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TECHNICAL EVALUATION REPORT

PUMP AND VALVE INSERVICE TESTING PROGRAM
SURRY POWER STATION, UNITS 1 & 2

N. B. Stockton
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Prepared for the
U.S. NUCLEAR REGULATORY COMMISSION

EG&G Idaho

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Docket No. 50-280 & 50-281

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ABSTRACT

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

PREFACE

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

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TECHNICAL EVALUATION REPORT
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SURRY POWER STATION, UNITS 1 AND 2

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by Virginia Electric and Power Company for its Surry Power Station, Units 1 and 2.

The working session with Virginia Electric and Power Company representatives was conducted on March 29 and 30, 1988. The licensee's pump and valve IST programs, Revisions 4 and 2 for Units 1 and 2 respectively, dated September 30, 1988, were reviewed to verify compliance with proposed tests for 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. A revision for relief request P-1 for both units was submitted on February 22, 1989. The licensee provided further clarification for numerous relief requests in a letter dated January 17, 1990. Any IST program revisions subsequent to those noted above are not addressed in this technical evaluation report (TER). Any program revisions should follow the guidance of Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs".

In their IST program, the Virginia Electric and Power Company has requested relief from the ASME Code testing requirements for specific pumps and valves. These requests have been evaluated individually to determine if the criteria in 10 CFR 50.55a for granting relief has indeed been met. This review was performed utilizing the acceptance criteria of the Standard Review Plan, Section 3.9.6, the Draft Regulatory Guide and Value/Impact Statement titled, "Identification of Valves for Inclusion in Inservice Testing Programs", and Generic Letter No. 89-04, "Guidance on Developing Acceptable 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 Virginia Electric and Power Company bases for requesting relief from the Section XI requirements for the Surry Power Station 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 shutdown 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.

This TER, including all relief requests and component identification numbers, is applicable to Units 1 and 2. The first digit of the valve number is the unit designator. The Unit 2 designator has been placed in parentheses, where possible, to minimize repetition (i.e., 1(2)-RH-5).

2. SCOPE

The EG&G Idaho review of the Surry Power Station IST program for pumps and valves began in April, 1987. The programs initially examined were Revisions 3 and 1 dated March 27 and April 1, 1987 for Units 1 and 2 respectively. These revisions identified the licensee's proposed testing of safety-related pumps and valves in the plant systems listed in Appendix B.

The licensee's proposed IST program was reviewed by locating and highlighting the components on the appropriate system P&IDs and determining their function in the system. Then the licensee's proposed testing was evaluated to determine if it was in compliance with the ASME Code, Section XI, requirements. During the course of this review, questions and comments were made pertaining to unclear or potential problem areas in the licensee's IST program. These were transmitted to the licensee in the form of a request for additional information (RAI) which served as the agenda for the working meeting between the licensee, the NRC, and the EG&G reviewers.

Each pump and valve relief request was individually evaluated to determine if the licensee had clearly demonstrated compliance with the Code requirements was impractical or presented a hardship without compensating increase in safety for the identified system components, and to determine if the proposed alternate testing would provide a reasonable indication of component operability. Where the licensee's technical basis or alternate testing was insufficient, 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 reviewer's experience and knowledge, it was determined that it may not be possible or practical to make the measurements identified in the licensee's IST program, a question or comment was generated requesting clarification.

For pumps, it was verified that each of the seven inservice test quantities of Section XI, Table IWP-3100-1, were being measured or observed. For those test quantities that were 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 RAI.

The review of the proposed testing for valves verified that all appropriate ASME Code testing for each individual valve was performed as required. The proposed testing was evaluated to determine if all valves that were judged to be active Category A, B, and/or C (other than safety and relief valves) were exercised quarterly in accordance with IWV-3410 or 3520. 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 its whether is was an acceptable alternative to the Code requirements.

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

For valves with 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. For valves having a fail-safe actuator, the reviewer confirmed that the fail-safe actuator is tested in accordance with IWV-3415.

Each check valve was evaluated to determine if the proposed testing would verify its ability to perform the required safety function(s). Extensive system knowledge and experience with other similar facilities is used to determine whether the proposed tests would full-stroke exercise 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.

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

Once all of the components 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 identify any additional pumps or valves that may perform a safety function. The licensee was asked to reconcile any components identified by this process which were not included in 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.

Additionally, if the reviewers suspected a specific or a general aspect of the licensee's IST program, questions were included in the RAI to clarify those areas of doubt. Some questions were included to allow the reviewers to make conclusive statements in the RAI.

At the completion of the review, the RAI was transmitted to the licensee. These questions were later used as the agenda for the working meeting with the licensee on March 29 and 30, 1988. At the meeting, each question and comment was discussed in detail and resolved as follows:

1. The licensee agreed to make the necessary IST Program corrections or changes to satisfy the concerns of the NRC and their reviewers.

2. The licensee provided additional information or clarification about their IST Program which satisfied the concerns of the NRC and their reviewers. Therefore a program change is not required.

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

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

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

A revised IST program dated September 30, 1988 was received and compared to the previous submittal to identify any changes. A revision to Pump Relief Request P-1 was also submitted by the licensee by letter dated February 22, 1989. The licensee provided further clarification for relief requests P-12, V-5, V-30, V-37, V-38, and V-39, and withdrew relief requests V-23 and V-33, in a letter dated January 17, 1990. The changes and additions were evaluated to determine whether they were acceptable. If not, they were added to the open items that remained from the meeting.

This TER is based on information contained in the submittals, and on information obtained either in the meeting or conference calls which took place during the review process, or contained in the IST program submittals.

3. PUMP TESTING PROGRAM

The IST Program submitted by Virginia Electric and Power Company for the Surry Power Station Units 1 and 2, 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 and summarized in Appendix C. Each Virginia Electric and Power Company basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request are summarized below.

3.1 General Relief Requests

3.1.1 Bearing Temperature and Pump Vibration Measurements

3.1.1.1 Relief Request. The licensee has requested relief from the bearing temperature and vibration amplitude measurement requirements of Section XI, Paragraphs IWP-4300 and 4500, respectively. The licensee has proposed to measure pump vibration velocity per ANSI/ASME, OM-6 1988, except that a minimum reference value of 0.05 in/sec will be applied to all velocity measurements.

3.1.1.1.1 Licensee's Basis for Relief--Pump vibration and bearing temperature measurements are used to detect changes in the mechanical characteristics of a pump. Regular testing should detect developing problems, thus repairs can be initiated prior to a pump becoming inoperable. The ASME Section XI minimum standards require measurements of the vibration amplitude displacement in mils every three months and bearing temperatures once a year.

Our proposed program is based on vibration readings in velocity units rather than vibration amplitude in mils displacement. This technique is an industry accepted method which is more sensitive to small changes that are indicative of developing mechanical problems and hence more meaningful. Velocity measurements detect not only high amplitude vibrations that indicate a major mechanical problem, but also the equally harmful low amplitude high frequency vibrations due to misalignment in balance, or bearing wear that usually go undetected by simple displacement measurements.

In addition, these readings go far beyond the capabilities of a bearing temperature monitoring program. A bearing will be seriously degraded prior to the detection of increased heat at the bearing housing. Quarterly vibration velocity readings should achieve a much higher probability of detecting developing problems than the once per year reading of bearing temperatures.

Bearing temperature tests present problems which include the following:

1. Certain systems have no recirculation test loops and a limited source of water. An enforced thirty minute run time would deplete the source.

2. The lubrication fluid for some pumps is taken from the process water, which can change temperature depending on ambient conditions. Data trending for these cases is not meaningful.

Therefore, the detection of possible bearing failure by a yearly temperature measurement is extremely unlikely. The small probability of detection of a bearing failure by temperature measurement does not justify the additional pump operating time required to obtain the measurements. In addition, it is impractical to measure bearing temperatures on many pumps.

Pump vibration measurements will be taken in vibration velocity (in/sec). The evaluation of the readings will be per the attached table. The ranges of test parameters given in the attached table were taken from ANSI/ASME OM-6 1988, an American National Standard In-service Testing of Pumps.

Ranges of Test Parameters (1)

Pump Type	Pump Speed	Test Parameter	Acceptable Range	Alert Range	Required Action Range
Centrifugal and Vertical Line Shaft	<600 rpm	V_d	$2.5V_r$	$>2.5V_r$ to $6V_r$ but not >10.5 mils	$>6V_r$ but not >22 mils
	>600 rpm	V_v	$2.5V_r$	$>2.5V_r$ to $6V_r$ but not >0.325 in/sec	$>6V_r$ but not >0.70 in/sec
Reciprocating		V_d or V_v	$2.5V_r$	$>2.5V_r$ to $6V_r$	$>6V_r$

Note: (1) V_r is the vibration reference value in the selected units
V_d is vibration displacement measured peak-to-peak, unfiltered
V_v is vibration velocity measured peak, unfiltered

(2) Small values of V_r will produce small acceptable ranges for pump operation. Based on a small acceptable range, an adequately and smoothly running pump could be subject to corrective action. To avoid this situation, a minimum value for V_r of 0.05 in/sec has been established for velocity measurements. Pumps with a measured reference value below 0.05 in/sec shall have subsequent test results compared to an acceptable range based on 0.05 in/sec.

3.1.1.1.2 Evaluation--For pumps which are not equipped with bearing temperature instrumentation, the required measurements must be taken on the bearing housing or major modifications must be made to install instrumentation. Equipment modifications to install bearing temperature instrumentation would be burdensome for the licensee due to the cost involved. There are several factors that would affect the temperature measured at the bearing housing which could mask a change in the bearing condition (short of catastrophic failure) such as the temperature of the working fluid, ambient room temperature, and lubricant temperature. Further, many pumps have a limited-capacity source which makes it impractical to run the pumps long enough for bearing temperatures to stabilize.

The use of pump vibration velocity can provide a great deal of information about pump mechanical condition that could not be obtained using vibration displacement readings or by measuring the temperature of the bearing housing. Pump bearing degradation results in increased bearing noise at frequencies 10 to 100 times the rotational speed of the pump.

These high frequency bearing noises would result in relatively large changes in pump vibration velocity measurements; whereas, vibration displacement and bearing housing temperature measurements may not change significantly.

An alternative acceptable to the staff is that relief may be granted from the annual pump bearing temperature measurement requirements of the Code provided the licensee performs quarterly vibration velocity testing on the affected pumps in accordance with the guidelines of ANSI/ASME OM-6. The licensee has proposed assigning a minimum reference value of 0.05 in/sec. This value of vibration velocity, with pump speeds greater than 600 rpm, is indicative of a pump in excellent operating condition. Values of pump vibration velocity which are 2.5 times higher than this reference value is representative of a pump which is still in good operating condition. Values of vibration velocity at 2.5 to 6 times higher than this minimum reference value appear to be reasonable for establishing the alert range of operation for smoothly running pumps. This issue is being considered by the ASME O&M Working Group on Pumps. It is expected that, within two or three years, a permanent change will be made to OM-6 to address this issue. Therefore, the proposed alternative may be used for a period of three years. Before the end of this period, this relief request must either be modified to reflect the Code changes on this issue or be withdrawn.

Based on the determination that the licensee's proposed alternative would provide an acceptable level of quality and safety, interim relief may be granted for a period of three years.

3.2 Centrifugal Charging Pumps

3.2.1 Measurement of Test Quantities

3.2.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100, that inlet pressure, differential pressure, and flowrate be measured or observed for the chemical and volume control system pumps 1(2)-CH-P-1A, 1B, and 1C. The licensee has proposed to observe the volume control tank pressure and to install the instrumentation necessary to meet Code requirements during the next refueling outage.

3.2.1.1.1 Licensee's Basis for Relief--Suction pressure instrumentation is not installed nor required, therefore differential pressure can not be calculated. These pumps are capable of producing greater than 2400 psig discharge pressure, while the suction pressure is normally 20 psig. Therefore, differential pressure developed by the pump is more than 100 times the suction pressure and a gauge for suction pressure would not provide significant data. Therefore, we propose to observe volume control tank pressure using control room indication to assure repeated initial conditions for pump testing. A design change has been initiated for inlet pressure instrumentation, which will allow for the calculation of differential pressure, and flow instrumentation. The instrumentation is scheduled for installation during the next refueling outage.

3.2.1.1.2 Evaluation--The volume control tank is the normal suction source for these pumps. The static pressure at the suction of the centrifugal charging pumps will be equal to the pressure of the volume control tank plus the pressure due to the height of the tank fluid level above the pump suction. Therefore, observing the pressure of the volume control tank will assure consistent initial conditions and adequate net positive suction head for these pumps.

Differential pressure and flow are not currently measured by the licensee during pump testing because the system is not equipped with the necessary instrumentation. The measurement of these test quantities requires a design change to the system. The licensee has committed to the installation of suction pressure and flow instrumentation during the next refueling outage. Because the normal discharge pressure is over 100 times greater than the normal suction pressure, and the suction pressure is essentially constant, monitoring discharge pressure during pump testing would provide a reasonable indication of the differential pressure developed by the pump. Therefore, the evaluation of discharge pressure during pump testing would provide some indication of the hydraulic performance of these pumps and should provide reasonable assurance of operational readiness until the instrumentation necessary to comply with the Code requirements is installed at the next refueling outage. A grace period for the installation of suction pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement of differential pressure and flow rate is installed during the next refueling outage.

