing problems than the quarterly performance of vibration signature analysis being performed by NNECO.

In general, as internal bearing metal temperatures increase due to bearing overload, improper lubrication of faulty installation, etc.; much of the heat will be dissipated throughout the relatively massive housings, oil reservoir and attached casing. As a result, bearing housing temperatures will respond much less than bearing metal temperature, greatly reducing the sensitivity to detect bearing heatup problems.

Another important requirement to assure reliable bearing temperature monitoring is that it be continuous, not periodic. Experience indicates that failing bearings whether anti-friction type or sleeve often exhibit fluctuations between normal and abnormal metal temperatures. A good example is the babbitt lined sleeve bearing which will initially experience a rapid rise in temperature and then return to normal temperatures after the bearing wipes and clearances open up causing increased oil flow. The abnormal temperature rise would most probably go undetected unless continuously monitored.

The vibration signature analysis conducted by NNECO will detect bearing problems at a very early state. At the onset of a bearing problem, low level vibration will be generated at characteristic frequencies depending on the nature of the problem. The low level vibration typically amounts to less than 1 percent of the overall vibration amplitude and therefore cannot be detected by a simple amplitude monitoring program conforming to IWP minimum requirements. However, the low level changes in bearing distress frequencies are routinely detected in the MP3 signature analysis program and analyzed to pinpoint the cause.

As an alternate, the pump vibration signature tests will be performed, recorded and analyzed quarterly. This analysis will provide more meaningful analysis of pump bearing condition than annual measurement of bearing temperature.

3.1.1.1.2 <u>Evaluation</u>--The licensee has indicated that a yearly measurement of pump bearing temperature for these pumps is not a meaningful test for detecting pump bearing degradation. There are several factors such as the temperature of the working fluid, the ambient temperature, and the lubricant temperature that would affect the measured bearing temperature and mask any bearing condition change short of a catastrophic bearing failure. The quarterly pump vibration signature measurement and analysis gives a much more accurate indication of pump bearing condition than annual temperature measurements, and the vibration measurement is not substantially affected by any system parameter or other factor that could mask problems or result in erroneous indications of bearing degradation. A yearly bearing temperature measurement is impractical for these pumps because they do not have temperature sensors installed in the bearings. The burden on the licensee if the Code requirements were imposed would not be justified by the limited information that would be provided about pump mechanical condition.

Based on the impracticality of complying with the Code and the burden on the licensee if the Code requirements were imposed and considering the quarterly pump vibration measurements that will be taken to determine pump mechanical condition and to detect pump bearing degradation, relief may be granted from the Section XI requirement of annually measuring bearing temperature for these pumps.

3.1.2 Measuring Pump Vibration Velocity

3.1.2.1 Relief Request. The licensee has requested relief from the pump vibration amplitude measurement and allowable range requirements of Section XI, Paragraphs IWP-3100 and -3210, for all pumps in the IST program and proposed to measure and analyze vibration velocity signatures quarterly during power operations and to use acceptance criteria based on revision 10 of the ANSI/ASME OM-6 draft.

3.1.2.1.1 Licensee's Basis for Requesting Relief--Experience has shown that measurement of overall vibration amplitude in mils does not provide the desired early warning of pump degradation. Vibration amplitude is adequate for measuring unbalance, misalignment, and other low frequency failures modes. It does not give early warning of bearing degradation since the magnitude of higher frequency vibrations created by such degradation is 10 to 1,000 times lower than the normal pump movements. Experience at Northeast Utilities has shown that monitoring pump vibration velocity (in/sec) provides earlier warning of pump degradation. Collection and review of vibration "signatures" (plots of vibration velocity vs. frequency) over a range from slightly below running frequency to several times running frequency provides optimal early warning of pump degradation.

In lieu of measuring overall amplitude (mils), vibration will be monitored at least quarterly using equipment which collects vibration velocity signatures. Overall, vibration velocity (in/sec RMS) will be compared to the following acceptance criteria:

NOTE: This acceptance criteria is based on Rev. 10 of OM-6.

Acceptance Range - 0 to 2.5 times Reference Velocity

Alert Range - >2.5 to 5 times Reference Velocity but not greater than 0.325 in/sec. (RMS)

Required Action Range - >5 times Reference Velocity but not greater than 0.70 in/sec. (RMS)

Reference Velocity shall be the average overall velocity determined during an inservice test at reference conditions when the pump is known to be operating acceptably.

In addition to the above quantitative analysis of overall vibration levels, vibration signatures will be reviewed at least quarterly to identify potential bearing degradation or other developing faults. When potential faults are identified, action as required for a pump in the Alert Range of vibration will be initiated.

3.1.2.1.2 Evaluation--Pump bearing degradation results in increased bearing noise at frequencies 5 to 100 times the rotational frequency of the pump. These high frequency bearing noises would not produce a significant increase in pump vibration displacement measurements and could go undetected. However, the high frequency noises would result in relatively large changes in pump vibration velocity measurements which could permit corrective action prior to catastrophic failure of the bearing. Because of the high frequencies of the vibrations associated with the pump bearings, vibration velocity measurements are generally much better than vibration displacement measurements in monitoring the mechanical condition of pumps and detecting pump bearing degradation.

The advantages of using vibration velocity instead of displacement for monitoring the mechanical condition of pumps, with the exception of reciprocating pumps, are widely acknowledged in the industry. The use of pump vibration velocity signatures over a wide frequency range can provide a great deal of information about pump mechanical condition that could not be obtained by using vibration displacement readings. Therefore, the licensee's proposed alternate test method is superior to the Code required testing method.

Section XI does not provide allowable ranges for vibration velocities and since the relationship between displacement and velocity is frequency dependent, a mathematical conversion of the Code displacement ranges is not appropriate. ANSI/ASME OM-6, draft 10, provides a set of allowable ranges for pump vibration velocity measurements that has been found to be acceptable by the NRC. The licensee has indicated that they are using the ranges and limits specified in draft 10 of OM-6. This is acceptable if the licensee complies with <u>all</u> of the vibration measurement requirements of this draft of ANSI/ASME OM-6. The licensee has agreed to measure pump vibration velocities in accordance with the requirements of OM-6, draft 10.

Based on the determination that pump vibration velocity measurements provide more information to evaluate pump mechanical condition and to detect bearing degradation than the Code required displacement readings, and considering the licensee's proposal to measure pump vibration velocity in accordance with the requirements of draft 10 of the ANSI/ASME OM-6 and to use the allowable ranges and limits specified in that document, relief may be granted from the Code requirements as requested.

3.2 <u>Service Water Pumps</u>

3.2.1 <u>Measurement of Pump Inlet Pressure</u>

3.2.1.1 <u>Relief Request</u>. The licensee has requested relief from the pump inlet pressure measurement requirements of Section XI, Paragraph IWP-3100, for the service water pumps and proposed to calculate pump inlet pressure based on the water level above the pump inlet.

3.2.1.1.1 <u>Licensee's Basis for Requesting Relief</u>--The service water pumps are vertical shaft pumps with no direct means to obtain the inlet pressure measurement as required by IWP-4200.

The inlet pressure will be calculated based on the water level (tide between 0-4 ft. per the surveillance procedure) above the pump inlet. This method provides sufficient information for evaluation of the hydraulic condition of the pumps.

3.2.1.1.2 <u>Evaluation</u>--The service water pumps are vertical shaft deep draft pumps that are submerged in the sea water. The inlet pressure is due to the head of the sea water above the level of the pump inlet. The inlet pressure when the pump is operating cannot be determined because there are no installed inlet pressure instruments. However, sufficient blockage in the pump suction would be indicated by a reduction in the pump flow rate. Calculation of the pump inlet pressure by measuring the water level above the pump suction will allow the licensee to determine the pump differential pressure. Using the calculated pump differential pressure in conjunction with the pump flowrate should provide adequate information to ascertain the hydraulic condition of the pump and to detect any pump hydraulic degradation.

A system modification would be necessary to allow direct measurement of pump inlet pressure and the additional information provided would have a minimal impact on the licensee's ability to detect pump hydraulic degradation. Based on the impracticality of these measurements, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of measuring sea water level and calculating pump inlet pressure, relief may be granted from the Section XI requirements as requested.

3.3 <u>Diesel Generator Fuel Oil Transfer Pumps</u>

3.3.1 <u>Measurement of Pump Inlet and Differential Pressures</u>

3.3.1.1 <u>Relief Request</u>. The licensee has requested relief from the pump inlet and differential pressure measurement requirements of Section XI, Paragraph IWP-3100, for the diesel fuel oil transfer pumps and proposed to measure pump discharge pressure and to verify that the fuel oil storage tank level is above 88% full during the quarterly pump tests.

3.3.1.1.1 Licensee's Basis for Requesting Relief--The fuel oil transfer pumps take suction directly from the fuel oil storage tanks and discharge to the fuel oil day tank. No inlet (suction) pressure indication is available. Pump discharge pressure is available and will be recorded.

The fuel oil storage tanks are required per Technical Specifications 3.8.1.1.b.2 to be filled to a minimum volume of 88% (32,769 gallons) not to exceed 95% (due to overflowing of the tank). The pressure difference between 89% and 95% is less than a fourth of a pound (psi). The discharge pressure will be recorded quarterly and the ASME limits per Table IWP-3100-2 will be applied to this reading.

3.3.1.1.2 Evaluation--The diesel fuel oil transfer pumps take their suction directly from the fuel oil storage tanks and would have an inlet pressure due to the head of fuel oil in the tank above the level of the pump inlet. The inlet pressure when the pump is operating cannot be determined because there are no installed inlet pressure instruments. However, sufficient blockage in the pump suction would be indicated by a reduction in the pump flow rate. There should not be any significant variation in the pump inlet pressure due to changes in the level of the storage tank since the storage tank is required to remain above 88% full by the plant Technical Specifications. The storage tank level will be checked during each pump test. Level fluctuations within the allowable range would have an insignificant effect on the differential pressure across the pump, therefore, using pump discharge pressure in conjunction with the pump flowrate should provide adequate information to determine the hydraulic condition of the pump and to detect any pump hydraulic degradation.

A system modification would be necessary to allow measurement of pump inlet pressure and the additional information provided would have a minimal impact on the licensee's ability to detect pump hydraulic degradation. Based on the impracticality of obtaining these measurements, the burden on the licensee if these Code requirements were imposed, and the measurement of the pump discharge pressure and flowrate that will be performed by the licensee, relief may be granted from the Section XI requirements as requested.

4. VALVE TESTING PROGRAM

The Millstone Nuclear Power Station, Unit 3 IST program submitted by Northeast Nuclear Energy Company was examined to verify that all valves included in the program are subjected to the periodic tests required by the ASME Code, Section XI, 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 established NRC positions. Each Northeast Nuclear Energy Company basis for requesting relief from the valve testing requirements and the reviewer's evaluation of that request are summarized below and grouped according to system and valve category.

4.1 General Valve Relief Requests

4.1.1 Trending Stroke Times for Power Operated Valves

4.1.1.1 Relief Request. The licensee has requested relief from the trending requirements of Section XI, Paragraph IWV-3417(a), for all power operated valves that are identified in the IST program and proposed to follow a plan that is based on deviation from a reference stroke time instead of the previous test stroke time to identify valves for further evaluation and possibly increase their test frequency.

4.1.1.1.1 Licensee's Basis for Requesting Relief--Use of the "previous test" stroke time does not adequately identify slow degradation of valve performance. For example, repeated increases in stroke time of 15 to 24 percent would not require that the valve be considered in "Alert", with attendant additional investigation and testing. The proposed alternative acceptance criteria would identify such valves and require that they be formally evaluated for acceptability or declared inoperable. In instances where the evaluation does not result in a determination of inoperability additional or increased frequency testing may be specified to aid in evaluating valve performance. This criteria provides increased assurance that degrading valves are promptly identified and that such degradation is promptly evaluated for its impact on valve operability.

Test results shall be compared to the reference values of stroke time for each valve.

a. Valves with reference stroke times greater than 10 seconds shall exhibit no more than a 25% change in stroke time when compared to the reference value.

b. Valves with reference stroke times less than 10 seconds shall exhibit no more than a 50% or 1 second (which ever is greater) change in stroke time when compared to the reference value.

c. Valves with reference stroke times of less than 2 seconds shall not exhibit a stroke time in excess of 2 seconds.

Valves with measured stroke times which do not meet the above acceptance criteria shall be immediately retested (or declared inoperable).

If retested and the second set of data also does not meet the acceptance criteria the data shall be analyzed within 96 hours to verify that the new stroke time represents acceptable valve operation, or the valve shall be declared inoperable. If the analysis indicates the deviation is acceptable, operation of the valve shall be tested monthly until it is repaired or declared inoperable, or until a new reference value is established. If trended test results indicate the valve will exceed the limiting value of stroke time prior to the next test or that valve operation is unreliable the valve shall be declared inoperable. The evaluation shall be documented in the record of the tests.

If the second set of data meets the acceptance criteria, the cause of the initial deviation shall be analyzed and the results documented in the record of tests.

Valves for which measured stroke times exceed limiting values for stroke times shall be immediately declared inoperable.

Valves which are declared inoperable shall be readjusted, repaired, or replaced prior to returning the valve to service. A test demonstrating satisfactory valve performance shall be performed prior to returning the valve to service.

4.1.1.1.2 Evaluation--Basing the trending of stroke times for power operated valves on the stroke time measured for a valve during its previous test can permit the gradual degradation of a valve over an extended period of time without taking any action until the limiting value of full-stroke time is exceeded. If the measured stroke time increases at a rate of 24% or less for valves with full-stroke times greater than 10 seconds, or 49% or less for those valves with full-stroke times less than or equal to 10 seconds, then no additional testing or valve evaluation is required until the limiting value of full-stroke time is exceeded, and since there are no Code guidelines on setting those limits, this could result in significant valve degradation before any action is taken.

The licensee's proposed alternate testing of establishing reference stroke times for power operated valves and taking corrective action when the measured stroke time differs from the reference value by ±25% for valves whose reference stroke times are greater than 10 seconds, or ±50% for valves whose reference values are less than or equal to 10 seconds, is more conservative than the Code requirements because it will not permit the gradual degradation of valves without taking corrective action. If the measured stroke time of a valve varies by more than the allowable 25% or 50%, the valves will be considered in "Alert" and will be evaluated and tested monthly until the valve is declared inoperable, repaired, or has a new reference value assigned.

Stroke time trending using the previous test method could also result in increased testing of a valve that is stroking at its normal time. This could occur if a condition caused a valve's measured stroke time to increase by nearly 25% and then in the subsequent test, the stroke time returns to just below the normal or average stroke time, but at less than 75% of the previous stroke time. Using the reference value in this case is desirable since the valve stroking near its normal stroke time indicates proper operation which does not warrant additional testing. The reference value method proposed by the licensee initiates corrective action in this case only if the measured stroke time differs by 25% or more from the reference value.

Based on the determination that the licensee's proposed testing is more conservative than the Code required trending of valve stroke times, relief may be granted from the Section XI requirements of IWV-3417(a) as requested. However, if a valve falls into the "Alert" status and its reference stroke time is changed to remove it from that status, the cause of the change should be known and the basis for the change should be documented to allow evaluation by the NRC.

4.1.2 Leak Rate Testing of Containment Isolation Valves

4.1.2.1 Relief Request. The licensee has requested relief from the leak rate test requirements of Section XI, Paragraph IWV-3421 through IWV-3425, for all valves that are individually leak rate tested to verify their containment isolation function, and proposed to leak rate test these valves to the requirements of 10 CFR 50, Appendix J and Section XI, Paragraphs IWV-3426 and 3427.

4.1.2.1.1 Licensee's Basis for Requesting Relief--Leak test procedures and requirements for containment isolation valves are determined by 10 CFR 50 Appendix J, IWV-3426 and IWV-3427. Relief from paragraphs IWV-3421 through 3425 (1983 Edition through Summer 1983 Addenda) presents no safety problem since the intent of these paragraphs is met by Appendix J requirements.

All 10 CFR 50 Appendix J tested valves that serve only a containment isolation function shall be tested in accordance with the requirements of Appendix J.

4.1.2.1.2 Evaluation--The leak test procedures and requirements for containment isolation valves identified by 10 CFR 50, Appendix J, essentially meet the Section XI Code requirements since it incorporates all of the major elements of Paragraphs IWV-3421 through 3425. Appendix J, Type C, leak rate testing adequately determines the leak-tight integrity of these valves. The 10 CFR 50, Appendix J, leak rate testing does not trend or establish corrective actions based on individual valve leakage rates, therefore, the "Analysis of Leakage Rates" and "Corrective Action" requirements of Section XI, Paragraphs IWV-3426 and 3427 must be followed and the licensee has committed to meet these requirements.

Relief may be granted from the requirements of Paragraphs IWV-3421 through IWV-3425 of the Code for containment isolation valves that are tested alternatively to the Appendix J, Type C, leak rate requirements based on the equivalency of the proposed alternative testing to the Code requirements.

4.1.3 Verification of Reverse Flow Closure for Check Valves Inside Containment

4.1.3.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for the following Category AC valves that are located inside containment, and proposed to verify reverse flow closure of these valves by performing a leak rate test during each refueling outage.

System	Valve	System	Valve
Chemical and Volume Ctl.	3CHS*V394	Chemical and Volume Ctl.	3CHS*V58
Chemical and Volume Ctl.	3CHS*V434	Hydrogen Recombiner	3HCS*V7
Chemical and Volume Ctl.	3CHS*V467	Hydrogen Recombiner	3HCS*V14
Chemical and Volume Ctl.	3CHS*V501		

4.1.3.1.1 Licensee's Basis for Requesting Relief--The only method available to verify reverse flow closure is by valve leak testing. These valves will be verified closed during Appendix J, Type C leak rate testing at refueling.

4.1.3.1.2 Evaluation--These are simple check valves which are located inside primary containment and are not equipped with position indication. The only method available to verify closure of these valves is to perform a leak test. The test connections to leak test these valves are inside containment and, therefore, it would require a containment entry in order to verify valve closure. Routine containment entry cannot be made quarterly during power operations because of high radiation levels and a potentially harsh environment inside containment. Performing this testing during cold shutdowns would subject the plant personnel to increased radiation dosages and other potential hazards, and could result in a delay in returning the plant to power. These valves receive an Appendix J, Type C, leak rate test during refueling outages and it would be impractical to require the licensee to make a containment entry quarterly during power operations or during cold shutdowns in order to verify closure of these valves.

Based on the impracticality of complying with the Code requirements, the burden on the licensee if the Code requirements were imposed, and the licensee's proposed alternate testing of verifying valve closure by the performance of leak rate testing during reactor refueling outages, relief may be granted from the exercising interval requirements of Section XI for these valves.

4.2 Reactor Coolant System

4.2.1 Category AC Valves

4.2.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3RCS*V30, V71, V107, and V146, the check valves in the flow path to the RCS cold legs from low pressure safety injection, high pressure safety injection, and the safety injection accumulators, and proposed to disassemble, inspect, and manually full-stroke exercise these valves on a sampling basis during refueling outages.

4.2.1.1.1 Licensee's Basis for Requesting Relief--These valves cannot be full-stroke or part-stroke exercised during operation since no flow path can be established to accomplish such a test. Normal flow through these valves during cold shutdown is provided from the RHR pumps. The discharge path from a single pump injects through two loop check valves, and, since no individual flow indication is available, stroking of a single valve cannot be verified. Flow from the accumulators cannot be initiated because this would result in a complete or partial discharge of the tanks into the reactor vessel which could result in low-temperature overpressurization of the RCS.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.2.1.1.2 Evaluation--These valves cannot be full- or partial-stroke exercised during power operations because the only flow path through these valves is into the reactor coolant system and the outlet pressure of the accumulators, safety injection pumps, and residual heat removal pumps is too low to establish flow into the RCS when it is at operating pressures. Residual heat removal recirculation flow can be established into the RCS during cold shutdowns, but this flow by itself would result in only a partial-stroke exercise of these valves and credit cannot be taken for partial-stroke exercising these valves because no method exists to verify flow through a particular valve. Administrative controls prevent accumulator or safety injection pump flow into the RCS during cold shutdowns because it could result in a low-temperature overpressurization of the RCS. Establishing design accident flow through these valves into the RCS during refueling outages when the vessel head is removed to provide an adequate expansion volume is not practical since this could cause hydraulic damage to reactor and core components. Disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages would provide an indication of valve mechanical condition and their ability to perform their safety-related functions.