3.3 Boric Acid Transfer Pumps

3.3.1 Measurement of Test Quantities

3.3.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100, that inlet pressure, differential pressure, flowrate, and vibration be measured or observed for the chemical and volume control system pumps 1-CH-P-2A, 2B, 2C, and 2D. The licensee has proposed observing the boric acid storage tank level in lieu of measuring pump inlet pressure, and installing the instrumentation necessary to meet Code requirements during the next refueling outage.

3.3.1.1.1 Licensee's Basis for Relief--No instrumentation is installed for inlet pressure, differential pressure, and flow. The pumps are totally encased in insulation. Therefore, probes for vibration cannot be placed in contact with the pumps for a reading. These pumps take suction from the boric acid storage tanks. Tank level will be observed to establish initial conditions of testing, therefore, inlet pressure will not be measured. No flow rate measurement device is currently installed. A design change has been initiated for inlet pressure, flow, and vibration instrumentation. Installation of inlet pressure instrumentation will allow for the calculation of differential pressure. The instrumentation is scheduled for installation during the next refueling outage.

3.3.1.1.2 Evaluation--The boric acid storage tank is the normal suction source for these pumps. The test loop returns the fluid being pumped to the boric acid storage tank. The static pressure at the suction of the pumps will be equal to the pressure due to the height of the tank fluid level above the pump suction. Therefore, observing the level of the liquid in the volume control tank will assure consistent initial conditions and adequate net positive suction head for these pumps.

Differential pressure, flow, and vibration are not currently measured by the licensee during pump testing. The measurement of these test quantities requires a design change to the system. The licensee has committed to the design changes and instrumentation installation necessary to meet the Code requirements during the next refueling outage. The pumps take suction from, and discharge to, the same tank during pump testing. Therefore, the tank level and the pump suction pressure will remain constant and monitoring discharge pressure during pump testing would provide a reasonable indication of the differential pressure developed by the pump. The evaluation of discharge pressure during pump testing would provide some indication of the hydraulic performance of these pumps and should provide reasonable assurance of operational readiness until the instrumentation necessary to comply with the Code requirements is installed at the next refueling outage. A grace period for the installation of suction pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the design changes and instrumentation installation necessary for the measurement of differential pressure, flow rate, and vibration are completed during the next refueling outage.

3.4 Low Head Safety Injection Pumps

3.4.1 Measurement of Test Quantities

3.4.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100, that inlet pressure and differential pressure be measured or observed for the safety injection system pumps 1(2)-SI-P-1A, and 1B. The licensee has proposed monitoring the refueling water storage tank (RWST) level in lieu of measuring pump inlet pressure, and installing the instrumentation necessary to meet Code requirements during the next refueling outage.

3.4.1.1.1 Licensee's Basis for Relief--Inlet and differential pressure instrumentation are not installed. These pumps take suction from the RWST for performance testing. The tank level has a minimum requirement by Technical Specifications which will insure initial conditions for testing. A design change has been initiated for inlet pressure instrumentation, which will allow for the calculation of differential pressure. The instrumentation is scheduled for installation during the next refueling outage.

3.4.1.1.2 Evaluation--The refueling water storage tank is the suction source for these pumps during pump testing. The static pressure at the suction of the pumps will be equal to the pressure due to the height of the tank fluid level above the pump suction. Therefore, observing the level of the liquid in the volume control tank will assure consistent initial conditions and adequate net positive suction head for these pumps.

Differential pressure is not currently measured by the licensee during pump testing. The measurement of this test quantity requires a design change to the system. The licensee has committed to the installation of the instrumentation necessary to meet the Code requirements during the next refueling outage. Flow rate is measured during pump testing. The evaluation of flow rate during pump testing would provide some indication of the hydraulic performance of these pumps and should provide reasonable assurance of operational readiness until the instrumentation necessary to comply with the Code requirements is installed at the next refueling outage. A grace period for the installation of suction pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement of differential pressure is installed during the next refueling outage.

3.5 Recirculation Spray Pumps

3.5.1 Measurement of Test Quantities

3.5.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100, that inlet pressure and differential pressure be measured or observed for the outside recirculation spray system pumps 1(2)-RS-P-2A, and 2B. The licensee has proposed installing the instrumentation necessary to meet Code requirements during the next refueling outage.

3.5.1.1.1 Licensee's Basis for Relief--Suction pressure instrumentation is not installed, therefore differential pressure cannot be calculated. Suction pressure is the same for each test since the suction pressure is only the head of water in the filled pump casing. A design change has been initiated for inlet instrumentation, which will allow for the calculation of differential pressure. The instrumentation is scheduled for installation during the next refueling outage.

3.5.1.1.2 Evaluation--These pumps take suction directly from individual reservoirs. In an accident situation, these reservoirs are filled from the containment sump. During pump testing the test loop recirculates water from the reservoir. The required suction pressure for these pumps is provided by the head of the water in the filled pump casing. However, measurement of suction pressure is required for the calculation of differential pressure.

Differential pressure is not currently measured by the licensee during pump testing. The measurement of this test quantity requires a design change to the system. The licensee has committed to the installation of the necessary instrumentation during the next refueling outage. Flow rate is measured during pump testing. The evaluation of flow rate during pump testing would provide some indication of the hydraulic performance of these pumps and should provide reasonable assurance of operational readiness until the instrumentation necessary to comply with the Code requirements is installed at the next refueling outage. A grace period for the installation of suction pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement of differential pressure is installed during the next refueling outage.

3.5.2 <u>Frequency of Inservice Tests</u>

3.5.2.1 <u>Relief Request</u>. The licensee has requested relief from the quarterly testing requirements of Section XI, Paragraph IWP-3400, for the inside recirculation spray pumps 1(2)-RS-P-1A and 1B. The licensee has proposed a dry run of these pumps quarterly to verify operability and a complete flow test at a refueling outage frequency.

3.5.2.1.1 <u>Licensee's Basis for Relief</u>--These pumps are located inside containment, therefore, flow testing cannot be performed during plant operation. Flow testing of these pumps requires the installation of a temporary recirculation line and the erection of a temporary dike to contain recirculated water. Approximately five to six days are needed to set up, perform the test, and return the system to its normal configuration. Testing on a cold shutdown frequency would not allow enough time to plan for and perform a five to six day flow test. These pumps will be run dry to verify operability every quarter. Each pump is equipped with a sensor to detect pump rotation which alarms in the control room. This alarm will be observed during each pump test. Each pump is equipped with a vibration detector and a high vibration alarm in the control room. This alarm will be observed during each pump test. A flow test which includes vibration measurement will be performed every reactor refueling.

3.5.2.1.2 Evaluation--These pumps are located inside the reactor containment and are not accessible during reactor operation. To prevent spraying down the containment, a temporary recirculation line must be installed and a dike erected to contain the water needed for pump testing. The planning and performance of this testing is a lengthy evolution. Since most unplanned outages are short in duration, performing this testing at a cold shutdown frequency would be a significant burden on the licensee. Considering that performing this testing during cold shutdowns could preclude less time consuming testing for a number of other safety-related components and the infrequent occurance of cold shutdowns of long duration, the extra expense and manpower requirements would not yield a significant increase in assurance of operational readiness. A dry run quarterly to verify operability combined with flow testing to Code requirements at a refueling outage frequency would provide reasonable assurance of operational readiness.

Based on the determination that the Code requirements are impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested.

3.6 Auxiliary Feedwater Pumps

3.6.1 Measurement of Test Quantities

3.6.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100 that flow be measured or observed for the auxiliary feedwater system pumps 1(2)-FW-P-2, 3A, and 3B. The licensee has proposed installing the instrumentation necessary to meet Code requirements during the next refueling outage.

3.6.1.1.1 Licensee's Basis for Relief--Flow instrumentation is not installed. A design change has been initiated to install larger recirculation lines with flow and pressure instrumentation. Installation is scheduled for the next refueling outage.

3.6.1.1.2 Evaluation--Flow is not currently measured by the licensee during the testing of these pumps because no instrumentation is installed in the system. A design change is required to enable the licensee to comply with Code requirements. The licensee has committed to the installation of flow instrumentation during the next refueling outage. All other required parameters are measured and analyzed during quarterly pump testing. The evaluation of differential pressure during pump testing would provide some indication of the hydraulic performance of these pumps and should provide reasonable assurance of operational readiness until the instrumentation necessary to comply with the Code requirements is installed during the next refueling outage. A grace period for the installation of suction pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the lice[illegible] f Code requirements were imposed, relief may be granted provided instr[illegible]ation necessary for the measurement of flow is installed during the next refueling outage.

3.7 Residual Heat Removal Pumps

3.7.1 Frequency of Inservice Tests

3.7.1.1 Relief Request. The licensee has requested relief from the quarterly testing requirements of Section XI, Paragraph IWP-3400 for the residual heat removal (RHR) pumps 1(2)-RH-P-1A and 1B. The licensee has proposed that these pumps be tested during each cold shutdown, but not more frequently than every three months.

3.7.1.1.1 Licensee's Basis for Relief--The low pressure RHR pumps take suction from and discharge to the reactor coolant system which operates at 2235 psig. This is well above the operat'ng pressure of the RHR pumps. Therefore, testing during normal operation is not possible. These pumps will be tested each cold shutdown (but not more frequently than every three months).

3.7.1.1.2 Evaluation--Due to the plant design, the only recirculation path for pump testing requires suction from the reactor coolant system. The RHR system is a low pressure system and the motor operated suction valves cannot be opened when the reactor coolant system is at normal operating pressure. Therefore, the Code required testing cannot be accomplished during normal plant operation without a significant modifications to the RHR system, such as the addition of an instrumented test loop, which would allow full or substantial flow, and an alternate suction source for use during pump testing. These modifications would be burdensome for the licensee due to the cost involved. The licensee's proposal to test these pumps during cold shutdowns should provide reasonable assurance of operational readiness.

Based on the determination that the Code required testing is impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested.

3.8 Service Water Pumps

3.8.1 Measurement of Test Quantities

3.8.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100 that inlet pressure, differential pressure, and flow be measured or observed for the service water system pumps 1-SW-P-1A, 1B, and 1C. The licensee has proposed that discharge water be observed to impact the discharge canal in relation to a fixed reference point, that inlet pressure be calculated from the river level, and that the instrumentation necessary to meet Code requirements be installed during the next refueling outage.

3.8.1.1.1 <u>Licensee's Basis for Relief</u>--No installed inlet pressure, differential pressure, or flow instrumentation exists. A crude flow test is performed by observing where the discharge water impacts in the canal in relation to a fixed reference point. Vibration is measured. A design change has been initiated for discharge pressure and flow rate. Inlet pressure will be calculated from the river level. The instrumentation is scheduled for installation during the next refueling outage.

3.8.1.1.2 <u>Evaluation</u>--The service water system is not equipped with the instrumentation necessary for the measurement of inlet pressure, flow rate, or differential pressure. The licensee's proposal to calculate the pump inlet pressure based on the river water level meets the intent of the Code requirements provided the accuracy of this technique is within the limitations of Section XI, Table IWP-4110-1. The current flow test, while crude, does provide a relative indication of pump hydraulic performance. In combination with vibration testing, this should provide reasonable assurance of operational readiness until the instrumentation necessary to comply with the Code requirements can be installed. A design change is required to enable the licensee to comply with Code requirements for pump flow rate and differential pressure. The licensee has committed to the installation of flow and pressure instrumentation during the next refueling outage. A grace period for the installation of pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement of flow and differential pressure is installed during the next refueling outage.

3.9 Diesel Fuel Oil Pumps

3.9.1 Measurement of Test Quantities

3.9.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100 that inlet pressure, differential pressure, and flow be measured or observed for the diesel fuel oil system pumps 1-EE-P-1A, 1B, 1C, 1D, 1E, and 1F. The licensee has proposed that the pumps be tested monthly to ensure fuel oil is flowing to the day tank when the pumps are running, and that the instrumentation necessary to meet Code requirements be installed during the next refueling outage.

3.9.1.1.1 Licensee's Basis for Relief--No instrumentation is installed for inlet pressure, differential pressure, or flow rate. These pumps will be tested monthly by observing that the pumps perform their intended function (fuel oil is flowing to the day tank when the pumps are running). A design change has been initiated for inlet pressure, discharge pressure, flow rate, and vibration. The instrumentation is scheduled for installation during the next refueling outage.

3.9.1.1.2 Evaluation--Flow rate, inlet pressure, and differential pressure are not currently measured by the licensee during the testing of these pumps because the necessary instrumentation is not installed in the system. The licensee's current diesel fuel oil day tank level system is not sufficiently accurate to allow a meaningful calculation of pump flowrate. During a conference call held on November 21, 1989, and in a letter dated January 17,1990, the licensee proposed verifying that the capacity of the diesel fuel oil pumps is greater than the rate of fuel oil use by the diesels during emergency diesel generator testing. A design change is required to enable the installation of the flow and pressure instrumentation necessary for compliance with the Code requirements. The licensee has committed to the installation of flow and pressure instrumentation during the next refueling outage. A grace period for the installation of pressure and flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement of flow and differential pressure is installed during the next refueling outage.