Full- or partial-stroke exercising these valves at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve condition by disassembly, inspection, and manually exercising the valve disks during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.2.1.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3RCS*V29, V70, V106, and V145, the check valves in the injection lines from the centrifugal charging pumps to the reactor coolant system cold legs, and proposed to full-stroke exercise these valves during refueling outages.

4.2.1.2.1 Licensee's Basis for Requesting Relief--Full-stroke exercising these valves during power operation would unnecessarily thermally shock the HPSI inlet nozzles to the reactor coolant system (RCS) cold legs by injecting non-preheated water. Full-stroking cannot be performed during cold shutdown because the required flow would risk overpressurization of the RCS. These valves will be full-stroke exercised during refueling outages when the closure head is removed.

4.2.1.2.2 Evaluation--The only path to exercise these valves with flow is through the centrifugal charging pumps and into the reactor coolant system cold legs which would result in injecting relatively cold water that may have a high concentration of boric acid. Injecting this water into the RCS during power operations could thermal shock the system piping and nozzles which could result in their premature failure induced by metal or weld fatigue due to thermal cycling. It could also cause reactivity and pressurizer level transients which could lead to a plant trip. Therefore, these valves cannot be full- or partial-stroke exercised quarterly during power operations unless extensive system modifications, such as installing full flow test loops, are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

During cold shutdowns there is inadequate expansion volume to establish centrifugal charging pump flow into the RCS through these valves without possibly resulting in a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full- or partial-stroke exercise valves 3RCS*V29, V70, V106, and V145 during cold shutdowns. The only time that there would be a sufficient expansion volume to establish design accident flow through these valves is during refueling outages when the reactor vessel head is removed.

Based on the impracticality of exercising these valves quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising these valves during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.2.2 Category C Valves

4.2.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3RCS*V175, the pressurizer auxiliary spray line check valve, and proposed to full-stroke exercise this valve during each refueling outage.

4.2.2.1.1 Licensee's Basis for Requesting Relief--This valve isolates the pressurizer auxiliary header from the normal charging header. Stroke testing of this valve during power operation would result in a pressurizer pressure transient and thermally shock the pressurizer spray nozzle.

Full-stroke exercising, at cold shutdown, is not practical while solid since there is no flow device to measure flow and there would be no effect on plant pressure. If a steam bubble were to exist at cold shutdown the differential temperature is too high and cause a thermal cycle (refer to Technical Specification 3.4.9.2 and 5.7.1).

This valve will be full-stroke exercised during refueling when the RCS is depressurized and the pressurizer is drained down.

4.2.2.1.2 Evaluation--The only flow path through this valve is into the pressurizer spray header, therefore, this check valve cannot be exercised with flow quarterly during power operations because establishing flow through this valve would inject relatively cold water into the pressurizer spray line. Pumping this water into the spray line during power operations could thermal shock the system piping and spray nozzle which could result in premature component failure induced by metal or weld fatigue due to thermal cycling. Also, adding this colder water to the normal spray flow would result in pressurizer pressure and level transients which could lead to a plant trip. Therefore, these valves cannot be exercised quarterly during power operations unless extensive system modifications, such as installing a full flow test loop, is made to permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert auxiliary pressurizer spray flow away from the pressurizer spray header.

During cold shutdowns when a steam bubble is maintained in the pressurizer, there could be a large enough differential temperature between the charging water and the pressurizer, that initiating auxiliary spray flow could thermal shock the spray nozzle which could lead to its premature failure. During cold shutdowns when the RCS is solid, there is no method to measure the flow rate through the auxiliary spray line to verify a full-stroke exercise of this valve. Also, establishing design accident flow through this valve while the RCS is solid could cause a low-temperature overpressurization of the reactor vessel. This valve will be full-stroke exercised during refueling outages when the RCS is depressurized and the pressurizer is drained down.

Based on the impracticality of exercising this valve quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising this valve during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.3 Chemical and Volume Control System

4.3.1 Category A Valves

4.3.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3410, for 3CHS*V393, V433 V466, V500, V532, and V533, the containment isolation valves in the reactor coolant pump seal water supply and return lines, and proposed to full-stroke exercise these valves during refueling outages when the reactor coolant system is depressurized to less than 100 psig.

4.3.1.1.1 Licensee's Basis for Requesting Relief--Plant operating procedures (per Westinghouse Tech. Manual) require #1 seal return flow be maintained whenever (RCS) pressure exceeds 100 psig. Isolating these valves during plant operation, or cold shutdowns in which the RCS is pressurized could damage the RCP seals.

These valves will be full-stroke exercised during refueling when the RCS is depressurized to less than 100 psig. Full-stroke exercising of the seal return valves will be performed during cold shutdown when the RCS is depressurized (i.e., for cold shutdowns which depressurize the RCS to less than 100 psig).

Full-stroke exercising of the seal supply valves will be done on cold shutdowns in which the RCS is drained down to a level which uncovers the RCP seals (i.e., refueling or cold shutdowns which drain the RCS).

4.3.1.1.2 Evaluation--The reactor coolant pump seals serve as a pressure boundary for the reactor coolant system, therefore, seal failure could result in unisolable leakage of reactor coolant from the RCS. Reactor coolant pump seals can be damaged if seal water flow is stopped when the pumps are running during power operations or during shutdowns. Stopping seal flow during these plant conditions would allow reactor coolant flow from the higher pressure RCS across the seal surfaces, this is a concern because the reactor coolant contains corrosion and wear products ("CRUD") which could cause accelerated wear of the seals and premature seal failure due to the abrasive nature of these particles as they pass through the seals.

During cold shutdowns the seal water return valves, 3CHS*V532 and V533, cannot be closed whenever the reactor coolant pressure is greater than 100 psig because there would be a sufficient pressure differential across the seals to result in flow from the RCS which could damage the seals as described above. The seal water supply valves, 3CHS*V393, V433, V466, and V500, cannot be closed during cold shutdowns unless the reactor coolant system is drained below the level of the reactor coolant pump seals or there could be some infiltration of CRUD into the seal which could damage the seal and lead to its premature failure.

It is impractical to exercise these valves during any plant condition that could result in abnormal seal wear which could lead to a seal failure, since a seal failure is an unisolable RCS leak and possibly a small break LOCA. It would be burdensome for the licensee to make the required system modifications that would allow testing these valves quarterly during power operations since these modifications would be costly and could result in reduced system reliability.

The seal water return valves, 3CHS*V532 and V533, will be full-stroke exercised and have their stroke times measured during each reactor refueling outage and during those cold shutdowns when the RCS pressure is reduced to less than 100 psig. The seal water supply valves, 3CHS*V393, V433, V466, and V500, will be full-stroke exercised and have their stroke times measured during each reactor refueling outage and during those cold shutdowns when the RCS is drained down below the level of the reactor coolant pump seals.

Based on the impracticality of full- or partial-stroke exercising these valves quarterly or during cold shutdowns when the identified RCS conditions are not met, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising these valves during each reactor refueling outage and those cold shutdowns when the RCS is depressurized below 100 psig or drained to below the seal level as appropriate, relief may be granted from the Section XI requirements as requested.

4.3.2 Category C Valves

4.3.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3CHS*V46, V47, and V48, the centrifugal charging pump discharge check valves, and proposed to partial-stroke exercise these valves quarterly and full-stroke exercise them during each refueling outage.

4.3.2.1.1 Licensee's Basis for Requesting Relief--The normal loads on the charging pumps do not generate sufficient flow (design flow) to full-stroke the valves during normal charging operations. Establishing injection flow through the HP injection lines is impossible because it could cause thermal shock, reactivity changes due to cold water injection, and abnormal pressurizer level deviations. These valves cannot be exercised during shutdowns since injection flow could result in low temperature overpressurization of the RCS. These valves will be quarterly part-stroked, and full-stroke exercised by subjecting them to full design flow during refueling outages.

4.3.2.1.2 Evaluation--The only full flow path through these valves is into the RCS through the injection headers since design accident flow cannot be established through the normal charging line. Establishing design accident flow through these valves quarterly during power operations would inject relatively cold water that may have a high concentration of boric acid into the RCS. Pumping this water into the RCS during power operations could thermal shock the system piping and nozzles which could result in premature component failure induced by metal or weld fatigue due to thermal cycling. Injecting into the RCS could also cause reactivity and pressurizer level transients which could lead to a plant trip. Therefore, these valves cannot be full-stroke exercised quarterly during power operations unless extensive system modifications, such as installing full flow test loops, are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

During cold shutdowns there is inadequate expansion volume to establish full centrifugal charging pump flow into the RCS through these valves without possibly resulting in a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full-stroke exercise valves 3CHS*V46, V47, and V48 during cold shutdowns. The only time that there would be a sufficient expansion volume to establish design accident flow through these valves is during refueling outages when the reactor vessel head is removed.

Based on the impracticality of full-stroke exercising these valves quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of partial-stroke exercising quarterly and full-stroke exercising these valves during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.3.2.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3CHS*V261, the check valve in the line from the refueling water storage tank to the suction of the centrifugal charging pumps, and proposed to full-stroke exercise this valve during refueling outages.

4.3.2.2.1 Licensee's Basis for Requesting Relief--This valve is in the suction line between the charging pumps (3CHS*P3A, P3B, and P3C) and the refueling water storage tank. Stroking this valve by taking suction from RWST with the charging pumps during operation or cold shutdown would result in uncontrolled boration of the reactor coolant system and a plant shutdown. Stroking this valve during cold shutdown would result in overpressurization of the RCS. The valve will be full-stroke tested during refueling outages.

4.3.2.2.2 Evaluation--The only flow path that results in full flow through this valve is into the RCS. Establishing design accident flow through this valve quarterly during power operations would inject relatively cold water with a high concentration of boric acid into the RCS. Pumping this water into the RCS during power operations could thermal shock the system piping and nozzles which could result in premature component failure induced by metal or weld fatigue due to thermal cycling. Injecting into the RCS could also cause reactivity and pressurizer level transients which could lead to a plant trip. Therefore, this valve cannot be full-stroke exercised quarterly during power operations unless extensive system modifications, such as installing a full flow test loop, are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

During cold shutdowns there is inadequate expansion volume to establish full centrifugal charging pump injection flow into the RCS without possibly resulting in a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full-stroke exercise valve 3CHS*V261 during cold shutdowns. The only time that there would be a sufficient expansion volume to establish design accident flow through this valve is during refueling outages when the reactor vessel head is removed.

Partial-stroke exercising this valve during power operations would add water with high concentrations of boric acid to the reactor coolant system causing reactor power fluctuations which could result in a plant trip. Establishing flow through this valve and into the normal charging and pump seal flow paths during cold shutdowns would result in a partial-stroke of the valve but could inject excessive amounts of boric acid into the RCS which could delay plant start-up and result in additional radioactive waste to be processed.

Based on the impracticality of full- or partial-stroke exercising valve 3CHS*V261 quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising this valve during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.4 Residual Heat Removal System

4.4.1 Category AC Valves

4.4.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3SIL*V26, 3SIL*V28, 3RCS*V69, and 3RCS*V142, the check valves in the low pressure safety injection flow path to the reactor coolant system hot legs, and proposed to full-stroke exercise these valves during each refueling outage.

4.4.1.1.1 Licensee's Basis for Requesting Relief--There is no flow path available to test these valves during power operation with a pressure source capable of overcoming Reactor Coolant System pressure. The normal pressure sources which would be used during an accident to stroke the valves are the Residual Heat Removal (RHS) pumps which develop a shutoff head of only 200 pounds. Pumping into the RCS via the RHR pumps is the only flow path to full flow exercise these valves. These valves cannot be full-stroked during cold shutdown because establishing flow through these valves could result in RHR cooling flow bypassing the reactor core. These valves will be full-stroke tested during refueling outages.

4.4.1.1.2 Evaluation--The only path available to establish flow through these valves to full- or partial-stroke exercise them is pumping into the reactor coolant system with the residual heat removal pumps for valves 3SIL*V26 and V28, and the residual heat removal or safety injection pumps for valves 3RCS*V69 and V142. Neither the residual heat removal nor the safety injection pumps produce sufficient head to overcome reactor coolant system pressure during power operations. Therefore, these valves cannot be full- or partial-stroke exercised quarterly during power operations unless extensive system modifications, such as installing full flow test loops, were made which would permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Furthermore, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

Valves 3RCS*V69 and V142 cannot be exercised by pumping into the RCS with the safety injection pumps during cold shutdowns because there is not an adequate expansion volume to receive the water and pumping into the RCS could cause or contribute to a low-temperature overpressurization of the RCS. Additionally, there are administrative controls to prevent pumping into the RCS with the safety injection pumps during cold shutdowns. Valves 3SIL*V26 and V28 cannot be exercised by pumping into the reactor coolant system hot legs with the residual heat removal pumps during cold shutdowns because establishing the necessary flow path to perform this testing would interrupt the residual heat removal flow through the reactor core. During the majority of cold shutdowns residual heat removal flow is required to remove the decay heat from the reactor core. Therefore, it is impractical to full- or partial-stroke exercise valves 3SIL*V26, 3SIL*V28, 3RCS*V69, and 3RCS*V142 during cold shutdowns. The licensee will exercise these check valves using residual heat removal pump flow during refueling outages when there is essentially no decay heat produced by the reactor core and the residual heat removal cooling flow is not needed.

Based on the impracticality of exercising these valves quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising these valves during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.4.2 Category C Valves

4.4.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3SIL*V982 and V983, the check valves in the lines from the discharge of the residual heat removal pumps to the safety injection pump suction and the centrifugal charging pump suction, and proposed to disassemble, inspect, and manually exercise these valves on a sampling basis during refueling outages.

4.4.2.1.1 Licensee's Basis for Requesting Relief--There is no flow path available to test these valves during power operation, cold shutdown, or refueling shutdowns. The isolation valves, 3SIL*V23 and 3SIL*V22 are interlocked requiring the residual heat removal and the recirculation spray systems be lined up for containment recirculation before they can be opened.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis for each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full-stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.4.2.1.2 Evaluation--Due to system design the only path available to establish flow through these valves to full- or partial-stroke exercise them requires opening the associated isolation valves, 3SIL*V23 and 3SIL*V22, and pumping with the recirculation spray system pumps and the safety injection or the charging pumps. The isolation valves are interlocked so they cannot be opened unless the RHR, the recirculation spray, and the high pressure safety injection systems are lined up in the recirculation mode with the recirculation spray system pumps taking suction from the containment sump. Establishing the system configuration necessary to exercise these valves during power operations would render an entire safety system unavailable to perform its analyzed function in the event that an accident occurred during testing. Testing that could render an entire safety system inoperable should not be performed during power operations.

These valves cannot be exercised by pumping from the containment sump during cold shutdowns because this would require filling the sump and aligning the RHR system in a configuration that would remove both trains from the shutdown cooling mode of operation. Also, to full-stroke exercise these valves would require pumping into the reactor coolant system which could result in a low-temperature overpressurization of the reactor vessel. Because of these concerns and administrative controls to prevent their occurrence, it is impractical to full- or partial-stroke exercise valves 3SIL*V982 and V983 during cold shutdowns. Disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages would provide an indication of the valve's mechanical condition and ability to perform their safety-related functions.

Compliance with the Code required valve exercising at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the

Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve operability by disassembly, inspection, and manually exercising the valve disks during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.5 High Pressure Safety Injection System

4.5.1 Category AC Valves

4.5.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3RCS*V26, 3RCS*V102, 3SIL*V27, 3SIL*V29, 3SIH*V110, and 3SIH*V112, the high pressure coolant injection to RCS hot leg check valves, and proposed to partial-stroke exercise valves 3SIH*V110 and V112 quarterly and to full-stroke exercise all of these valves during refueling outages when an adequate expansion volume is available.

4.5.1.1.1 Licensee's Basis for Requesting Relief--The source of flow to full-stroke exercise these valves is the safety injection pumps (3SIH*P1A and P1B). The shutoff head of these pumps (1,520 psig) is insufficient to stroke these valves against the normal reactor coolant system (RCS) pressure. Full stroking cannot be performed during cold shutdown because the required flow would risk overpressurization of the RCS.

These valves will be full-stroke exercised during refueling outages when the reactor closure head is removed. The backup pressure isolation check valves (3SIH*V110 and V112) will be part stroke exercised quarterly.

4.5.1.1.2 Evaluation--The only path available to establish sufficient flow through these valves to full-stroke exercise them is pumping with the safety injection pumps into the reactor coolant system. There is a flow path to establish flow through valves 3SIH*V110 and 3SIH*V112 quarterly during power operations, however, the flow path incorporates small diameter piping that will not permit the passage of sufficient flow to full-stroke exercise these valves. There are no flow paths through valves 3RCS*V26, 3RCS*V102, 3SIL*V27, and 3SIL*V29 except into the reactor coolant system. The safety injection pumps do not produce sufficient head to overcome reactor coolant system pressure during power operations. Therefore, these valves cannot be full-stroke exercised quarterly during power operations unless extensive system modifications, such as installing full flow test loops, are made which permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

These valves cannot be exercised by pumping into the RCS with the safety injection pumps during cold shutdowns because there is not an adequate expansion volume and pumping into the RCS could cause or contribute to a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full- or partial-stroke exercise valves 3RCS*V26, 3RCS*V102, 3SIL*V27, 3SIL*V29, 3SIH*V110, and 3SIH*V112 during cold shutdowns. The licensee will full-stroke exercise these check valves using safety injection pump flow during refueling outages when an adequate expansion volume exists to accommodate the flow required to exercise them.

Based on the impracticality of full-stroke exercising valves 3RCS*V26, 3RCS*V102, 3SIL*V27, 3SIL*V29, 3SIH*V110, and 3SIH*V112 quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of partial-stroke exercising valves 3SIH*V110 and V112 quarterly and full-stroke exercising all of these valves during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.5.1.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3SIH*V5, the check valve in the injection path from the centrifugal charging pumps to the reactor coolant system cold legs, and proposed to full-stroke exercise this valve during each refueling outage.

4.5.1.2.1 Licensee's Basis for Requesting Relief--Full-stroke or partial-stroke exercising of this valve during power operation would unnecessarily thermally shock the HPSI inlet nozzles to the reactor coolant system (RCS) cold legs by injecting non-preheated water causing premature failure of the component. This valve cannot be exercised during cold shutdown because the required flow would risk overpressurization of the RCS. This valve will be full-stroke exercised during refueling outages when the reactor closure head is removed.

4.5.1.2.2 Evaluation--The only full flow path through this valve is into the RCS and establishing design accident flow through this valve quarterly during power operations would inject relatively cold water into the RCS. Pumping this water into the RCS during power operations could thermal shock the system piping and nozzles which could result in premature component failure induced by metal or weld fatigue due to thermal cycling. Injecting into the RCS could also cause reactivity and pressurizer level transients which could lead to a plant trip. Therefore, this valve cannot be full-stroke exercised quarterly during power operations unless extensive system modifications, such as installing a full flow test loop, are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

During cold shutdowns there is inadequate expansion volume to establish full centrifugal charging pump flow into the RCS through this valve without possibly resulting in a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full-stroke exercise valve 3SIH*V5 during cold shutdowns. The only time that there would be a sufficient expansion volume to establish design accident flow through these valves is during refueling outages when the reactor vessel head is removed.

Based on the impracticality of exercising this valve quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising valve 3SIH*V5 during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.5.2 Category C Valves

4.5.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for the following safety injection system check valves, and proposed to full-stroke exercise these valves during refueling outages.