4.0 VALVE TESTING PROGRAM

The Surry Power Station, Units 1 and 2, IST program submitted by Virginia Power and Electric Company was examined to verify that all valves that are included in the program are subjected to the periodic tests required by the ASME Code, Section XI, 1980 Edition through Winter 1980 Addenda, and the NRC positions and guidelines. The reviewers found that, except as noted in Appendix C or where specific relief from testing has been requested, these valves are tested to the Code requirements and the NRC positions and guidelines. Each Virginia Power and Electric 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 Relief Requests

4.1.1 Leak Rate Testing Reactor Coolant System Boundary Isolation Valves

4.1.1.1 Relief Request. The licensee has requested relief from the analysis of leakage rates and corrective action requirements of Section XI, Paragraphs IWV-3426 and 3427, for the Category A and A/C valves listed in Table 1. The licensee has proposed that these valves be leak rate tested in accordance with Technical Specification Section 3.1.C and 4.3, and Section XI, Subsection IWB-5000.

4.1.1.1.1 Licensee's Basis for Relief--These valves are adequately leak tested in accordance with Technical Specification Sections 3.1.C and 4.3 and ASME Section XI, Subsection IWB-5000. These valves will be leak tested in accordance with Technical Specification Sections 3.1.C and 4.3 and ASME Section XI, Subsection IWB-5000.

Article IWV-3421 states, "Category A valves shall be leak tested except that valves which function in the course of plant operation in a manner that demonstrates functionally adequate seat tightness need not be leak tested. In such cases, the valve record shall provide the basis for the conclusion that operational observations constitute satisfactory demonstration."

Table 1. Listing of Reactor Coolant System Boundary Isolation Valves

Valve	Function
1-RC-HCV-1556A, B, C 2-RC-HCV-2556A, B, C	Loop fill boundary valves
1(2)-SI-107, 109 1(2)-SI-128, 130 1(2)-SI-145, 147	Accumulator discharge check valves
1(2)-SI-88, 91 1(2)-SI-94, 238 1(2)-SI-239, 240	Combined safety injection check valves to the reactor coolant system hot legs
1(2)-SI-235, 236, 237	High head safety injection check valves to the reactor coolant system cold legs
1-RH-MOV-1700, 1701 2-RH-MOV-2700, 2701	Residual heat removal system suction from the reactor coolant system
1-RH-MOV-1720A, 1720B 2-RH-MOV-2720A, 2720B	Residual heat removal system discharge to the reactor coolant system

The intent of this relief request is not to identify valves which cannot be leak tested per Section XI, but to present valves which are part of a leakage detection system that constantly monitors the leakage integrity of the reactor coolant system (RCS) boundary and thus "demonstrates adequate seat tightness" for these valves. The RCS boundary is limited to 1 gpm of unidentified leakage and 10 gpm of identified leakage as required by Technical Specification 3.1.C.

RCS leakage is calculated every day. Several parameters are used to determine leakage including: increased charging flow required to maintain normal level in the pressurizer, increasing level in the safety injection accumulators and, increasing level in the pressurizer relief tank.

4.1.1.1.2 Evaluation--These valves are reactor coolant system boundary isolation valves. Most of these valves interface with low pressure systems, or systems of which portions are low pressure (i.e. - safety injection accumulators, residual heat removal, safety injection system pump suction piping). The failure of these valves could result in a loss of coolant accident. The licensee has classified these valves as reactor coolant leakage (RCL) valves and, as such, proposed testing these valves in accordance with Technical Specifications 3.1.C and 4.3 and Section XI, Subsection IWB-5000. The test connections necessary to individually leak rate test these valves are not installed in the system. The licensee has stated that Technical Specification requirements and the requirements of Subsection IWB-5000 demonstrate adequate seat tightness for these valves. However, since most of these valves are paired in series, the licensee's proposed testing would not demonstrate the leak tightness of each valve as required by the Code. The leak tight integrity of the second valve in the pair cannot be verified unless the first valve has failed or is leaking significantly, therefore, the proposed testing verifies only the leak tight integrity of each pair of valves. Although the Technical Specification requirements mentioned by the licensee do not verify the leak tight integrity of individual valves as required by the Code, system hydrostatic tests and monitoring the total RCS leakage does provide assurance of the leak tight integrity of the valve pairs at the RCS boundary.

The licensee's proposed testing combined with the Technical Specification corrective action requirements for excessive leakage would provide some assurance of leak tight integrity. On this basis, the licensee may continue to monitor leakage and perform leak testing in accordance with their plant Technical Specifications until the NRR Inter-System Loss of Coolant Accident (ISLOCA) study is completed, and the results analyzed, to determine if further testing should be required.

4.1.2 Relief Valve Testing

4.1.2.1 Relief Request. The licensee has requested relief from test procedure requirements of Section XI, Paragraph IWV-3512, for the safety and relief valves listed in Table 2. The licensee has proposed that the main steam safety valves be tested in accordance with PTC-25.3-1976, Section 4.091(a)(2), and that all other safety and relief valves be tested in accordance with Section 4.091(c)(1).

4.1.2.1.1 Licensee's Basis for Relief--These valves will be tested in accordance with PTC-25.3-1976 Sections 4.091(a)(2) and 4.091(c)(1). The main steam safety valves will be tested in accordance with PTC-25.3-1976, Section 4.091(a)(2). All other safety and relief valves will be tested in accordance with Section 4.091(c)(1).

4.1.2.1.2 Evaluation--Section XI, Paragraph IWV-3512, states that safety and relief valve set points shall be tested in accordance with ASME PTC 25.3-1976, "Safety and Relief Valve Performance Test Codes". PTC-25.3-1976, Section 4.091(a)(2) is the test method for system testing to determine set pressure with calibrated hydraulic or pneumatic-assist equipment. PTC-25.3-1976, Section 4.091(c)(1) is the test method for bench testing to determine set pressure and valve leakage. Paragraph IWV-3512 further states that bench testing, or testing in place, with suitable hydraulic or pneumatic assist equipment is an acceptable method under PTC 25.3-1976. Since the licensee's proposed testing is specifically mentioned as being acceptable in the Code, relief is not required.

Table 2. Listing of Relief Valves

Valve	Function
1-MS-SV-101A, B, C 2-MS-SV-201A, B, C 1-MS-SV-102A, B, C 2-MS-SV-202A, B, C 1-MS-SV-103A, B, C 2-MS-SV-203A, B, C 1-MS-SV-104A, B, C 2-MS-SV-204A, B, C 1-MS-SV-105A, B, C 2-MS-SV-205A, B, C	Main steam safety valves
1-CC-RV-111A, B	Component cooling to fuel pit cooler relief valves
1-CC-RV-116A, B, C 2-CC-RV-216A, B, C	Reactor coolant pump thermal barrier relief valves
1-CC-RV-118 2-CC-RV-218	Component cooling from excess letdown heat exchanger relief valves
1-CC-RV-119A, B 2-CC-RV-219A, B	Component cooling from residual heat removal heat exchanger relief valves
1-CC-RV-122	Component cooling to surge tank relief valve
1-CC-RV-123	Component cooling to surge tank vacuum relief valve
1-CC-RV-124 2-CC-RV-224	Component cooling piping relief valves
1-RH-RV-1721 2-RH-RV-2721	Residual heat removal system relief valves
1-RC-SV-1551A, B, C 2-RC-SV-2551A, B, C	Pressurizer safety valves
1-CH-RV-1203 2-CH-RV-2203	Volume control tank relief valves
1-CH-RV-1209 2-CH-RV-2209	Reactor coolant system letdown relief valves
1-CH-RV-1382A, B 2-CH-RV-2382A, B	Seal water return line relief valves
1-AS-RV-1322	Batching tank heating jacket relief valve
1-SI-RV-1845A, B, C 2-SI-RV-2845A, B, C	Low head safety injection relief valves

Table 2. (Continued)

Valve	Function
1-SI-RV-1858A, B, C 2-SI-RV-2858A, B, C	Accumulator relief valves
1-SI-RV-1859 2-SI-RV-2859	Accumulator return to the refueling water storage tank relief valves
1-GW-RV-107	Gas line to waste gas surge drain relief valve

4.1.3 Rapid-Acting Valves

4.1.3.1 Relief Request. The licensee has requested relief from the trending requirements of Section XI, Paragraph IWV-3417(a), for the valves listed in Table 3. The licensee has proposed that the corrective actions of IWV-3417(b) be applied whenever the stroke time of these valves exceeds 2 seconds.

4.1.3.1.1 Licensee's Basis for Relief--These valves have a normal stroke time of 2 seconds or less, and they are rapid-acting valves. Whenever the stroke time of these valves exceeds 2 seconds, IWV-3417(b) will be applied.

4.1.3.1.2 Evaluation--The values of stroke time for fast acting valves can be greatly affected by operator response, and therefore, may not be indicative of valve performance. A staff approved alternative to the Code requirements is that relief from Section XI, Paragraph IWV-3417(a), may be granted for fast acting valves (those valves whose normal stroke time is 2 seconds or less) provided: a) those valves designated in the IST program as fast acting valves are assigned a maximum limiting stroke time of 2 seconds, and b) when the limiting value of 2 seconds is exceeded, corrective action shall be initiated per Section XI, Paragraph IWV-3417(b).

Imposing the Code required testing could cause unnecessary maintenance on valves which are not degraded which would be burdensome for the licensee.

Based on the determination that the Code required testing is impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested.

4.1.4 Group Leak Rate Testing of Containment Isolation Valves

4.1.4.1 Relief Request. The licensee has requested relief from the analysis of leakage rate requirements of Section XI, Paragraph IWV-3426, for the containment isolation valves listed in Table 4. The licensee has

Table 3. Listing of Rapid Acting Valves

Valve	Function
1-MS-TV-110 2-MS-TV-210	Main steam drain to blowdown valve
1-CC-TV-107 2-CC-TV-207	Component cooling isolation from the reactor coolant pumps
1-SS-TV-103 A, B 2-SS-TV-203 A, B	Residual heat removal system sample valves
1-SS-TV-100 A, B 2-SS-TV-200 A, B	Pressurizer liquid space sample valves
1-SS-TV-101 A, B 2-SS-TV-201 A, B	Pressurizer vapor space sample valves
1-SS-TV-102 A, B 2-SS-TV-202 A, B	Primary coolant hot leg sample valves
1-SS-TV-104 A, B 2-SS-TV-204 A, B	Pressurizer relief tank gas sample valves
1-SS-TV-106 A, B 2-SS-TV-206 A, B	Primary coolant hot leg sample valves
1-DA-TV-100 A, B 2-DA-TV-200 A, B	Reactor containment sump pump discharge isolations
1-DA-TV-103 A, B 2-DA-TV-203 A, B	Post accident sample return line isolations
1-VG-TV-109 A, B 2-VG-TV-209 A, B	Gas vent header isolations
1-LM-TV-100 A-H 2-LM-TV-200 A-H	Leakage monitoring system isolations
1-CV-TV-150 A-D 2-CV-TV-250 A-D	Containment vacuum pump suction isolations
1-RC-PCV-1456 2-RC-PCV-2456	Pressurizer power operated relief valve
1-RC-PCV-1455C 2-RC-PCV-2455C	Pressurizer power operated relief valve
1-RC-SOV-100A-1, 2 2-RC-SOV-200A-1, 2 1-RC-SOV-100B-1, 2 2-RC-SOV-200B-1, 2	Reactor vessel head vents

Table 3. (Continued)

Valve	Function
1-RC-SOV-101A-1, 2 2-RC-SOV-201A-1, 2 1-RC-SOV-101B-1, 2 2-RC-SOV-201B-1, 2	Pressurizer head vents
1-CH-TV-1204 2-CH-TV-2204	Reactor coolant system letdown isolation trip valve
1-GW-TV-100-107 2-GW-TV-200-207	Suction/discharge line valves to the hydrogen analyzer
1-GW-TV-111 A, B 2-GW-TV-211 A, B	Containment grab sample valves
1-BD-TV-100 A-F 2-BD-TV-200 A-F	Steam generator blowdown isolations
1-RM-TV-100 A, B, C 2-RM-TV-200 A, B, C	Radiation monitor return line isolations

proposed that containment isolation valves which cannot be tested individually be tested in groups, with leakage limits assigned to the group which are subject to the acceptance criteria of IWV-3426 and 3427.

4.1.4.1.1 Licensee's Basis for Relief--The piping configurations for some containment penetrations do not allow for the individual leakage testing of the containment isolation valves which isolate the penetrations. In cases where containment isolation valves cannot be individually leakage tested, the containment isolation valves are grouped based on the configuration restraints and the groups are assigned permissible leakages. The valve groups are subject to the acceptance criteria described in IWV-3426 and 3427.

The group leakage criteria are determined by summing the valve diameters in the group and multiplying the sum by 0.32 SCFH which corresponds to the guideline criterion of 7.5 SCFD per inch of valve diameter given in IWV-3426. Based on this method, the ratios of the smallest valve to the sum of the valve diameters for cases where the valve diameters differ are given below.