Valve	Description
3SIH*V13	Safety injection pump discharge check valve
3SIH*V17	Safety injection pump discharge check valve
3SIH*V22	HPSI to RCS cold leg injection header check valve
3SIH*V24	HPSI to RCS cold leg injection header check valve
3SIH*V26	HPSI to RCS cold leg injection header check valve
3SIH*V28	HPSI to RCS cold leg injection header check valve

4.5.2.1.1 Licensee's Basis for Requesting Relief--The source of flow to full-stroke exercise these valves is the safety injection pumps (3SIH*P1A and P1B). The shutoff head of these pumps (1,520 psig) is insufficient to stroke these valves against the normal reactor coolant system (RCS) pressure (this is the only path to establish flow through these valves). Full stroking cannot be performed during cold shutdown because the required flow would risk overpressurization of the RCS. These valves will be full-stroke exercised during refueling outages when the reactor closure head is removed.

4.5.2.1.2 Evaluation--The only path available to establish flow through these valves to full- or partial-stroke exercise them is pumping with the safety injection pumps into the reactor coolant system. The safety injection pumps do not produce sufficient head to overcome reactor coolant system pressure during power operations. Therefore, these valves cannot be full- or partial-stroke exercised quarterly during power operations unless extensive system modifications, such as installing full flow test loops, are made which permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

These valves cannot be exercised by pumping into the RCS with the safety injection pumps during cold shutdowns because there is not an adequate expansion volume and pumping into the RCS could cause or contribute to a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full- or partial-stroke exercise the above listed valves during cold shutdowns. The licensee will full-stroke these check valves using safety injection pump flow during refueling outages when an adequate expansion volume exists to accommodate the flow required to exercise them.

Based on the impracticality of exercising these valves quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising these valves during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.5.2.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3SIH*V11, the check valve in the safety injection pump suction from the refueling water storage tank, and proposed to partial-stroke exercise this valve quarterly during power operations and to full-stroke exercise it at refueling outages.

4.5.2.2.1 Licensee's Basis for Requesting Relief--There is no flow path available to full-stroke test this valve during power operations since the safety injection pumps do not develop sufficient head to overcome RCS pressure. Full-stroke testing cannot be performed during cold shutdown because the required flow would risk overpressurization of the RCS.

This valve will be part stroke tested quarterly during the surveillance tests for the Safety Injection Pumps 3SIH*P1A and 3SIH*P1B. Full-stroke testing will be performed during a refueling outages when the reactor closure head is removed.

4.5.2.2.2 Evaluation--The only path available to establish full flow through valve 3SIH*V11 to full-stroke exercise it is pumping with the safety injection oumps into the reactor coolant system. The safety injection pumps do not produce sufficient head to overcome reactor coolant system pressure during power operations. This valve is exercised during the quarterly safety injection pump tests, however, the recirculation flow path used for this test does not allow passage of design accident flow which makes this a partial-stroke exercise of this check valve. Therefore, 3SIH*V11 cannot be full-stroke exercised quarterly during power operations unless extensive system modifications, such as installing a full flow test loop, are made which permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

3SIH*V11 cannot be exercised by pumping into the RCS with the safety injection pumps during cold shutdowns because there is not an adequate expansion volume and pumping into the RCS could cause or contribute to a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full- or partial-stroke exercise valve 3SIH*V11 during cold shutdowns. The licensee will partial-stroke exercise this check valve quarterly during power operations and full-stroke it using safety injection pump flow into the RCS during refueling outages when an adequate expansion volume exists to accommodate the flow required to exercise the valve.

Based on the impracticality of exercising valve 3SIH*V11 quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of partial-stroke exercising this valve quarterly during power operations and full-stroke exercising it during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.6 Recirculation Spray System

4.6.1 Category AC Valves

4.6.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3RSS*V3, V6, V9, and V12, the recirculation spray header check valves, and proposed to disassemble, inspect, and manually exercise the valve disks on a sampling basis during refueling outages.

4.6.1.1.1 Licensee's Basis for Requesting Relief--There is no flow path available to full-stroke exercise these valves without actual initiation of recirculation spray. This could result in damage to plant equipment and spread of radioactive contamination.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis for each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full-stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.6.1.1.2 Evaluation--Valves 3RSS*V3, V6, V9, and V12 cannot be full- or partial-stroke exercised with flow during power operations or any plant operating mode, because the only flow path through these valves results in flow to the recirculation spray rings which would result in spraying water inside containment. Establishing flow through the containment spray nozzles would result in wetting down most of the equipment and structures inside containment which could cause damage to equipment and insulation and require extensive repairs and cleanup.

Disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages would provide an indication of valve mechanical condition and their ability to perform their safety-related functions.

Compliance with the Code required valve exercising at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve operability by disassembly, inspection, and manually exercising the valve disks during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.7 Quench Spray System

4.7.1 Category AC Valves

4.7.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3QSS*V4 and V8, the quench spray header check valves, and proposed to disassemble, inspect, and manually exercise the valve disks on a sampling basis during refueling outages.

4.7.1.1.1 Licensee's Basis for Requesting Relief--There is no flow path available to full-stroke exercise these valves without actual initiation of quench spray. This could result in damage to plant equipment and spread of radioactive contamination.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis for each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full-stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.7.1.1.2 Evaluation--Valves 3QSS*V4 and V8 cannot be full- or partial-stroke exercised with flow during power operations or any plant operating mode, because the only flow path through these valves results in flow to the quench spray rings which would result in spraying water inside containment. Establishing flow through the quench spray nozzles would result in wetting down most of the equipment and structures inside containment which could cause damage to equipment and insulation and require extensive repairs and cleanup.

Disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages would provide an indication of valve mechanical condition and their ability to perform their safety-related functions. These valves are grouped with valves 3QSS*V978 and V979 for sample disassembly and inspection.

Compliance with the Code required valve exercising at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve operability by disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.7.2 Category C Valves

4.7.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3QSS*V976, V977, V978, and V979, the quench spray header check valves, and proposed to disassemble, inspect, and manually exercise the valve disks on a sampling basis during refueling outages.

4.7.2.1.1 Licensee's Basis for Requesting Relief--There is no flow path available to full-stroke exercise these valves without actual initiation of quench spray. This could result in damage to plant equipment and spread of radioactive contamination.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis for each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full-stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.7.2.1.2 Evaluation--Valves 3QSS*V976, V977, V978, and V979 cannot be full- or partial-stroke exercised with flow during power operations or any plant operating mode, because the only flow path through these valves results in flow to the quench spray rings which would result in spraying water inside containment. Establishing flow through the quench spray nozzles would result in wetting down most of the equipment and structures inside containment which could cause damage to equipment and insulation and require extensive repairs and cleanup.

Disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages would provide an indication of valve mechanical condition and their ability to perform their safety-related functions. Valves 3QSS*V978 and V979 are grouped with valves 3QSS*V4 and V8 for sample disassembly and inspection and valves 3QSS*V976 and V977 form a separate group for sample disassembly.

Compliance with the Code required valve exercising at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve operability by disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.8 Accumulator Safety Injection System

4.8.1 Category AC Valves

4.8.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3SIL*V15, V17, V19, and V21, the safety injection accumulator outlet check valves, and proposed to disassemble, inspect, and manually exercise the valve disks on a sampling basis during refueling outages.

4.8.1.1.1 Licensee's Basis for Requesting Relief--These valves cannot be full-stroke or partial-stroke exercised during operation since no flow path exists to accomplish such a test. The valves cannot be full stroke or part stroke exercised during a cold shutdown because this would result in a complete or partial discharge of the tanks into the reactor vessel which could result in low temperature overpressurization of the RCS.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full-stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.8.1.1.2 Evaluation--Valves 3SIL*V15, V17, V19, and V21 cannot be full- or partial-stroke exercised during power operations because the only flow path through these valves is into the reactor coolant system and the accumulator cannot establish flow into the RCS when at operating pressures. Therefore, these valves cannot be full- or partial-stroke exercised quarterly during power operations unless extensive system modifications, such as installing full flow test loops, are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved. Additionally, reduced system reliability could result from failures that could divert the injection flow away from the RCS.

These check valves cannot be exercised by discharging the accumulators into the RCS during cold shutdowns because there is not an adequate expansion volume and injecting into the RCS could cause or contribute to a low-temperature overpressurization of the RCS. Because of this concern and administrative controls to prevent its occurrence, it is impractical to full- or partial-stroke exercise valves 3SIL*V15, V17, V19, and V21 during cold shutdowns. Establishing design accident flow through these valves into the RCS during refueling outages when the vessel head is removed to provide an adequate expansion volume is not practical since this could cause hydraulic damage to reactor and core components. These valves will be disassembled, inspected, and the valve disks will be manually exercised on a sampling basis during refueling outages.

Compliance with the Code required valve exercising at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve operability by disassembly, inspection, and manually exercising the valve disks during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.9 Service Water System

4.9.1 Category B Valves

4.9.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3410, for 3SWP*V25, V27, V58, and V60, the isolation valves in the service water supply to the containment recirculation coolers, and proposed to full-stroke exercise these valves during refueling outages.

4.9.1.1.1 Licensee's Basis for Requesting Relief--These valves are interlocked so that they cannot be opened unless valves 3SWP*V33 and V65 are closed shutting off service water supply to the component cooling water coolers. Component cooling water (CCP) cannot be secured during power operation. A failure of component cooling water during power operation would inop. l Technical Specification required train of CCP and related safety equipment. Component cooling water cannot be secured during cold shutdown. This would prevent proper cooling of safety-related and non-safety-related equipment and cause a service water pump runout. These valves will be full-stroked during refueling outages.