Valve	Valve Diameter	Ratio of Smallest Valve Diameter to Sum of Valve Diameters
1-SI-150	1"	
1-SI-MOV-1867C	3"	0.14
1-SI-MOV-1867D	3"	
1-SI-174	1"	0.25
1-SI-MOV-1869A	3"	
1-VS-MOV-101	8"	
1-VS-MOV-100C	36"	0.10
1-VS-MOV-100D	36"	

The ratios given above establish that the smallest diameter valve in a given group provides a significant contribution to the group leakage. We

Table 4. Listing of Containment Isolation Valves.

Valve	Function
1(2)-SI-150 1-MOV-1867C, D 2-MOV-2867C, D	Boron injection tank isolations
1(2)-SI-174 1-MOV-1869A 2-MOV-2869A	High head safety injection to the reactor coolant system isolations
1-SI-MOV-1860A, B 2-SI-MOV-2860A, B	Low head safety injection pump suction isolations from the containment sump
1-CH-HCV-1200A, B, C 2-CH-HCV-2200A, B, C	Letdown orifice isolations
1-IA-466 2-IA-704	Backup instrument air containment isolations
1-IA-TV-100 2-IA-TV-200	Instrument air containment isolations
1-LM-TV-100A, C, E, G 2-LM-TV-200A, C, E, G 1-LM-TV-100B, D, F, H 2-LM-TV-200B, D, F, H	Leakage monitoring system isolations
1-CS-MOV-101A, B, C, D 2-CS-MOV-201A, B, C, D	Containment spray pump discharge isolations
1-RS-MOV-155A, B 2-RS-MOV-255A, B	Recirculation spray pump suction isolations from the containment sump
1-VS-MOV-100C, D 1-VS-MOV-101 2-VS-MOV-200C, D 2-VS-MOV-201	Containment purge exhaust isolations
1-VS-MOV-100A, B 1-VS-MOV-102 2-VS-MOV-200A, B 2-VS-MOV-202	Containment purge supply isolations
1(2)-RL-3, 5	Reactor cavity purification return line isolations

believe that these ratios pro.ide reasonable assurance that no valve will be returned to service with excessive leakage. The leak test procedure also has an administrative leak limit which is based on 0.16 SCFH per inch of valve diameter. If the leakage exceeds this limit, the valves will be reworked at the discretion of the Type C test coordinator.

4.1.4.1.2 Evaluation--It is not practicable to individually leak test these valves because of the system design and lack of appropriate test taps. The only practical method of verifying the leak-tight integrity of these valves is to leak rate test the identified valves in groups. For situations where there are multiple containment isolation valves branching from a common header, ascribing all leakage through the penetration to one valve could cause the performance of baseless maintenance on operable valves.

These valves could only be individually leak rate tested after significant redesign of the systems involved. These modifications would be burdensome for the licensee due to the cost involved. Further, modifications to enable individual leak rate testing, such as piping reconfiguration or the addition of isolation valves, could result in a reduction of safety system reliability and plant safety.

The licensee has stated that maximum leakage rates will be assigned to each valve group and if the measured leakage exceeds the assigned group limit, corrective actions will be taken as required by Paragraph IWV-3427. This test method should provide reasonable assurance of the leak-tight integrity of these valves as long as the assigned limiting leakage rate for each valve grouping is conservative considering the number and sizes of valves in the group. The assigned maximum group leakage rates should be based on the smallest valve in the group so that corrective actions are taken whenever the leak-tight integrity of any valve of that group is in question.

The licensee's proposed method of determining maximum leakage rates for valves tested in groups, summing valve diameters in each group and assigning a maximum penetration leakage rate equal to 7.5 SCFD per inch of total valve diameter, does not appear to be conservative. Using this methodology, individual valve leakage rates could be many times the leakage limit which would be appropriate for that valve, based on IWV-3426(b), before corrective action is required. In some valve groups, leakage through the smallest valve could be a factor of 10 greater than the individual valve leakage limit of IWV-3426(b) before corrective action is required. Significant degradation of the smallest valve could go undetected in a group of otherwise leak tight valves. The licensee should reevaluate this criteria in the light of the service history of these valve groups. The criteria established for these groups should ensure that no valve will become seriously degraded before corrective action is required.

Based on the determination that it is impractical to individually leak rate test the listed valves, that it would be burdensome to require the licensee to comply with the Code requirements, relief may be granted provided the licensee reevaluates the group leakage limits based on the diameter of the smallest valve in each group as discussed above.

4.2 Feedwater System

4.2.1 Category C Valves

4.2.1.1 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the main feedwater containment isolation check valves 1(2)-FW-10, 41, and 72. The licensee has proposed that these valves be demonstrated operable by disassembly, on a sampling basis, at a refueling outage frequency.

4.2.1.1.1 Licensee's Basis for Relief--Closure of these valves during power operation would require securing feedwater which would result in a reactor trip. Cold shutdown testing of valves using flow to verify closure is inconclusive due to the low differential pressure across the valve disk. A test was conducted in an effort to verify whether closure of these valves can be determined using flow. Because there is no isolation boundary between the steam generators and the valves, the test volume must include the steam generators. A steam generator was pressurized with a nitrogen blanket to approximately 5 psig. The 0.75 inch drain valve just upstream of the check valve was opened and flow was observed. The 14 inch check valve did not stop the back flow through the vent. It was concluded that the flow was inadequate to seat the check valve completely. Just a small gap between the disk and the seat was sufficient to create a flow area equal to or greater than the flow area through the drain. Therefore, the pressure differential associated with the back flow is being created across the drain valve and not the disk of the check valve.

This test proved to be inconclusive because of the inability to establish a sufficient differential pressure across the disk. The only way to increase the differential pressure is to increase the flow area from the test volume. However, this is not achievable for the existing configuration. Immediately upstream of the drain valve is another 14 inch check valve, so the only available flow area from the test volume is the drain valve.

These valves will be grouped together and one valve from this group will be disassembled every refueling. A different valve will be disassembled every reactor refueling.

4.2.1.1.2 Evaluation--The closure of these check valves would require securing feedwater flow to the steam generators. This cannot be done during power operation because it would cause a reactor trip. Using reverse flow or the head of a pressurized steam generator to verify closure capability could only be done during cold shutdowns and refueling outages. However, the licensee concluded that the drain valves are too small for the differential pressure across the check valves to be sufficient to fully seat the valves. Therefore, these methods of testing are inconclusive.

The Code required testing could only be performed if modifications were made to the system, such as the installation of significantly larger drain valves. These modifications would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee follows the NRC staff guidance on disassembly and inspection in Generic Letter No. 89-04.

4.2.1.2 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following auxiliary feedwater pump recirculation line and oil cooler check valves. The licensee has proposed that these valves be demonstrated operable by disassembly, on a sampling basis, at a refueling outage frequency.

1(2)-FW-144	1(2)-FW-148	1(2)-FW-159
1(2)-FW-163	1(2)-FW-174	1(2)-FW-178

4.2.1.2.1 Licensee's Basis for Relief--These check valves cannot be full flow tested because instrumentation is not installed to measure flow or differential pressure. These valves cannot be partially flow tested during normal operation because the auxiliary feedwater system must be isolated to perform the test. These valves will be grouped together and one valve from this group will be disassembled and inspected every reactor refueling. A different valve will be disassembled every reactor refueling. These valves will be partial flow tested every cold shutdown. Valves 1(2)-FW-144, 159, and 174 will be verified closed every cold shutdown.

4.2.1.2.2 Evaluation--The instrumentation necessary to verify a full-stroke of these check valves with flow is not installed in the auxiliary feedwater pump recirculation and oil cooler lines. The testing connections necessary to verify valve closure are not installed in the system.

Full-stroke exercising these check valves with flow could only be performed if flow rate instrumentation were installed in these lines. These modifications would be burdensome for the licensee due to the cost involved.

The NRC staff position is that valve disassembly and inspection can be used to verify the full-stroke capability of check valves when full-stroke exercising with flow is impractical. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic

Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs."

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee conforms to the NRC staff positions on disassembly and inspection.

4.3 Chemical and Volume Control System

4.3.1 Category C Valves

4.3.1.1 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the charging pump discharge check valves 1(2)-CH-258, 267, and 276. The licensee has proposed that these valves be part-stroked quarterly and full flow tested each refueling.

4.3.1.1.1 Licensee's Basis for Relief--With the present plant design, these valves can only be partial stroke exercised during power operation and the charging pumps cannot achieve design accident flow when pumping into the reactor coolant system at operating pressure. The only available flow path to test these valves is into the reactor coolant system. During cold shutdown, stroke exercising these valves could result in an overpressurization of the reactor coolant system and could force a safety system to function. These valves will be partially stroked every three months and full flow tested each refueling.

4.3.1.1.2 Evaluation--The demonstration of a full-stroke with flow requires the passage of the maximum required accident flow through these valves. The only full flow path through these valves is into the reactor coolant system. However, the charging pumps do not develop sufficient head to pass the required amount of flow into the reactor coolant system when the plant is at normal operating pressure. The performance of this testing during cold shutdowns could cause a low temperature overpressurization of the reactor coolant system.

These valves could be full-stroke exercised with flow at the Code required frequency only after system modifications, such as addition of a full flow test loop. This modification would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code required testing is impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested.

4.3.1.2 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the charging pump discharge recirculation line check valves 1(2)-CH-256, 265, and 274. The licensee has proposed that these valves be disassembled and inspected on a sampling basis at a refueling outage frequency, and part-stroke exercised quarterly.

4.3.1.2.1 Licensee's Basis for Relief--These check valves cannot be full flow tested because instrumentation is not installed to measure flow or differential pressure. These valves will be grouped together and one valve from this group will be disassembled and inspected every reactor refueling. A different valve will be disassembled every reactor refueling. These valves will be partial flow tested every three months.

4.3.1.2.2 Evaluation--The instrumentation necessary to verify a full-stroke of these check valves with flow is not installed in the charging pump recirculation lines. Installation of flow rate instrumentation to verify a full-stroke of these check valves would be burdensome for the licensee due to the cost involved.

The NRC staff position is that valve disassembly and inspection can be used to verify the full-stroke capability of check valves when full-stroke exercising with flow is impractical. The NRC staff positions regarding disassembly and inspection are explained in detail in Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs."

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee conforms to the NRC staff positions on disassembly and inspection.

4.4 Safety Injection System

4.4.1 Category A/C Valves

4.4.1.1 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following safety injection system accumulator discharge check valves. The licensee has proposed that one discharge line check valve be flow tested every refueling outage with a different valve tested every reactor refueling.

1(2)-SI-107	1(2)-SI-109	1(2)-SI-128
1(2)-SI-130	1(2)-SI-145	1(2)-SI-147

4.4.1.1.1 Licensee's Basis for Relief--These valves cannot be part- or full-stroke tested during normal operation because the accumulator pressure (600 to 650 psig) is below reactor coolant system (RCS) pressure and the injection of borated water would upset the reactor coolant chemistry. During cold shutdown, the RCS pressure still prevents full flow testing.

One accumulator discharge line will be full flow tested every reactor refueling. During every reactor refueling, a different line will be tested. The full flow test will consist of discharging the accumulator from an initial pressure of 100 to 150 psig into a vented reactor coolant system. The time to depressurize from the initial conditions, which will be held constant for each test, to a final pressure and accumulator level will be compared to a reference discharge time. If test results show an increase in the discharge time greater than the specified limiting discharge time, corrective action will be initiated immediately and the other two accumulator lines will be tested. Analysis has shown that a reduced pressure test will provide full flow conditions in the check valves. Also, the rate of accumulator discharge is directly dependent on the total system resistance, which would increase if the check valve disks failed to move to the full open position. These valves are confirmed closed by monitoring seat leakage from each valve. The leakage is collected in a common header, measured, and compared to the criteria in Technical Specification 3.1.C.

4.4.1.1.2 Evaluation--These valves cannot be part- or full-stroke exercised to the open position quarterly because the head of the safety injection accumulators is insufficient to open these valves against reactor coolant system pressure. Full or substantial flow testing of these check valves requires that the reactor coolant system be depressurized and vented. In order to perform this testing during cold shutdown, the reactor coolant pumps and the residual heat removal system must be secured and the pressurizer cooled down. The residual heat removal system is required to be in operation to remove decay heat from the reactor core. Reactor coolant system chemistry would have to be reestablished within specifications and the reactor coolant pumps must be vented to remove non-condensable gases. Performance of the Code required testing during cold shutdowns could result in a significant delay in the return to power which would be burdensome for the licensee due to the cost involved.

The licensee has proposed that only one set of check valves be tested every refueling and that a different set of check valves be tested each refueling. This would allow the testing of each check valve no more than once every three refueling outages unless failure of one valve occurs during this time period. The licensee has neither demonstrated that this testing frequency would provide reasonable assurance of operational readiness nor that it would be burdensome to test all three sets of check valves each refueling outage.

During a conference call with the licensee held on November 21, 1989, the licensee stated that they have not developed definitive acceptance criteria for their proposed testing. The licensee is currently working to demonstrate that the proposed testing is capable of detecting valve degradation, that the results of this test can be extrapolated to demonstrate a valve's ability to pass design basis flow, and that the acceptance criteria to be adopted would provide reasonable assurance of valve operational readiness. Prior to the start of the next refueling outage, the licensee should demonstrate that their proposed testing would provide reasonable assurance of operational readiness or adopt another alternative which meets the criteria of Generic Letter No. 89-04, Position 1 or Position 2.