4.9.1.1.2 Evaluation--Because of the interlock between valves 3SWP*V25, V27, V58, and V60 and the service water isolation valves to the component cooling water heat exchangers (valves 3SWP*V33 and V65), exercising valves 3SWP*V25, V27, V58, and V60 on quarterly or during cold shutdowns would result in the loss of cooling water flow to the component cooling water heat exchangers and could result in overheating and damage of the equipment cooled by the component cooling water system. Loss of cooling water to the component cooling water heat exchangers during power operations could result in a reactor trip due to the loss of cooled components such as reactor coolant pumps and the letdown heat exchanger. Loss of cooling water to the component cooling water heat exchangers during cold shutdowns would result in loss of cooling to the residual heat removal heat exchangers and other equipment that is necessary to remove reactor decay heat and for normal shutdown operations. To allow testing during power operations or cold shutdowns the licensee would have to defeat the valve interlock which could result in compromising the ability of this system to perform its safety-related function. It is impractical to require the licensee to disable protective interlocks in order to test these valves at the Code required frequency.

Based on the impracticality of exercising these valves quarterly or during cold shutdowns, the burden on the licensee if these Code requirements were imposed, and the licensee's proposed alternate testing of full-stroke exercising valves 3SWP*V25, V27, V58, and V60 during reactor refueling outages, relief may be granted from the Section XI requirements as requested.

4.9.2 Category C Valves

4.9.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3520, for 3SWP*V705, V706, V707, and V708, the check valves in the service water supply to the safety injection pump coolers and MCC and rod control area cooler booster pump suctions, and proposed to disassemble, inspect, and manually exercise the valve disks on a sampling basis during refueling outages.

4.9.2.1.1 Licensee's Basis for Requesting Relief--Full-stroke exercising these valves closed would require stopping the service water pumps which provide both safety-related cooling capability at power operation as well as shutdown cooling capability during cold shutdown.

These valves will be partially disassembled, inspected and manually exercised on a staggered sampling basis for each refueling outage. During each disassembly, the valve internals will be inspected for structural soundness (no loose or corroded parts). In the event that a disassembled valve's full-stroke capability is questionable, additional valves will be disassembled until one hundred percent (100%) of the valves identified in this group have been disassembled and inspected.

4.9.2.1.2 Evaluation--Check valves 3SWP*V705, V706, V707, and V708 are normally open to provide cooling water flow to the cooled components. Exercising these valves closed requires isolating the cooling flow to the coolers for safety-related equipment which could result in the ambient temperatures increasing to the point where damage occurs thereby rendering the equipment inoperable. Therefore, these valves should not be exercised closed quarterly during power operations or during any plant mode when the cooled equipment is operating and could be damaged if space cooling is interrupted.

It would be necessary to secure the service water pumps in order to exercise these check valves closed. During cold shutdowns the plant heat loads could remain at levels that require service water cooling flow for several weeks, depending on ambient conditions and the plant operating history prior to the shutdown. Therefore, it is not practical to require the licensee to test these valves on a cold shutdown frequency.

Due to the system design, valve closure can only be verified by valve disassembly and inspection. Disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages would provide an indication of valve mechanical condition and their ability to perform their safety-related functions.

Compliance with the Code required valve exercising at power is impractical due to system design. Compliance with the Code required testing frequency would be burdensome since this would require quarterly shutdown and valve disassembly. Based on the impracticality of complying with the Code required testing method, the burden to the licensee of complying with the Code required testing frequency, and the licensee's proposed alternate testing of verifying valve operability by disassembly, inspection, and manually exercising the valve disks on a sampling basis during reactor refueling outages, relief may be granted from the Code requirements as requested.

4.10 Emergency Diesel Generator Air Start System

4.10.1 Category B Valves

4.10.1.1 Relief Request. The licensee has requested relief from the stroke time measurement requirements of Section XI, Paragraph IWV-3413, for 3EGF*V25, V26, V51, and V52, the emergency diesel generator air start solenoid operated valves, and proposed to measure the diesel generator starting times to verify valve operation and to monitor valve degradation.

4.10.1.1.1 Licensee's Basis for Requesting Relief--It is impractical to measure the limiting value of full-stroke time of these valves. These valves do not have remote position indication. Measuring the stroke time of these valves by observing stem travel would require disassembly of the operator. The safety function of these valves is to open to support the startup of its respective diesel to provide rated frequency and voltage in less than ten seconds. Successful start-up of each emergency diesel generator within the above specified conditions is dependent upon the proper operation and speed of these valves. Measuring start-up time of each emergency diesel generator is an indirect method of verifying the degradation of these valves and meets the intent of the code. Upon failure of the diesel generators to start as required, corrective action shall be taken to assure proper diesel start-up conditions.

These valves shall be full-stroke tested using the emergency diesel generator start-up times per Surveillance Procedure 3646A.1.2 as an indirect indication of valve operability.

4.10.1.1.2 Evaluation--These valves are totally enclosed solenoid operated valves which have no externally visible indication of valve position. It is not possible to measure the stroke times of these solenoid operated valves because there is no way to determine when a valve receives a signal to open or when it reaches the open position. These solenoid valves are rapid acting valves which normally stroke almost instantly and when they do not operate promptly, they most commonly fail to operate at all.

These valves function to admit starting air to the diesel generator starting motors, therefore, it can be indirectly verified that each valve has opened by monitoring the diesel generator start times to insure that the diesel starts within the Technical Specification limit. Measuring the diesel start times gives an indication of possible valve degradation since any significant change in valve stroke time would result in longer diesel generator start times. Valve full-stroke times cannot be measured unless significant system modifications, such as replacing these diesel air start solenoid valves with valves that have valve disk position indication, are made to permit this testing. It would be burdensome for the licensee to make such modifications because of the time and expense involved and considering the most common failure mode and the limited amount of additional information that would be provided above that generated by the proposed alternate testing.

Compliance with the Code required testing method is impractical due to the system design. Based on the impracticality of complying with the Code required testing method and on the licensee's proposed alternate testing of measuring the diesel generator starting times to verify operation of the solenoid operated air start valves and to monitor their degradation, relief may be granted from the Code requirements as requested.

APPENDIX A

VALVES TESTED DURING COLD SHUTDOWNS

APPENDIX A

VALVES TESTED DURING COLD SHUTDOWNS

The following are Category A, B, and C valves that meet the exercising requirements of the ASME Code, Section XI, and are not full-stroke exercised every three months during plant operation. These valves are specifically identified by the owner in accordance with Paragraphs IWV-3412 and -3522 and are full-stroke exercised during cold shutdowns and refueling outages. All valves in this Appendix have been reviewed and the reviewer agrees with the licensee that testing these valves during power operations is not practical due to the valve type, location, or system design. These valves should not be full-stroke exercised during power operations. These valves are listed below and grouped according to the system in which they are located.

1. REACTOR COOLANT SYSTEM

1.1 Category B Valves

3RCS*V174, the isolation valve in the auxiliary spray line, cannot be exercised quarterly during power operations because opening this valve would cause low temperature spray flow into the pressurizer which could result in an RCS pressure transient and thermal shock to the pressurizer spray nozzle. A pressure transient in the RCS could result in a reactor trip and thermally shocking the spray nozzle could result in premature failure due to thermally induced fatigue failure. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

3RCS*V168 and V170, the pressurizer power operated relief valves, will be exercised during cold shutdowns. This exercising frequency is consistent with the NRC guidelines for pressurizer power operated relief valves.

2. CHEMICAL AND VOLUME CONTROL SYSTEM

2.1 Category A Valves

3CHS*V5 and V802, the containment isolation valves in the normal letdown line, cannot be exercised during power operations because failure of either valve in the closed position during testing would isolate the normal letdown flow which would cause a loss of pressurizer level control and could result in a plant trip. Also, the plant is designed with a limited number of letdown isolation thermal cycles and exercising these valves during power operations can result in a thermal cycle to the charging path to the RCS. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3CHS*V57, the containment isolation valve in the normal charging line, cannot be exercised during power operations because failure of this valve in the closed position during testing would isolate the normal charging flow which would cause a loss of pressurizer level control and could result in a plant trip. This valve will be exercised and have its stroke times measured during cold shutdowns and refueling outages.

2.2 Category B Valves

3CHS*V56, the isolation valve in the normal charging line to the reactor coolant system, cannot be exercised during power operations because closing this valve would isolate normal charging flow to the reactor coolant system which would cause a loss of pressurizer level control and could result in a plant trip. This valve will be exercised and have its stroke times measured during cold shutdowns and refueling outages.

3CHS*V40 and V41, the isolation valves in the line from the volume control tank to the charging pump suctions, cannot be exercised during power operations because closing either valve would isolate the normal suction source for the charging pumps which could stop charging flow and cause a loss of pressurizer level control and result in a plant trip. Using an alternate suction source for the charging pumps could result in injecting water with a higher concentration of boric acid into the seals and the reactor coolant system which would cause a reactor power transient and could result in a plant shutdown. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3CHS*V710 and V712, the isolation valves in the gravity boration paths from the boric acid tank to the charging pump suctions, cannot be exercised during power operations because opening either valve would result in uncontrolled boration of the reactor coolant system thereby introducing a large amount of negative reactivity to the reactor which could result in a plant shutdown. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3CHS*V665 and V666, the isolation valves to the charging pump discharge relief valves, cannot be exercised during power operations because they are interlocked with valves 3CHS*LVC112B and LVC112C (the isolation valves between the volume control tank and the suction of the charging pumps) such that 3CHS*LVC112B and LVC112C must close in order for 3CHS*V665 and V666 to be opened. Isolating the volume control tank from the charging pumps during power operations would result in a loss of pressurizer level control which could lead to a plant shutdown. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

2.3 Category C Valves

3CHS*V333 and V711, the check valves in the gravity boration flow paths, cannot be exercised during power operations because the only flow path available to exercise these valves establishes flow from the boric acid tank to the charging pump suction and then into the reactor coolant system which would cause a substantial boration of the reactor coolant system. This boration would cause unwanted negative reactivity addition and result in reactor power fluctuations and possibly in a plant shutdown. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

3CHS*V320, the check valve in the emergency boration flow path, cannot be exercised during power operations because the only flow path available to exercise this valve establishes flow from the boric acid tank to the charging pump suction and then into the reactor coolant system which would cause a substantial boration of the reactor coolant system. This boration would cause unwanted negative reactivity addition and result in reactor power fluctuations and possibly in a plant shutdown. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

3. RESIDUAL HEAT REMOVAL SYSTEM

3.1 Category A Valves

3RHS*V994, V995, V996, and V997, the isolation valves in the residual heat removal pump suction from the RCS hot legs, cannot be exercised during power operations because these valves are interlocked with reactor coolant system pressure so that they cannot be opened when pressure is above 375 psig in order to prevent overpressurization of the low pressure RHR system piping by the higher pressure reactor coolant system. Overpressurization of the RHR piping could result in an inter-system LOCA outside of containment. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3RHS*V998 and V999, the isolation valves in the residual heat removal pump suction from the RCS hot legs, cannot be exercised during power operations because these valves are pressure boundary isolation valves which are required to remain closed during power operations by the plant Technical Specifications. These valves must be leak tested within 24 hours after being operated and this testing would require a containment entry which could pose a hazard to the personnel performing the testing due to the presence of high energy fluids and the fact that the containment is maintained at subatmospheric pressures. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3SIL*V5 and V11, the isolation valves for low pressure safety injection to the reactor coolant system cold legs, cannot be exercised during power operations because these valves are required to remain open with power removed from the valve operators by plant Technical Specification 3/4.5.2 during operating modes 1, 2, and 3. Closing these valves during power operations would prevent the low pressure safety injection system from being able to perform its safety related function. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3SIL*V25, the isolation valve for low pressure safety injection to the reactor coolant system hot legs, cannot be exercised during power operations because this valve is required to remain closed with power removed from the valve operator by plant Technical Specification 3/4.5.2 during operating modes 1, 2, and 3. Opening this valve during power operations would prevent the low pressure safety injection system from being able to perform its safety related function. This valve will be exercised and have its stroke times measured during cold shutdowns and refueling outages.

3.2 Category A/C Valves

The following check valves in the residual heat removal injection lines to the reactor coolant system cold legs, cannot be exercised during power operations because the only flow path available to exercise these valves with flow is into the reactor coolant system and the residual heat removal pumps (discharge pressure of _200 psig) do not produce sufficient head to overcome the normal operating reactor coolant system pressure. These valves will be full-stroke exercised during cold shutdowns and refueling outages when the residual heat removal system is in operation.

SIL*V6	SIL*V13	SIL*V986
SIL*V7	SIL*V984	SIL*V987
SIL*V12	SIL*V985	

3.3 Category B Valves

3RHS*V4 and V8, the isolation valves in the cross-connect line between the two low pressure safety injection headers, cannot be exercised during power operations because closing either valve would isolate each low pressure safety injection header from two of the RCS loops. With these cross-connect valves closed, if a single active failure of one of the low pressure safety injection trains occurred, the remaining train could only deliver cooling water to two of the four reactor coolant loops. The FSAR accident analyses take credit for low head safety injection flow into three reactor coolant system cold legs, therefore, in order to meet these requirements, valves 3RHS*V4 and V8 cannot be closed during power operations when credit is taken for the operability of the low pressure safety injection function of the residual heat removal system. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

4. ACCUMULATOR SAFETY INJECTION SYSTEM

4.1 Category B Valves

3SIL*V14, V16, V18, and V20, the isolation valves on the outlets of the safety injection accumulator tanks, cannot be exercised during power operation because closing any of these valves would isolate an accumulator and these valves are required to remain open with power disconnected from their operators by the plant Technical Specifications. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

5. HIGH PRESSURE SAFETY INJECTION

5.1 Category A Valves

3SIH*V20, the isolation valve for high pressure safety injection to the reactor coolant system cold legs, cannot be exercised during power operations because this valve is required to remain open with power removed from the valve operator by plant Technical Specification 3/4.5.2 during operating modes 1, 2, and 3. Closing this valve during power operations would prevent the high pressure safety injection system from being able to perform its safety-related function. This valve will be exercised and have its stroke times measured during cold shutdowns and refueling outages.

3SIH*V3 and V4, the containment isolation valves in the high pressure injection flow path to the reactor coolant system cold legs, cannot be exercised during power operations because opening these valves would disrupt the normal charging flow and result in the injection of non-preheated water into the reactor coolant system resulting in thermal shock to the inlet nozzles which could cause premature failure of these components. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3SIH*V93 and V100, the isolation valves in the safety injection headers to the RCS hot legs, cannot be exercised during power operations because these valves are required to remain closed with power removed from their actuators by the plant Technical Specification 3/4.5.2 in order to prevent diversion of safety injection flow from the reactor coolant system cold legs. Safety injection flow is required to be into the RCS cold legs to help mitigate a loss of coolant accident (LOCA) as analyzed in the plant FSAR. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

5.2 Category B Valves

3SIH*V10, the isolation valve in the safety injection pump suction line from the refueling water storage tank, cannot be exercised during power operations because if this valve failed in the closed position during testing it would disable both trains of safety injection thereby disabling an entire safety system. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

3SIH*V962, the isolation valve in the minimum flow line for both safety injection pumps, cannot be exercised during power operations since failure in the closed position during testing would isolate the minimum flow path for both safety injection pumps which could damage both pumps and render an entire safety system inoperable if they were started when reactor coolant system pressure was above the safety injection pump discharge pressure capability. This valve will be exercised and have its stroke times measured during cold shutdowns and refueling outages.

6. COMPONENT COOLING WATER SYSTEM

6.1 Category A/C Valves

3CCP*V18 and V60, containment isolation valves in the component cooling water headers to containment, cannot be exercised quarterly during power operations because to verify these valves in the closed position would require that cooling flow be interrupted to the associated train inside containment which would cause loss of cooling water flow to the letdown heat exchanger, the seal water heat exchanger, and other components inside containment. Loss of cooling to these components would cause thermal cycling which could result in their premature failure. These valves will be exercised during cold shutdowns and refueling outages.

7. MAIN STEAM SYSTEM

7.1 Category B Valves

3MSS*V1, V4, V7, and V10, the main steam isolation valves, cannot be full-stroke exercised during power operations because fully closing one of these valves isolates the steam supply from one of the four steam generators to the main turbine resulting in an unbalanced steam flow condition producing an abnormal power distribution in the reactor core which could cause a reactor trip. These valves will be partial-stroke exercised quarterly during power operations and will be full-stroke exercised and have their stroke times measured during cold shutdowns and refueling outages.

3MSS*V2, V5, V8, and V11, the bypass valves around the main steam isolation valves (MSIVs), cannot be full-stroke exercised during power operations because failure of one of these valves in the open position during testing could prevent isolation of the associated main steam line. These valves are used to warm the main steam headers and equalize pressures around the MSIVs during plant startup, but are then closed and remain closed during plant operation and are not required to open to perform any safety-related function. These valves will be full-stroke exercised and have their stroke times measured during cold shutdowns and refueling outages.

8. MAIN FEEDWATER SYSTEM

8.1 Category B Valves

3FWS*V15, V22, V29, and V36, the control valves in the main feedwater headers, cannot be exercised during power operations because closing these valves would isolate feedwater flow to a steam generator which would cause the loss of steam generator water level control and could result in a plant trip. These valves modulate during power operations to control steam generator water level and are full-stroke exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

3FWS*V20, V27, V34, and V41, the isolation valves in the main feedwater headers, cannot be exercised during power operations because closing these valves would isolate feedwater flow to a steam generator which would cause the loss of steam generator water level control and could result in a plant trip. These valves will be full-stroke exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

3FWS*V18, V25, V32, and V39, the main feedwater bypass control valves, cannot be exercised during power operations because opening these valves would alter feedwater flow to a steam generator which could cause the loss of steam generator water level control and could result in a plant trip. These valves remain closed during power operations above 20% reactor power and are not required to open to perform a safety-related function. They will be full-stroke exercised, fail-safe tested, and have their stroke times measured during cold shutdowns and refueling outages.

8.2 Category C Valves

3FWS*V898, V899, V920, and V921, the feedwater header check valves, cannot be exercised quarterly during power operations because to verify these valves in the closed position would require securing feedwater flow to the associated steam generator which would cause a loss of steam generator water level control and possibly a reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

9. AUXILIARY FEEDWATER SYSTEM

9.1 Category C Valves

The following auxiliary feedwater check valves cannot be exercised during power operations because to exercise these valves open would require establishing auxiliary feedwater flow into the steam generators and this relatively cold water could thermal shock the feedwater piping and nozzles which could result in premature failure of those components. These valves will be full-stroke exercised open during cold shutdowns and refueling outages. These valves cannot be individually verified in the closed position, this is an open item for the licensee (see Appendix C).

Valve	Function
3FWA*V3	Motor driven pump P1A discharge check valve
3FWA*V7	Motor driven pump supply to SG "A"
3FWA*V12	Motor driven pump supply to SG "D"
3FWA*V17	Motor driven pump P1B discharge check valve
3FWA*V21	Motor driven pump supply to SG "B"
3FWA*V26	Motor driven pump supply to SG "C"
3FWA*V31	Turbine driven pump discharge check valve
3FWA*V35	Turbine driven pump supply to SG "C"
3FWA*V39	Turbine driven pump supply to SG "B"
3FWA*V43	Turbine driven pump supply to SG "A"
3FWA*V47	Turbine driven pump supply to SG "D"

The following auxiliary feedwater check valves cannot be exercised during power operations because to exercise these valves open would require establishing auxiliary feedwater flow into the steam generators which could cause steam generator level fluctuations which could result in a reactor trip. Also, injecting this relatively cold water could thermal shock the feedwater piping and nozzles which could result in premature failure of those components. These valves will be full-stroke exercised open during cold shutdowns and refueling outages.