4.4.1.2 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following safety injection and high head safety injection line check valves. The licensee has proposed that these valves be full-stroke exercised open during refueling outages when the reactor vessel head is removed and verified closed by leak testing in accordance with Technical Specifications.

Valve	Function
1(2)-SI-88, 91, 94, 238, 239, 240	Combined safety injection isolation check valves to the RCS hot legs
1(2)-SI-235, 236, 237	High head safety injection isolation check valves to the RCS cold legs
1(2)-SI-241, 242, 243	Low head safety injection isolation check valves to the RCS cold legs
1(2)-SI-79, 82, 85	Combined safety injection isolation check valves to the RCS cold legs

4.4.1.2.1 Licensee's Basis for Relief--The valves on the high head injection lines cannot be part- or full-stroke exercised during power operation because flow through these valves would thermal shock the injection system and cause unnecessary plant transients. Flow cannot be established in the low head injection lines during power operation. During cold shutdown, the reactor coolant system pressure still prevents full design flow. Also, a part- or full-stroke test could cause an overpressurization of the reactor coolant system and force a safety system to function. To verify closure, valves 1(2)-SI-79, 82, 85, 241, 242, and 243 must be vented upstream and a leakage test performed. Per Technical Specification Table 4.1-2A, periodic leakage testing on each valve shall be accomplished prior to entering power operation condition after every time the plant is placed in the cold shutdown condition for 72 hours if testing has not been accomplished in the preceding 9 months. No significant increase in safety will be realized by performing the leakage tests every cold shutdown. These valves are full-stroke exercised during refueling outages when the vessel head is removed. Valves 1(2)-SI-79, 82, 85, 241, 242, and 243 will be tested to the closed position per Technical Specification Table 4.1-2A. Valves 1(2)-SI-88, 91, 94, 235, 236, 237, 238, 239, and 240 are confirmed closed by monitoring leakage from the reactor coolant system per Technical Specifications 3.1.C and 4.3. Individual valve verification to the closed position is not possible with the current line configurations.

4.4.1.2.2 Evaluation--The demonstration of a full-stroke to the open position with flow requires the passage of the maximum required accident flow through these valves. The only flow path for exercising these valves to the open position with flow bypasses the regenerative heat exchanger and would inject cold water into the RCS. During reactor operation this would cause pressure, temperature, and reactivity transients as well as thermal shock to the safety injection nozzles. Further, the safety injection pumps do not develop sufficient head to overcome reactor coolant system pressure during normal operation. During cold shutdowns, exercising these valves with flow could cause a low temperature overpressurization of the RCS. It is, therefore, impractical to exercise these valves to the open position with flow quarterly or during cold shutdowns.

Valves 1(2)-SI-79, 82, 85, 241, 242, and 243 are simple check valves that do not have position indication. The only practicable way of verifying valve closure is by leak testing. These valves are identified as pressure boundary isolation valves in the plant Technical Specifications and are leak rate tested during cold shutdowns which are 72 hours or greater in length if testing has not been performed in the preceding 9 months. It would be impractical to leak test these valves more frequently than this because leak rate testing would render the safety injection system inoperable. Further, these valves are located inside the reactor containment and are inaccessible during reactor operation. The increase in closure verification frequency for these valves from the current Technical Specification frequency to every cold shutdown would not provide a sufficient increase in assurance of operational readiness to justify the increased burden.

Valves 1(2)-SI-88, 91, 94, 235, 236, 237, 238, 239, and 240 form the RCS boundary with low pressure systems, or systems of which portions are low pressure. However, these valves are not identified as PIVs in the plant Technical Specifications. The only feasible method for verifying these valves in the closed position is leak rate testing. However, there are no test connections installed in the system to enable leak rate testing of these valves. Even if test connections were installed, it would be impractical to test these valves quarterly since the valves are located inside containment and are inaccessible during reactor operation. Further, leak rate testing during cold shutdowns would require a significant amount of time for test equipment setup, test performance, and test equipment removal and could result in a delay in the return to power. This would be burdensome for the licensee due to the costs involved. The licensee's proposal for leak rate testing these valves is discussed in Section 4.1.1.1 of this report.

Based on the determination that it is impractical to full-stroke exercise these valves to the open position quarterly or during cold shutdowns, that the proposed testing provides reasonable assurance of the ability of these valves to perform their safety function in the open position, and considering the burden on the licensee if Code requirements were imposed, relief may be granted, from the Code exercising requirements for all valves to the open position.

Based on the determination that it is impractical to leak rate test these valves quarterly, and that it would be burdensome to perform this testing during cold shutdowns, relief may be granted from the Code exercising requirements for valves 1(2)-SI-79, 82, 85, 241, 242, and 243 to the closed position provided they are individually leak rate tested. Interim approval of the licensee's proposed alternative for verifying the closure capability of valves 1(2)-SI-88, 91, 94, 235, 236, 237, 238, 239, and 240 for the leak rate testing requirements of Section XI, IWV-3420, is discussed in Section 4.1.1.1 of this report.

4.4.2 Category C Valves

4.4.2.1 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following safety injection and high head safety injection line check valves. The licensee has proposed that these valves be full-stroke exercised during refueling outages when the reactor vessel head is removed.

1(2)-SI-224	1(2)-SI-225	1(2)-SI-226
1(2)-SI-227	1(2)-SI-228	1(2)-SI-229

4.4.2.1.1 Licensee's Basis for Relief--The valves on the high head injection lines cannot be part- or full-stroke exercised during power operation because flow through these valves would thermal shock the injection system and cause unnecessary plant transients. Flow cannot be established in the low head injection lines during power operation. During cold shutdown, the reactor coolant system pressure still prevents full design flow. Also, a part- or full-stroke test could cause an overpressurization of the reactor coolant system and force a safety system to function. These valves are full-stroke exercised during refueling outages when the vessel head is removed.

4.4.2.1.2 Evaluation--The demonstration of a full-stroke to the open position with flow requires the passage of the maximum required accident flow through these valves. The only flow path for exercising these valves to the open position with flow bypasses the regenerative heat exchanger and would inject cold water into the RCS. During reactor operation, this would cause pressure, temperature, and reactivity transients as well as thermal shock to reactor coolant and safety injection system components. Further, the safety injection pumps do not develop sufficient head to overcome reactor coolant system pressure during normal operation. Exercising these valves to the open position during cold shutdowns could cause a low temperature overpressurization of the RCS. Therefore, it would be impractical to full-stroke exercise these valves to the open position quarterly or during cold shutdowns. Testing at the Code required frequency could only be achieved after significant system modifications, such as the addition of a full flow test loop, which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code required testing is impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested.

4.4.2.2 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the low head safety injection pump suction check valves from the containment sump, 1(2)-SI-56 and 47. The licensee has proposed that these valves be disassembled and inspected on a sampling basis at a refueling outage frequency.

4.4.2.2.1 Licensee's Basis for Relief--To partial or full flow test these valves requires taking suction from the reactor containment sump which contains untreated water. This water should not be introduced into the system. These valves will be grouped together and one valve from this group will be disassembled and inspected every reactor refueling. A different valve will be disassembled every reactor refueling.

4.4.2.2.2 Evaluation--Full- or part-stroke exercising these valves with flow would cause the addition of non-reactor grade containment sump water into the reactor coolant system, the safety injection system, and the refueling water storage tank. This would cause a loss of chemistry control which could result in increased corrosion rates, increased radiation levels, and reduced plant reliability. The Code required testing could only be performed after significant system modifications, such as the addition of a full flow test loop, which would be burdensome for the licensee due to the cost involved.

The NRC staff position is that valve disassembly and inspection can be used to verify the full-stroke capability of check valves when full-stroke exercising with flow is impractical. The NRC staff positions regarding disassembly and inspection are explained in detail in Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs."

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee conforms to the NRC staff positions on disassembly and inspection.

4.4.2.3 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the low head safety injection pump suction check valves from the refueling water storage tank, 1(2)-SI-46A and 46B, and the low head safety injection pump discharge check valves, 1(2)-SI-50, 1-SI-58, and 2-SI-327. The licensee has proposed that these valves be part-stroke exercised quarterly, and full-stroke exercised at a refueling outage frequency.

4.4.2.3.1 Licensee's Basis for Relief--These valves cannot be full stroke exercised during plant operation. The only full flow path is into the reactor coolant system (RCS) and low head safety injection pumps cannot overcome RCS operating pressure. These valves will be partially stroked every three months through the pump recirculation line. During cold shutdown, the RCS pressure still prevents full flow testing of the check valves. During cold shutdown, the charging flow could cause an overpressurization condition.

Testing valves 1(2)-SI-50, 1-SI-58, and 2-SI-327 to the closed position requires isolating the suction lines to the low head safety injection pumps. This test places the unit into a Limiting Condition for Operation (LCO) per Technical Specification 3.3 if performed during normal operation.

These valves will be partially stroked every three months and full-stroked every refueling. Valves 1(2)-SI-50, 1-SI-58, and 2-SI-327 will be tested to the closed position every cold shutdown.

4.4.2.3.2 Evaluation--The demonstration of a full-stroke to the open position with flow requires the passage of the maximum required safety injection system accident flow rate through these valves. The only full flow path for the safety injection system is into the reactor coolant system. The low head safety injection pumps cannot develop sufficient head to overcome reactor coolant system pressure during normal operation. During cold shutdown, reactor coolant system pressure prevents the centrifugal low head safety injection pumps from achieving the required flowrate. Further, the discharge head of these pumps is high enough that performance of this testing during cold shutdown could result in a low temperature overpressurization of the reactor coolant system.

Based on the determination that the Code required testing is impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted to exercise these valves to open position at a refueling outage frequency.

4.5 Refueling Water Storage Tank Crosstie System

4.5.1 Category C Valves

4.5.1.1 Relief Request. The licensee has requested relief from the quarterly check valve exercising requirements of Section XI, Paragraph IWV-3521, for the charging pump suction check valves from the refueling water cross tie, 1(2)-SI-25, 1-SI-410, and 2-SI-400. The licensee has proposed that these valves be part-stroke exercised open at a cold shutdown frequency and full-stroke exercised open at a refueling outage frequency also, that valve 1(2)-SI-25 be exempted from exercising to the closed position.

4.5.1.1.1 Licensee's Basis for Relief--Exercising these valves during power operation would require the charging pump suctions to be aligned with the refueling water storage tank (RWST). This would cause a sudden increase in reactor coolant boron inventory. Full flow for the charging system can only be established during reactor refueling when the reactor coolant system (RCS) is depressurized. Valve 1(2)-SI-25 cannot be adequately tested to the closed position because the current configuration would require draining at least one RWST and possibly the other RWST. If the valve did not backseat, the other RWST would drain. This test would place the unit into a Limiting Condition for Operation (LCO) per Technical Specification 3.4. The valve cannot be disassembled because both RWSTs would have to be drained. These valves will be partial flow tested during every cold shutdown and full flow tested during every reactor refueling.

4.5.1.1.2 Evaluation--The demonstration of a full-stroke to the open position with flow requires the passage of the maximum required safety analysis flow rate through these valves. The only full flow path for this test is into the reactor coolant system. The high flow rate required cannot be achieved during reactor operation without causing pressure and reactivity transients which could cause a reactor trip. The discharge head of these pumps is high enough that performance of this testing during cold shutdown could result in a low temperature overpressurization of the reactor coolant system. This testing could only be performed at the Code required frequency after significant system modifications, such as the addition of a full-flow test loop, which would be burdensome for the licensee due to the cost involved.

Valve 1(2)-SI-25 has a safety function in the closed position to prevent diversion of flow when the other RWST is used as a source for the high head safety injection pumps. The licensee has proposed that testing which demonstrates the valves' closure capability not be performed. This is unacceptable. The licensee has not provided sufficient technical justification for their claim that performance of this testing would require draining one or both RWSTs. Further, the licensee has not explained why valves shown in P&IDs supplied by the licensee (1(2)-SI-24, 26, TV-102A, B, and 1(2)-CS-25) cannot be shut to enable testing without draining one or both refueling water storage tanks.

Based on the determination that the Code requirements are impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested for exercising these valves to the open position. However, relief should not be granted from the closure verification requirements for valve 1(2)-SI-25 since the licensee has proposed no alternatives to the Code required testing.

4.6 Reactor Coolant System

4.6.1 Category B Valves

4.6.1.1 Relief Request. The licensee has requested relief from the exercising and fail-safe testing requirements of Section XI, Paragraphs IWV-3412 and 3415, respectively, for the following reactor vessel and pressurizer vent valves. The licensee has proposed that this testing be performed during cold shutdowns when the reactor coolant system is not pressurized.

1-RC-SOV-100A-1	1-RC-SOV-100A-2	1-RC-SOV-100B-1	1-RC-SOV-100B-2
1-RC-SOV-101A-1	1-RC-SOV-101A-2	1-RC-SOV-101B-1	1-RC-SOV-101B-2
2-RC-SOV-200A-1	2-RC-SOV-200A-2	2-RC-SOV-200B-1	2-RC-SOV-200B-2
2-RC-SOV-201A-1	2-RC-SOV-201A-2	2-RC-SOV-201B-1	2-RC-SOV-201B-2

4.6.1.1.1 Licensee's Basis for Relief--These valves isolate the reactor vessel and pressurizer from containment atmosphere. Partial or full-stroke exercising the valves during normal operation or during cold shutdowns where the reactor coolant system is pressurized could result in the release of uncontrolled contamination to the containment. These valves will be exercised for operability during cold shutdowns when the reactor coolant system is not pressurized (but not more frequently that once per three months).