Valve	Function
3FWA*V9	Auxiliary feedwater supply check valve to SG "A"
3FWA*V14	Auxiliary feedwater supply check valve to SG "D"
3FWA*V23	Auxiliary feedwater supply check valve to SG "B"
3FWA*V28	Auxiliary feedwater supply check valve to SG "C"
3FWA*V882	Auxiliary feedwater supply check valve to SG "A"
3FWA*V883	Auxiliary feedwater supply check valve to SG "B"
3FWA*V884	Auxiliary feedwater supply check valve to SG "C"
3FWA*V885	Auxiliary feedwater supply check valve to SG "D"

10. SERVICE WATER SYSTEM

10.1 Category B Valves

3SWP*V33 and V65, isolation valves in the cooling water supply to the component cooling water heat exchangers, cannot be exercised quarterly during power operations because closing these valves would isolate cooling flow to the component cooling water heat exchanger which would cause a loss of cooling to the equipment supplied by the component cooling water system. Loss of cooling to these components could cause equipment damage or could result in their premature failure due to thermal cycling. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

11. COMPRESSED AIR SYSTEM

11.1 Category A Valve

3IAS*V131 and V809, the containment isolation valves for the instrument air supply to the containment, cannot be exercised during power operations because closing these valves will interrupt the instrument air supply to components inside containment including the normal letdown valves and the pressurizer spray valves which would cause pressurizer level and RCS pressure fluctuations and could result in a plant trip. These valves will be exercised and have their stroke times measured during cold shutdowns and refueling outages.

APPENDIX B

P&ID AND FIGURE LIST

System	P&ID or Figure	Revision
Main Steam System	25212-26923 Sh.1	2
	25212-26923 Sh.2	3
	25212-26923 Sh.5	2
Feedwater System	25212-26930 Sh.1	2A
	25212-26930 Sh.2	2B
Chemical Feed System	25212-26931	2B
Service Water System	25212-26933 Sh.1	5
	25212-26933 Sh.2	5
	25212-26933 Sh.3	1
Compressed Air System	25212-26938 Sh.1	2A
	25212-26938 Sh.3	2B
Nitrogen and Hydrogen System	25212-26939 Sh.2	2B
Reactor Plant Sampling System	25212-26944 Sh.1	2
	25212-26944 Sh.2	2
Turbine Plant Miscellaneous Drains	25212-26945 Sh.1	2A
Fire Protection System	25212-26946 Sh.2	3A
Control Building Heating, Ventilation and Air Conditioning System	25212-26951 Sh.1	2B
	25212-26951 Sh.2	2B
	25212-26951 Sh.4	2B
	25212-26951 Sh.5	2B
Containment Structure Ventilation	25212-26953 Sh.1	2
Containment Monitoring System	25212-26954	2B
Post Accident Sample System	25212-26955 Sh.1	2
Emergency Diesel Generator Systems	25212-26916 Sh.1	5
	25212-26916 Sh.2	4
Emergency Generator Fuel Oil System	25212-26917 Sh.1	4

APPENDIX B

P&ID AND FIGURE LIST

The P&IDs and Figures listed below were used during the course of this review.

System	P&ID or Figure	Revision
Reactor Coolant System	25212-26902 Sh.1	2
	25212-26902 Sh.2	2
	25212-26902 Sh.3	2
Reactor Coolant Pump Seals	25212-26903	2A
Chemical & Volume Control System	25212-26904 Sh.1	5
	25212-26904 Sh.2	2A
	25212-26904 Sh.3	2A
	25212-26904 Sh.4	2A
	25212-26904 Sh.5	0A
Charging Pump Sealing and Lubrication	25212-26905 Sh.1	2A
Radioactive Liquid Drains	25212-26906 Sh.3	2
Reactor Plant Gaseous Drains	25212-26907	2
Fuel Pool Cooling and Purification System	25212-26911	2
Low Pressure Safety Injection System	25212-26912 Sh.1	2
	25212-26912 Sh.2	2
	25212-26912 Sh.3	2
High Pressure Safety Injection System	25212-26913 Sh.1	2
	25212-26913 Sh.2	2
Safety Injection Pump Cooling System	25212-26914	2A
Quench Spray and H_2 Recombiner	25212-26915	2B
Primary Grade Water System	25212-26919 Sh.1	2
Component Cooling System	25212-26921 Sh.1	2
	25212-26921 Sh.2	2
	25212-26921 Sh.3	3
Reactor Plant Chilled Water System	25212-26922 Sh.1	2B
	25212-26922 Sh.2	2A

APPENDIX C

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

APPENDIX C

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. The licensee's proposal to test the following auxiliary feedwater check valves closed during each shift by feeling the temperature of the auxiliary feedwater pumps is unacceptable because this testing method only indicates that at least one of the check valves in a particular train is closed and cannot indicate which valve is closed nor the condition of the other valves in that train. Section XI of the ASME Code provides the rules and requirements to assess operational readiness of safety related pumps and valves as discrete components. The licensee's proposed testing for these valves does not verify the reverse flow closure of any specific valve in the affected trains of auxiliary feedwater.

Valve	Function
3FWA*V3	Motor driven pump P1A discharge check valve
3FWA*V7	Motor driven pump supply to SG "A"
3FWA*V12	Motor driven pump supply to SG "D"
3FWA*V17	Motor driven pump P1B discharge check valve
3FWA*V21	Motor driven pump supply to SG "B"
3FWA*V26	Motor driven pump supply to SG "C"
3FWA*V31	Turbine driven pump discharge check valve
3FWA*V35	Turbine driven pump supply to SG "C"
3FWA*V39	Turbine driven pump supply to SG "B"
3FWA*V43	Turbine driven pump supply to SG "A"
3FWA*V47	Turbine driven pump supply to SG "D"

In their transmittal dated September 2, 1987, the licensee stated:

> Valves 3FWA-V35, 39, 43, 47, 12, 7, 21, 26, 3, 17, and 31 are not active valves in the open-to-closed position as defined in

IWV-2100. The above valves are category "C" valves as defined in IWV-2000 and need not be tested in accordance with IWV-3420. Therefore, these valves are not required to be and are not in the inservice test program in the closed position.

Outside of the program these valves are verified shut during operation rounds. Each shift the temperature of the auxiliary feed pumps are felt to ensure that there is no backflow through the pump. This does not verify that each valve in service is closed but only one valve is required to be fully closed to prevent backflow. It should be noted that 3FWA-V13, 48, 8, 44, 22, 40, 27, 36, 34, 38, 42, and 46 have been added to the program. If after the initial response to an accident the check valves do not fully shut when the associated pump is secured, then the isolation valves can be shut to secure backflow.

The reviewer agrees with the licensee that the above valves are Category "C" valves as defined in IWV-2000 and need not be tested in accordance with IWV-3420. These valves are not required to be leak rate tested in accordance with IWV-3420 because they are not Category "A" or "AC" valves. However, the reviewer does not agree with the licensee's statement that these valves are not required to be in the inservice testing program in the closed position. Those valves that perform a safety function in the closed position should be tested to that position in accordance with the requirements of IWV-3520.

These check valves are normally closed and are required to open to pass auxiliary feedwater flow in response to an accident. Since these valves are required to change position to accomplish a specific function, they are active valves as defined in IWV-2100(a) and should be exercised as active Category "C" valves in accordance with the requirements of IWV-3520. At least one of these check valves in each train performs a safety-related function in the closed position to prevent the diversion of flow through an idle auxiliary feedwater pump and to prevent vapor binding of an auxiliary feedwater pump which could be caused by leakage from the feedwater header during power operations. These valves would therefore, perform safety-related functions in both the open and the closed positions and should be exercised to both these positions in accordance with the requirements of IWV-3520. Even though these valves are closed during normal operations, they are active valves and their reverse flow closure should be verified to demonstrate their ability to perform their safety-related function in the closed position. Further, if an auxiliary feedwater pump failed or was secured during an accident, at least one check valve in that train would have to move from the open to the closed position to prevent the diversion of flow back through that pump.

It is recognized that credit can be taken for operator action during an accident, however, the NRC staff has never analyzed the use of the auxiliary feedwater pump manual isolation valves to prevent backflow through an idle pump, but instead relies on the closure of the pump discharge check valves to perform this function. Therefore, credit should not be taken for this operator action as a protective measure.

The licensee should identify the valve or valves in each of the auxiliary feedwater trains that perform the functions of preventing reverse flow through the associated auxiliary feedwater pump and preventing vapor binding of the auxiliary feedwater pump due to leakage of hot water from the feedwater header. The identified valves should have their reverse flow closure verified in accordance with IWV-3522(a) at least on a cold shutdown frequency unless relief is requested and approved by the NRC for a less frequent testing interval.

ATTACHMENT 1

EGG-NTA-7809

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
MILLSTONE NUCLEAR POWER STATION, UNIT 3

Docket No. 50-423

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Published November 1987

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Prepared for the
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Under DOE Contract No. DE-AC07-76ID01570
FIN No. A6812

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NRC FORM 335 (2 84) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE

1 REPORT NUMBER (Assigned by TIDC, add Vol No., if any)

EGG-NTA-7809

2 TITLE AND SUBTITLE

TECHNICAL EVALUATION REPORT, PUMP AND VALVE INSERVICE TESTING PROGRAM, MILLSTONE NUCLEAR POWER STATION, UNIT 3

3 LEAVE BLANK

4 DATE REPORT COMPLETED

MONTH	YEAR
November	1987

5 AUTHOR(S)

C. B. Ransom, R. S. Hartley

6 DATE REPORT ISSUED

MONTH	YEAR
November	1987

7 PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

NRR and I&E
EG&G Idaho, Inc.
P. O. Box 1625
Idaho Falls, ID, 83415

8 PROJECT/TASK/WORK UNIT NUMBER

9 FIN OR GRANT NUMBER

A6812

10 SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

Mechanical Engineering Branch
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC, 20555

11a TYPE OF REPORT

Technical Evaluation Report

b PERIOD COVERED (Inclusive dates)

12 SUPPLEMENTARY NOTES

13 ABSTRACT (200 words or less)

This EG&G Idaho, Inc. report presents the results of our evaluation of the Millstone Nuclear Power Station, Unit 3, Inservice Testing Program for pumps and valves that perform a safety-related function.

14 DOCUMENT ANALYSIS a KEYWORDS/DESCRIPTORS

b IDENTIFIERS/OPEN ENDED TERMS

15 AVAILABILITY STATEMENT

Unlimited

16 SECURITY CLASSIFICATION

(This page)
Unclassified

(This report)
Unclassified

17 NUMBER OF PAGES

18 PRICE