4.6.1.1.2 Evaluation--The exercising of these valves during reactor operation or cold shutdowns when the reactor coolant system is pressurized, would cause the discharge of reactor coolant water to the containment environment. This could result in uncontrolled surface and airborne contamination. Therefore, exercising these valves during cold shutdowns when the RCS is depressurized and refueling outages, not to exceed every three months, is a reasonable alternative to the Code requirements.

The system modifications necessary to enable the performance of the Code required testing quarterly during power operation would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code required testing is impractical, that the proposed testing provides reasonable assurance of operational readiness, and considering the burden on the licensee if Code requirements were imposed, relief may be granted as requested.

4.7 Main Steam System

4.7.1 Category C Valves

4.7.1.1 Relief Request. The licensee has requested relief from the check valve exercising requirements of Section XI, Paragraph IWV-3521, for the main steam header supply check valves to the turbine driven auxiliary feedwater pump, 1(2)-MS-176, 178, and 182. The licensee has proposed that these valves be disassembled and inspected on a sampling basis at a refueling outage frequency, and part-stroke exercised quarterly.

4.7.1.1.1 Licensee's Basis for Relief--These check valves cannot be exercised to the closed position during normal operation because this test would require the venting of process steam while verifying the closed position. Venting of process steam would endanger the test personnel. These valves will be grouped together and one valve from this group will be disassembled and inspected every reactor refueling. A different valve will be disassembled every reactor refueling. The valves will be partial flow tested every three months.

4.7.1.1.2 Evaluation--Verifying the closure capability of these valves by leak rate testing requires the pressurization of the downstream piping and venting of the upstream piping. Since the upstream piping is pressurized with high pressure steam during normal operation, this testing could not be done quarterly. Due to the system design a leak test to verify valve closure cannot be done since test lines are not installed to facilitate this testing.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee follows the NRC staff guidance on disassembly and inspection in Generic Letter No. 89-04.

4.8 Diesel Fuel Oil System

4.8.1 Category B Valves

4.8.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3412, for the following diesel fuel oil pump discharge valves. The licensee has proposed that these valves be tested monthly by observing that fuel oil is flowing to the day tank after the solenoid valve has opened.

1-EE-SOV-100	1-EE-SOV-101	1-EE-SOV-102
1-EE-SOV-103	1-EE-SOV-104	1-EE-SOV-105

4.8.1.1.1 Licensee's Basis for Relief--These valves are small (1 inch), fast acting solenoid operated gate valves with no position indication lights and no local visual means of determining stroke time. Valve operability can only be indirectly observed by verifying system operability. Also, these valves are interlocked with the pumps to open and close upon pump startup and shutdown. These solenoid valves will be stroke tested monthly by observing that the solenoid valves perform their intended function (fuel oil is flowing to the day tank after the solenoid valve has been opened).

4.8.1.1.2 Evaluation--These solenoid operated valves have no control switches or position indication. The valve design is such that valve stem movement cannot be visually verified. Therefore, stroke timing of these valves is not possible. The licensee has proposed that these valves be verified operable by observing that the solenoid valves pass fuel oil. During a conference call held on November 21, 1989, and in a letter dated January 17, 1990, the licensee proposed verifying that the capacity of the diesel fuel oil pumps is greater than the rate of fuel oil use by the diesels during emergency diesel generator testing. This should be sufficient to provide reasonable assurance of operational readiness until flow rate instrumentation can be installed. The licensee has committed to the installation of flow rate instrumentation during the next refueling outage. This instrumentation will enable the licensee to positively verify that all valves are performing their intended design function.

A grace period for the installation of flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement flow rate is installed during the next refueling outage.

4.8.2 <u>Category C Valves</u>

4.8.2.1 <u>Relief Request</u>. The licensee has requested relief from the check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following diesel fuel oil pump discharge check valves. The licensee has proposed that demonstration of system operability be considered adequate for verification of the check valves' operability.

1-EE-13	1-EE-15	1-EE-19
1-EE-28	1-EE-31	1-EE-35

4.8.2.1.1 <u>Licensee's Basis for Relief</u>--These check valves cannot be full flow tested because instrumentation is not installed to measure flow or differential pressure. Verifying system operability every three months during pump testing is adequate for verifying valve operability. No further valve testing is necessary. NOTE: When flow instrumentation is installed during the next refueling outage, full flow will be verified every three months.

4.8.2.1.2 Evaluation--During a conference call held on November 21, 1989, and in a letter dated January 17, 1990, the licensee proposed verifying that the capacity of the diesel fuel oil pumps is greater than the rate of fuel oil use by the diesels during emergency diesel generator testing. This should be sufficient to provide reasonable assurance of operational readiness until flow rate instrumentation can be installed. The licensee has committed to the installation of flow rate instrumentation during the next refueling outage. This instrumentation will enable the licensee to individually verify a full stroke of these valves to the open position with flow.

A grace period for the installation of flow instrumentation is necessary to allow the licensee time to complete design changes, work packages, and procurement. Imposition of immediate compliance would result in a long outage which would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code requirements are impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided instrumentation necessary for the measurement flow rate is installed during the next refueling outage.

4.9 Diesel Generator Starting Air System

4.9.1 Category B Valves

4.9.1.1 Relief Request. The licensee has requested relief from the stroke timing requirements of Section XI, Paragraph IWV-3413, for the following diesel air start system solenoid valves. The licensee has proposed that these valves be tested monthly by verifying that the diesel generator starts.

1-EG-SOV-100A	1-EG-SOV-100B	1-EG-SOV-200A
1-EG-SOV-200B	1-EG-SOV-300A	1-EG-SOV-300B

4.9.1.1.1 Licensee's Basis for Relief--These valves have actuation times considerably under a second and there is no visual reference on the solenoid valve when it has stroked, therefore, the stroke time cannot be measured. These solenoid valves will be stroke tested monthly by observing that the solenoid valves perform their intended function (if the diesel starts, then the solenoid valve was stroked successfully). The failure of these valves to open will promptly give a diesel engine trouble alarm. Further investigation would identify problems with the operability of these valves.

4.9.1.1.2 Evaluation--These solenoid operated valves have no control switches or position indication. Due to the valve design, valve stem movement cannot be visually verified. Therefore, stroke timing of these valves is not possible with the current system design. However, the only acceptance criteria proposed by the licensee for a successful test is that the diesel engine starts, which would provide no indication of valve degradation. Therefore, the licensee should add additional acceptance criteria to ensure that the proposed testing would provide reasonable assurance of operational readiness. Measuring the diesel generator start time and assigning a maximum limiting start time for a satisfactory test could provide an indication of degradation if each bank is individually tested. This maximum start time should be less than or equal to the Technical Specification requirement.

Compliance with the Code stroke timing requirements could only be achieved after significant modifications of these valves and their control circuitry to provide individual valve control and position indication. These design changes would be burdensome for the licensee due to the cost involved.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided these valves are individually tested and the licensee's acceptance criteria for the proposed test is expanded to include a maximum limiting start time which is less than or equal to the Technical Specification limit.

APPENDIX A

VALVES TESTED DURING COLD SHUTDOWNS

APPENDIX A

VALVES TESTED DURING COLD SHUTDOWNS

The following are Category A, B, and C valves which 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 evaluated and the reviewer agrees with the licensee that testing these valves during power operation is not practical due to the valve type, location, or system design. These valves should not be full-stroke exercised during power operation. These valves are listed below and grouped according to the system in which they are located.

1. MAIN STEAM

1.1 <u>Category B Valves</u>

The following main steam line trip valves cannot be full- or part-stroke exercised during power operation because this could result in a turbine and reactor trip. Further, the Technical Specification acceptance criteria are more limiting than the standard Section XI test criteria. The Technical Specification requires the measurement of elapsed time from the manual initiation of steam line isolation to initiation of main trip valve motion and the measurement of elapsed time from full open to full closed. If either of the limiting times are exceeded, the valve fails the test. Section XI requires only the measurement of elapsed time from initiation of steam line isolation to full valve closure, which is a less conservative test. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

1-MS-TV-101A	1-MS-TV-101B	1-MS-TV-101C
2-MS-TV-201A	2-MS-TV-201B	2-MS-TV-201C

Decay heat release control valves, 1-MS-HCV-104 and 2-MS-HCV-204. cannot be full- or part-stroke exercised quarterly during reactor operation because this testing would result in added steam load to the reactor which could result in an overpower condition and reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

The following main steam system power operated relief valves cannot be full- or part-stroke exercised during power operation because this could result in a turbine and reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

1-MS-RV-101A	1-MS-RV-101B	1-MS-RV-101C
2-MS-RV-201A	2-MS-RV-201B	2-MS-RV-201C

1.2 Category C Valves

The following main steam system non-return valves cannot be full- or part-stroke exercised during power operation because this could result in a turbine and reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

2. AUXILIARY FEEDWATER SYSTEM

2.1 Category C Valves

The following auxiliary feedwater system check valves cannot be full- or part-stroke exercised to the open position during power operation because this would introduce cold auxiliary feedwater to the steam generators resulting in thermal stress and possible degradation. Also, full flow can only be established to a depressurized steam generator. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

Valve	Function
1(2)-FW-27, 58, 89	Auxiliary feedwater header check valves
1(2)-FW-131, 133, 136, 138	Auxiliary feedwater header containment isolation check valves
1(2)-FW-142, 157, 172	Auxiliary feedwater pump discharge check valves
1(2)-FW-272, 273, 1-FW-309, 310 2-FW-305, 360	Auxiliary feedwater cross-connect header containment isolation valves

3. COMPONENT COOLING SYSTEM

3.1 Category B Valves

The following component cooling system return line isolation valves from the reactor coolant pumps cannot be full-stroke exercised or fail safe-tested quarterly during reactor coolant pump operation. This testing would require the isolation of the component cooling lines thereby stopping the flow of cooling water to the pumps. The loss of cooling water to these pumps can be damaging, even for short periods of time. These valves will be full-stroke exercised and fail-safe tested during cold shutdowns and refueling outages.

1-CC-TV-105A	1-CC-TV-105B	1-CC-TV-105C	1-CC-TV-107
2-CC-TV-205A	2-CC-TV-205B	2-CC-TV-205C	2-CC-TV-207

3.2 Category C Valves

The following component cooling system check valves cannot be exercised to the open or closed positions during reactor operation because these valves are located inside the containment. They may be open or closed depending on the system lineup. A containment entry, and the manipulation of other systems' valves is necessary to test these valves to either the open or closed position. These valves will be full-stroke exercised to the open and closed positions during cold shutdowns and refueling outages.

Valve	Function
1(2)-CC-176, 177	Component cooling to the residual heat removal heat exchangers
1(2)-CC-242, 233, 224	Component cooling to the containment air recirculation coolers

Component cooling system supply line isolation check valves to the reactor coolant pumps, 1(2)-CC-1, 58, and 59, cannot be full-stroke exercised quarterly during reactor coolant pump operation. This testing would require the isolation of the component cooling lines thereby stopping the flow of cooling water to the pumps. The loss of cooling water to these pumps can be damaging even for short periods of time. These valves will be full-stroke exercised during refueling outages.

4. REACTOR COOLANT SYSTEM

4.1 Category B Valves

Pressurizer power operated relief valves, 1-RC-PCV-1456, 1-RC-PCV-1455C, 2-RC-PCV-2456, and 2-RC-PCV-2455C have shown a high probability of sticking open while being exercised during power operation. These valves are not required for overpressure protection unless the primary system temperature is under 350^{0}F. These valves will be tested on the approach to cold shutdown and testing shall not be deferred.

4.2 Category A/C Valves

The primary grade water line to the pressurizer relief tank containment isolation valves, 1-RC-160 and 1-RC-160, cannot be full-stroke exercised to the closed position quarterly during reactor operation. The only method to verify closure capability of this valve is by performing a local leak rate test. Since this check valve is located inside the reactor containment, a local leak rate test cannot be performed during reactor operation. This valve will be full-stroke exercised to the closed position during cold shutdowns and refueling outages.

5. RESIDUAL HEAT REMOVAL SYSTEM

5.1 Category A Valves

Residual heat removal (RHR) pump suction valves from the reactor coolant system, 1-RH-MOV-1700, 1-RH-MOV-1701, 2-RH-MOV-2700, and 2-RH-MOV-2701 cannot be full-stroke exercised quarterly during reactor operation. These valves are interlocked with the reactor coolant system to prevent them from opening at elevated reactor coolant system pressure, because this would cause overpressurization of the RHR system and could result in a loss of coolant accident. The valve interlocks cannot be bypassed with normal control circuits. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

RHR system discharge valves to the reactor coolant system, 1-RH-MOV-1720A, 1-RH-MOV-1720B, 2-RH-MOV-2720A, and 2-RH-MOV-2720B cannot be full-stroke exercised quarterly during reactor operation. With these motor operated valves shut, there is no way to determine if its respective check valve is leaking before opening the valve. If this condition did exist, an overpressurization condition could occur when the primary pressure of 2235 psig was released into the RHR system. The RHR system pressure relief valve has a setting of 700 psig. This would unnecessarily challenge the overpressure protection system. Since these valves are also part of the discharge piping of the accumulators, there is a possibility of discharging an accumulator into, and disabling, the RHR system. The accumulators are maintained at pressure above the normal operating or shutdown pressure of the RHR system. Opening these valves would dump accumulator water into the RHR system. This would dilute the boron concentration of the accumulator as well as lower its level and pressure, which is a violation of Technical Specifications. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

RHR system heat exchanger flow control valves, 1-RH-FCV-1605, 1-HCV-1758, 2-RH-FCV-2605, and 2-HCV-2758 cannot be full- or part-stroke exercised quarterly during reactor operation because they are located inside containment and a containment entry is required to perform the Code required testing. These valves are not equipped with remote position indication. Therefore, an exercise test can only be verified by locally observing stem movement. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

3.2 <u>Category C Valves</u>

RHR pump discharge check valves, 1(2)-RH-5,and 1(2)-RH-11, and 2-RH-47 cannot be full-stroke exercised to the open or closed positions quarterly during reactor operation. These low head pumps take suction from, and discharge to, the reactor coolant system which operates at 2235 psig. This pressure is well above the shutoff head of the RHR pumps. Therefore, testing is not possible during reactor operation. These valves will be full-stroke exercised to the open and closed positions during cold shutdowns and refueling outages.

6. CHEMICAL AND VOLUME CONTROL SYSTEM

6.1 Category A Valves

The reactor coolant pump seal water return valves, 1-CH-MOV-1381 and 2-CH-MOV-2381, cannot be full-stroke exercised quarterly during reactor coolant pump operation because closure of these valves with the reactor coolant pumps in operation would cause a loss of seal water flow which could result in pump seal damage. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

The reactor coolant system (RCS) letdown isolation trip valves, 1-CH-TV-1204 and 2-CH-TV-2204, cannot be full-stroke exercised quarterly during reactor operation because this testing would interrupt the letdown flow from the RCS to the volume control tank. If these valves failed in the closed position, reactor coolant inventory control would be lost. The pressurizer level control program controls reactor coolant inventory by regulation the operation of the charging flow control valve so that the charging input flow to the RCS and reactor coolant pump seal injection flow into the RCS matches letdown flow. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

The normal charging header isolation valves, 1-CH-MOV-1289A and 2-CH-MOV-2289A, cannot be full-stroke exercised quarterly during reactor operation because failure of these valves in the closed position during testing would cause a loss of charging flow and could result in the inability to maintain reactor coolant inventory. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

6.2 Category B Valves

The normal charging header isolation valves, 1-CH-MOV-1289B and 2-CH-MOV-2289B, cannot be full-stroke exercised quarterly during reactor operation. Failure of these valves in the closed position during testing would cause a loss of charging flow and could result in the inability to maintain reactor coolant inventory. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

Charging pump suction valves from the volume control tank, 1-CH-LCV-1115C, 1-CH-LCV-1115E, 2-CH-LCV-2115C, and 2-CH-LCV-2115E cannot be full- or part-stroke exercised quarterly during reactor operation because this testing would require the charging pumps' suction to be aligned with the refueling water storage tank. This would cause a sudden increase in the reactor coolant system boron inventory which could cause reactor pressure, temperature, and reactivity transients. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

The charging pump recirculation header stop valves, 1-CH-MOV-1373 and 2-CH-MOV-2373, cannot be full-stroke exercised quarterly during reactor operation because failure of these valves in the closed position during testing would challenge the operability of the charging pumps. The individual pump recirculation valves are cycled, but the failure of one of these valves would only disable one pump. Since valves 1-CH-MOV-1373 and 2-CH-MOV-2373 are common to all recirculation lines (for their respective units) failure in the closed position would jeopardize the operability of all three charging pumps. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

6.3 Category A/C Valves

The normal charging line containment isolation check valve, 1(2)-CH-309, cannot be full-stroke exercised to the closed position quarterly during reactor operation. The only method to verify closure capability of this valve is by performing a local leak rate test. Since this check valve is located inside the reactor containment, a local leak rate test cannot be performed during reactor operation. This valve will be full-stroke exercised to the closed position during cold shutdowns and refueling outages.

7. SAFETY INJECTION SYSTEM

7.1 Category A Valves

The following high head safety injection to reactor coolant system isolation valves cannot be part- or full-stroke exercised during power operation. Opening these valves would bypass the regenerative heat exchanger and allow cold charging flow into the reactor coolant system causing reactivity transients and possible thermal shock to the high head safety injection system. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

1-SI-MOV-1869A	1-SI-MOV-1869B	1-SI-MOV-1842
2-SI-MOV-2869A	2-SI-MOV-2869B	2-SI-MOV-2842

The low head safety injection line to the RCS cold legs containment isolation valves, 1-SI-MOV-1890C and 2-SI-MOV-2890C cannot be full- or part-stroke exercised quarterly during reactor operation. Technical Specification 3.3.A.8 requires these valves to be in the open position, with power removed, during power operation. If these valves failed in the closed position during testing, the low head safety injection system would be rendered inoperable. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

The boron injection tank outlet isolation valves, 1-SI-MOV-1867C, 1-SI-MOV-1867D, 2-SI-MOV-2867C, and 2-SI-MOV-2867D cannot be full- or part-stroke exercised during reactor operation because opening these valves would bypass the flow control valve and the regenerative heat exchanger. This would allow cold excess charging flow into the reactor coolant system causing a reactivity transient and thermal shock to the injection nozzles. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

7.2 Category B Valves

The following accumulator nitrogen supply/vent line isolation valves cannot be full- or part-stroke exercised quarterly during reactor operation because this testing would provide a vent path from the accumulators which would result in their depressurization. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

1-SI-HCV-1853A	1-SI-HCV-1853B	1-SI-HCV-1853C	1-SI-HCV-1936
2-SI-HCV-2853A	2-SI-HCV-2853B	2-SI-HCV-2853C	2-SI-HCV-2936

7.3 Category A/C Valves

The containment isolation valve for the nitrogen supply line to the accumulators, 1(2)-SI-234, cannot be full-stroke exercised to the closed position quarterly during reactor operation. The only method to verify closure capability of this valve is by performing a local leak rate test. Since this check valve is located inside the reactor containment, a local leak rate test cannot be performed during reactor operation. This valve will be full-stroke exercised to the closed position during cold shutdowns and refueling outages.

8. STEAM GENERATOR BLOWDOWN SYSTEM

8.1 Category B Valves

The following steam generator blowdown isolation valves cannot be full-stroke exercised quarterly during reactor operation. Closing these valves during power operation causes the downstream piping to become empty due to drainage and the water flashing to steam. When the valves reopen, a flow surge occurs which automatically isolates the inner valves due to high flow. A containment entry is then necessary to reset these valves. Upon reopening, the process may occur again. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

1(2)-BD-TV-100A	1(2)-BD-TV-100B	1(2)-BD-TV-100C
1(2)-BD-TV-100D	1(2)-BD-TV-100E	1(2)-BD-TV-100F

9. CONTAINMENT SPRAY SYSTEM

9.1 Category A/C Valves

The containment spray pump discharge containment isolation check valves, 1(2)-RS-11, 1(2)-RS-17, 1(2)-CS-13, and 1(2)-CS-24 cannot be full- or part-stroke exercised during normal operation because this testing would result in spraying down the containment which could result in equipment damage. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

9.2 Category C Valves

The containment spray pump discharge check valves, 1(2)-CS-105, 1-CS-127, and 2-CS-104 cannot be full- or part-stroke exercised during normal operation because this testing would result in spraying down the containment which could result in equipment damage. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

10. RADIATION MONITORING SYSTEM

10.1 Category A/C Valves

The monitor return line containment isolation valve, 1(2)-RM-3, cannot be full-stroke exercised to the closed position quarterly during reactor operation. The only method to verify closure capability of this valve is by performing a local leak rate test. Since this check valve is located inside the reactor containment, a local leak rate test cannot be performed during reactor operation. This valve will be full-stroke exercised to the closed position during cold shutdowns and refueling outages.

11. INSTRUMENT AIR SYSTEM

11.1 Category A/C Valves

Instrument air system containment isolation valves, 1-IA-938, 1-IA-939, 2-IA-864, and 2-IA-868 cannot be full-stroke exercised to the closed position quarterly during reactor operation. The only method to verify closure capability of this valve is by performing a local leak rate test. Since this check valve is located inside the reactor containment, a local leak rate test cannot be performed during reactor operation. These valves will be full-stroke exercised to the closed position during cold shutdowns and refueling outages

APPENDIX B

P&ID LIST

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APPENDIX B

P&ID LIST

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

Unit 1

SYSTEM	DRAWING NO.
Main Steam System	11448-CBM-64A
Auxiliary Steam and Air Removal System	11448-FM-66A
Feedwater System	11448-FM-68A
Auxiliary Feedwater Cross-connect System	11448-FM-68B
Circulating and Service Water System	11448-FM-71A
Circulating and Service Water System	11448-FM-71B
Component Cooling Water System	11448-FM-72A
Component Cooling Water System	11448-FM-72B
Component Cooling Water System	11448-FM-72C
Component Cooling Water System	11448-FM-72D
Compressed Air System	11448-FM-75E
Compressed Air System	11448-FM-75G
Containment Instrument Air System	11448-FM-75J
Sampling System	11448-FM-82B
Vents and Drains System	11448-FM-83A
Vents and Drains System	11448-FM-83B
Containment Spray System	11448-FM-84A
Recirculation Spray System	11448-FM-84B
Containment Vacuum and Leakage Monitoring System	11448-FM-85A
Reactor Coolant System	11448-FM-86A
Reactor Coolant System	11448-FM-86B
Residual Heat Removal System	11448-FM-87A
Chemical and Volume Control System	11448-FM-88A
Chemical and Volume Control System	11448-FM-88B
Chemical and Volume Control System	11448-FM-88C
Safety Injection System	11448-FM-89A

SYSTEM	DRAWING NO.
Safety Injection System	11448-FM-89B
Gaseous Waste Disposal System	11448-FM-90A
Gaseous Waste Disposal System	11448-FM-90B
Containment Hydrogen Analyzer System	11448-FM-90C
Reactor Cavity Purification System	11448-FM-118A
Steam Generator Blowdown System	11448-FM-124A
Containment Particulate Radiation Monitor System	11448-SPS-14A
Air Cooling And Purging System	11448-FB-6A

Unit 2

SYSTEM	DRAWING NO.
Main Steam System	11548-CBM-64A
Auxiliary Steam and Air Removal System	11548-FM-66A
Feedwater System	11548-FM-68A
Auxiliary Feedwater Cross-connect System	11548-FM-68B
Circulating and Service Water System	11548-FM-71A
Circulating and Service Water System	11548-FM-71B
Component Cooling Water System	11548-FM-72A
Component Cooling Water System	11548-FM-72B
Component Cooling Water System	11548-FM-72C
Component Cooling Water System	11548-FM-72D
Compressed Air System	11548-FM-75E
Compressed Air System	11548-FM-75G
Containment Instrument Air System	11548-FM-75J
Sampling System	11548-FM-82B
Vents and Drains System	11548-FM-83A
Vents and Drains System	11548-FM-83B
Containment Spray System	11548-FM-84A
Recirculation Spray System	11548-FM-84B
Containment Vacuum and Leakage Monitoring System	11548-FM-85A
Reactor Coolant System	11548-FM-86A
Reactor Coolant System	11548-FM-86B
Residual Heat Removal System	11548-FM-87A

SYSTEM	DRAWING NO.
Chemical and Volume Control System	11548-FM-88A
Chemical and Volume Control System	11548-FM-88B
Chemical and Volume Control System	11548-FM-88C
Safety Injection System	11548-FM-89A
Safety Injection System	11548-FM-89B
Gaseous Waste Disposal System	11548-FM-90A
Gaseous Waste Disposal System	11548-FM-90B
Containment Hydrogen Analyzer System	11548-FM-90C
Reactor Cavity Purification System	11548-FM-118A
Steam Generator Blowdown System	11548-FM-124A
Containment Particulate Radiation Monitor System	11548-SPS-14A
Air Cooling And Purging System	11548-FB-6A

Units 1 & 2

SYSTEM	DRAWING NO.
Diesel Fuel Oil System	11448-FB-4B
Fire Protection System	11448-FB-47B
Emergency Diesel Generator System	11448-FB-46A
Emergency Diesel Generator System	11448-FB-46B
Emergency Diesel Generator System	11448-FB-46B

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APPENDIX C

IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

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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. Section 4.1 (program development philosophy) of the licensee's IST program states "The requirements of Section XI are not interpreted as superceding or adding to any limiting condition for operation". The licensee's meaning is not apparent and this statement should be clarified. However, the following points should be noted: (a) 10CFR50.55(a)(5)(ii) states that if the IST program for a facility conflicts with the Technical Specifications, the licensee shall apply to the commission for amendment of the Technical Specifications to conform the Technical Specifications with the revised program, (b) though the licensee is not expected to violate Technical Specifications to perform Section XI testing, the Code requirements in excess of Technical Specifications do apply and should be performed, (c) Technical Specifications should be changed to conform to Section XI requirements unless specific relief from the Code requirements is granted and, (d) if Section XI testing requires a component to be declared inoperable, and the inoperability of this component results in entering a Limiting Condition for Operation, the Technical Specification Limiting Condition for Operation should be followed even if the Technical Specification operability requirements are less stringent.

2. Section 4.2 (program implementation) of the licensee's IST program states, "Certain valves cannot be full-stroke exercised during normal operation following maintenance. If maintenance cannot be deferred to cold shutdown, then an engineering evaluation must be performed prior to the maintenance being performed to determine the

effect on valve operability. If the evaluation shows the operability of the valve will not be affected, then no post maintenance testing will be required. A partial-stroke test will be performed if possible." Section XI, Paragraph IWV-3200, states, "When a valve or its control system has been replaced or repaired or has undergone maintenance (adjustment of stem packing, removal of the bonnet, stem assembly, or actuator, and disconnection of hydraulic or electrical lines are examples) that could affect its performance, and prior to the time it is returned to service, it shall be tested to demonstrate that the performance parameters which could be affected by the replacement, repair, or maintenance are within acceptable limits". If the maintenance could affect the performance of the valve (stroke time, leak rate, ect.) then post maintenance testing must be performed even if the licensee decides that the valve will still be operable. The licensee should change this statement to conform to the Code requirements.

3. Relief has been requested for the following pumps because there is no installed instrumentation for the measurement of various test quantities. Relief may be granted provided the required instrumentation is installed during the next refueling outage.

RR No.	Pump Identification	Function	TER Section
P-2	1(2)-CH-P-1A, 1B, 1C	High head charging	3.2.1.1
P-3	1(2)-SI-P-1A, 1B	Low head safety injection	3.4.1.1
P-4	1(2)-RS-P-2A, 2B	Outside recirculation spray	3.5.1.1
P-6	1(2)-FW-P-3A, 3B, 2	Auxiliary feedwater	3.6.1.1
P-9	1(2)-CH-P-2C, 2D	Boric acid transfer	3.3.1.1
*P-11	1-SW-P-1A, 1B, 1C	Service water	3.8.1.1

* - Unit 1 only

4. The NRC staff position is that valve disassembly and inspection can be used to verify check valve operability when full-stroke exercising by flow or by the other positive means allowed by IWV-3522 are not practicable. The NRC staff positions regarding disassembly and inspection are explained in detail in Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing

Programs." Relief may be granted for the listed valves in Relief Requests V-20, V-40, and V-41 provided the licensee complies with these staff positions. (Reference Sections 4.2.1.2, 4.3.1.2, and 4.4.2.2 of this report.)

5. The licensee has proposed, in valve relief requests V-5 and V-42, to disassemble and inspect valves to verify their closure capability. Relief may be granted provided the licensee follows the NRC staff guidance on disassembly and inspection in Generic Letter No. 89-04. (Reference Sections 4.2.1.1 and 4.7.1.1 of this report.)

6. In Valve Relief Request V-1, the licensee proposes that the main steam safety valves be tested in accordance with PTC-25.3-1976, Section 4.091(a)(2), and that all other safety and relief valves be tested in accordance with Section 4.091(c)(1). Section XI, Paragraph IWV-3512, states that safety and relief valve set points shall be tested in accordance with ASME PTC 25.3-1976, "Safety and Relief Valve Performance Test Codes." PTC-25.3-1976, Section 4.091(a)(2) is the test method for system testing to determine set pressure with calibrated hydraulic or pneumatic-assist equipment. PTC-25.3-1976, Section 4.091(c)(1) is the test method for bench testing to determine set pressure and valve leakage. Paragraph IWV-3512 further states that bench testing, or testing in place, with suitable hydraulic or pneumatic assist equipment is an acceptable method under PTC 25.3-1976. Since the licensee's proposed testing is specifically mentioned as being acceptable in the Code, relief is not required. (Reference Section 4.1.2.1 of this report.)

7. Valve Relief Request V-30 states that the following valves are adequately leak rate tested by Technical Specification requirements. These valves are reactor coolant system boundary isolation valves. The failure of these valves could result in a loss of coolant accident. However, since most of these valves are paired in series, the licensee's proposed testing would not demonstrate the leak tightness of each valve as required by the

Code. The leak tight integrity of the second valve in the pair cannot be verified unless the first valve has failed or is leaking significantly, therefore, the proposed testing verifies only the leak tight integrity of each pair of valves. Although the Technical Specification requirements mentioned by the licensee do not verify the leak tight integrity of individual valves as required by the Code, system hydrostatic tests and monitoring the total RCS leakage does provide assurance of the leak tight integrity of the valve pairs at the RCS boundary. The licensee's proposed testing combined with the Technical Specification corrective action requirements for excessive leakage would provide some assurance of leak tight integrity. On this basis, the licensee may continue to monitor leakage and perform leak testing in accordance with their plant Technical Specifications until the NRR Inter-System Loss of Coolant Accident (ISLOCA) study is completed, and the results analyzed, to determine if further testing should be required. (Reference Section 4.1.1.1 of this report.)

Valve	Function
1-RC-HCV-1556A, B, C 2-RC-HCV-2556A, B, C	Loop fill boundary valves
1(2)-SI-107, 109 1(2)-SI-128, 130 1(2)-SI-145, 147	Accumulator discharge check valves
1(2)-SI-88, 91 1(2)-SI-94, 238 1(2)-SI-238, 240	Combined safety injection isolation check valves to the RCS hot legs
1(2)-SI-235, 236, 237	High head safety injection isolation check valves to the RCS cold legs
1-RH-MOV-1700, 1701 2-RH-MOV-2700, 2701	RHR system suction valves from the RCS
1-RH-MOV-1720A, 1720B 2-RH-MOV-2720A, 2720B	RHR system discharge valves to the RCS

8. In Valve Relief Request V-39, the licensee proposes that containment isolation valves which cannot be individually leak rate

tested be tested in groups, with leakage limits assigned to the group which are subject to the acceptance criteria of IWV-3426 and 3427. This test method should provide reasonable assurance of the leak-tight integrity of these valves as long as the assigned limiting leakage rate for each valve grouping is conservative considering the number and sizes of valves in the group. The assigned leakage rates should be based on the smallest valve in the group so that corrective actions are taken whenever the leak-tight integrity of any valve of that group is in question. However, using the licensee's methodology for determining group leakage rates, individual valve leakage rates could be many times the leakage limit which would be appropriate for that valve, based on IWV-3426(b), before corrective action is required. In some valve groups, leakage through the smallest valve could be a factor of 10 greater than the individual valve leakage limit of IWV-3426(b) before corrective action is required. Significant degradation of the smallest valve could go undetected in a group of otherwise leak tight valves. The licensee should reevaluate this criteria in the light of the service history of these valve groups. The criteria established for these groups should ensure that no valve will become seriously degraded before corrective action is required. Relief may be granted provided the licensee reevaluates the group leakage limits based on the diameter of the smallest valve in each group as discussed above. (Reference Section 4.1.4.1 of this report.)

9. Valve Relief Request V-26 proposes that the following safety injection system accumulator discharge check valves be full flow tested on a sampling basis at a refueling outage frequency. This would allow the testing of each check valve no more than once every three refueling outages unless failure of one valve occurs during this time period. The licensee has neither demonstrated that this testing frequency would provide reasonable assurance of operational readiness nor that it would be burdensome to test all three sets of check valves each refueling outage. During a conference call with the licensee held on November 21, 1989, the licensee stated that

they have not developed definitive acceptance criteria for their proposed testing. The licensee is currently working to demonstrate that the proposed testing is capable of detecting valve degradation, that the results of this test can be extrapolated to demonstrate a valve's ability of pass design basis flow, and that the acceptance criteria to be adopted would provide reasonable assurance of operational readiness. Prior to the start of the next refueling outage, the licensee should demonstrate that their proposed testing would provide reasonable assurance of operational readiness or adopt another alternative which meets the criteria of Generic Letter No. 89-04, Position 1 or Position 2. (Reference Section 4.4.1.1 of this report.)

1(2)-SI-107	1(2)-SI-109	1(2)-SI-128
1(2)-SI-130	1(2)-SI-145	1(2)-SI-147

10. Valve Relief Request V-27 proposes that the following safety injection system check valves to the reactor coolant system be exercised to the closed position in accordance with plant Technical Specifications. Relief may be granted from the Code exercising requirements for valves 1(2)-SI-79, 82, 85, 241, 242, and 243 to the closed position provided they are individually leak rate tested. Interim approval of the licensee's proposed alternative for verifying the closure capability of valves 1(2)-SI-38, 91, 94, 235, 236, 237, 238, 239, and 240 for the leak rate testing requirements of Section XI, IWV-3420, is discussed in Section 4.1.1.1 of this report. (Reference Section 4.4.1.2 of this report.)

Valve	Function
1(2)-SI-88, 91, 94, 238, 239, 240	Combined safety injection isolation check valves to the RCS hot legs
1(2)-SI-235, 236, 237	High head safety injection isolation check valves to the RCS cold legs
1(2)-SI-241, 242, 243	Low head safety injection isolation check valves to the RCS cold legs
1(2)-SI-79, 82, 85	Combined safety injection isolation check valves to the RCS cold legs

11. Valve Relief Request V-28 proposes that valve 1(2)-SI-25, a charging pump suction check valve from the refueling water storage tank cross tie, be exempted from exercising to the closed position. Valve 1(2)-SI-25 has a safety function in the closed position to prevent diversion of flow when the other RWST is used as a source for the high head safety injection pumps. The licensee has not provided sufficient technical justification for their claim that performance of this testing would require draining one or both RWSTs. For this reason, and because the licensee has proposed no alternatives to the Code required testing, relief should not be granted. (Reference Section 4.5.1.1 of this report.)

12. Valve Relief Request V-37 proposes that the following diesel generator air start solenoid valves be demonstrated operable monthly by verifying that the diesel generator starts. However, the only acceptance criteria proposed by the licensee for a successful test is that the diesel engine starts, which would provide no indication of valve degradation. Therefore, the licensee should add additional acceptance criteria to ensure that the proposed testing would provide a reasonable assurance of operational readiness. Measuring the diesel generator start time and assigning a maximum limiting start time for a satisfactory test could provide an indication of degradation if each bank is individually tested. This maximum start time should be less than or equal to the Technical Specification requirement. Relief may be granted provided the licensee's acceptance criteria for the proposed test is expanded to include a maximum limiting start time which is less than or equal to the Technical Specification limit. (Reference section 4.9.1.1 of this report.)

1-EG-SOV-100A	1-EG-SOV-100B	1-EG-SOV-200A
1-EG-SOV-200B	1-EG-SOV-300A	1-EG-SOV-300B

13. Cold Shutdown Justification CSV-19 for the following emergency boration system valves states: "Exercising these valves during power operation would allow the injection of boric acid into the

reactor coolant system, which would upset the boron concentration in the primary plant water. There is a possibility of discharging an accumulator into the residual heat removal system (RHR) and disabling it. The accumulators are maintained at pressure above the normal operating or shutdown pressure of the RHR system. Opening of these valves would dump accumulator water into the RHR system. This will dilute the boron concentration of the accumulator as well as lower its level and pressure, which is a violation of Technical Specifications. Valves 1-CH-76, 92, 109, and 116 will be partial flow exercised every quarter." The first sentence, by itself, does not provide sufficient detail to justify cold shutdown testing. Exercising emergency boration line valves has no relation to safety injection accumulator pressure or level; nor would it affect the operability of the accumulators or the RHR system. For these reasons, this cold shutdown justification is unacceptable.

1-CH-MOV-1350	2-CH-MOV-2350	1(2)-CH-227
1-CH-76	1-CH-92	1-CH-109
1-CH-116		

14. Cold Shutdown Justification CSV-20 for Unit 2 lists the primary grade water supply to the pressurizer relief tank as 2-RC-20 while the IST program valve table lists this valve as 2-RC-160. This cold shutdown justification also lists the instrument air containment isolation valves as 2-IA-864 and 939 while the valve table lists them as 2-IA-864 and 868. This discrepancy should be corrected.

15. Relief Request V-21 provides the cold shutdown justification for not exercising valves 1(2)-SI-50, 1-SI-58, and 2-SI-327 to the closed position quarterly. Relief is not required to perform cold shutdown testing. Therefore, this portion of the licensee's relief request was not evaluated in Section 4.0 of this report. The licensee's justification for not testing these valves quarterly during power operation is inadequate. The licensee has stated that testing these valves to the closed position quarterly

would require isolating the suction line to the low pressure safety injection pumps, which would require them to enter a Technical Specification LCO. However, the licensee currently exercises valves 1(2)-SI-MOV-1862A and B quarterly during power operation. Closing these valves isolates the suction piping for the low pressure safety injection pumps. Therefore, valves 1(2)-SI-50, 1-SI-58, and 2-SI-327 should be tested quarterly during power operation.

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This EG&G Idaho, Inc., report presents the results of our evaluation of the Surry Power Station Inservice Testing Program for Pumps and Valves whose function is safety related.

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