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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

Docket Nos. 50-237 and 50-249

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ABSTRACT

This report presents the results of the evaluation of relief requests for the inservice testing program for safety-related pumps and valves at Commonwealth Edison Company's Dresden Nuclear Power Station, Units 2 and 3.

PREFACE

This report is part of the "Selected Operating Reactor Issues, Program III" program 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 Unit.

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1. INTRODUCTION

This report provides the results of the technical evaluation of certain relief requests from the pump and valve inservice testing (IST) program for Dresden Nuclear Power Station, Units 2 and 3, which was submitted by the Commonwealth Edison Company.

Section 2 presents the Commonwealth Edison Company's bases for requesting relief from the requirements for pumps followed by an evaluation and conclusion. Section 3 presents similar information for valves.

Appendix A lists program inconsistencies and omissions, and identifies needed program changes.

1.1 IST Program Description

The Commonwealth Edison Company submitted Revision 0 to the Dresden Nuclear Power Station, Units 2 and 3, pump and valve IST program with a letter dated February 28, 1992. This program covers the third ten year IST interval, which runs from March 1, 1992, to February 28, 2002. The relief requests pertain to requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI, 1986 Edition, and the Code of Federal Regulations (CFR), 10 CFR 50.55a.

1.2 IST Requirements

10 CFR 50.55a(g) states that IST of certain ASME Code Class 1, 2, and 3 pumps and valves will be done per the ASME Code, Section XI, Subsections IWP and IWV, except where relief is granted by NRC in accordance with 10 CFR 50.55a(a)(3)(i), (a)(3)(ii), or (f)(6)(i). The Commonwealth Edison Company requests relief from the ASME Code testing requirements for specific pumps and valves. Certain of these requests are evaluated in this Technical Evaluation Report (TER) using the acceptance criteria of the Standard Review Plan, Section 3.9.6, NRC Generic Letter No. 89-04 (GL 89-04), "Guidance on Developing Acceptable Inservice Testing Programs," and 10 CFR 50.55a. Other requests in the licensee's IST program that are not evaluated in this TER, may be granted by provisions of GL 89-04 or addressed in previously issued Safety Evaluations (SEs).

1.3 Scope and Limits of the Review

The scope of this review is limited to the relief requests addressed in this TER and the cold shutdown justifications submitted with the licensee's IST program. Other portions of the program, such as general discussions, pump and valve test tables, etc., are not necessarily reviewed. Endorsement of these aspects of the program by the reviewer or NRC is not stated or implied. Any deviation from the Code test method, frequency, or other requirement should be identified in the IST program and submitted according to 10 CFR 50.55a for review and approval by NRC prior to implementation.

The evaluations in this TER are applicable only to the components or groups of components identified by the submitted requests. These evaluations may not be extended to apply to similar components that are not identified by the request at this or any other comparable facility without separate review and approval by NRC. Further, the evaluations and recommendations are limited to the requirement(s) and/or function(s) explicitly discussed in the applicable TER section. For example, the results of an evaluation of a request involving testing of the containment isolation function of a valve cannot be extended to allow the test to satisfy a requirement to verify the valve's pressure isolation function, unless that extension is explicitly stated.

The Commonwealth Edison Company provided several cold shutdown justifications for exercising Category A, B, and C valves during cold shutdowns and refueling outages instead of quarterly. Valves identified to be tested during cold shutdowns need not be tested if testing was performed within three months of the cold shutdown. These justifications were reviewed and found to be acceptable except as noted in Appendix A.

2. PUMP TESTING PROGRAM

The following relief requests were evaluated against the requirements of the ASME Code, Section XI, 10 CFR 50.55a, and applicable NRC positions and guidelines. A summary is presented for each relief request followed by the licensee's basis for relief and the evaluation with the reviewer's recommendations. The evaluations are grouped according to topic or system.

2.1 Various Systems

2.1.1 Pump Vibration Measurements

RP-00A requests relief from the vibration measurement requirements of Section XI, Paragraph IWP-4510 and Table IWP-3100-2, and proposes to monitor pump vibration using a program patterned after ANSI/ASME OM-6, Draft 11, for all pumps in the IST program. RP-00A also requests relief from the frequency response range requirements of OM-6 for the standby liquid control (SBLC) pumps. That portion of the request is evaluated in section 2.1.2 of this report.

2.1.1.1 Licensee's Basis for Requesting Relief. The ASME Code requires measurement of vibration displacement amplitude in mils every inservice test and bearing temperatures once per year. A far more informative reading is obtained using vibration velocity equipment because it accounts for both displacement and range of frequency.

The alternative testing described herein for pump vibration monitoring was developed using ANSI/ASME OM-6 (Draft 11) as a guideline. Pump vibration measurements will be obtained and recorded in velocity (inches per second) and are broadband (unfiltered) peak readings. All monitored locations are clearly marked to identify the specific point at which the transducer is to be placed while taking vibration measurements using portable equipment. The readout system and transducers used to take vibration measurements are capable of frequency response in the range of one-third minimum pump speed (with the exception of the SBLC pumps) to at least one-thousand hertz. They also have a minimum accuracy over that range of $\pm 5\%$.

The SBLC pumps operate at 250 rpm. The low frequency response range requirement of ASME (1/2 minimum pump shaft rotational speed) for these pumps is 2.1 Hz. The current vibration measurement system used at Dresden is the Technology for Energy Corporation's (TEC) SMART Meter. The frequency range of this vibration measuring system (includes the SMART meter, cable and probe) is 2 to 10K Hz. When applying the OM-6, Draft 11, frequency response range criteria (1/3 minimum pump shaft rotational speed), the low frequency response range requirement becomes 1.4 Hz. Dresden knows of no available equipment which has this low range ability (limited to probe performance).

Dresden Station proposes an alternate program which is believed to be more comprehensive than that required by ASME Section XI. This program consists of performing the required vibration readings in velocity rather than mils of displacement. The technique of velocity measurement is an industry accepted method which is much more meaningful and sensitive to small changes that are indicative of developing mechanical problems.

Velocity measurements detect not only high amplitude vibrations that indicate major mechanical problems but also the equally harmful low amplitude - high frequency vibrations due to misalignment, imbalance, or bearing wear that usually go undetected by simple displacement measurements.

All centrifugal pumps in the IST program will have vibration taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions on each accessible pump bearing housing. Measurement will also be taken in the axial direction on all bearing housings when accessible. Reciprocating pumps will have vibration measurements taken approximately perpendicular to the crankshaft and the line of plunger travel, including the axial direction when accessible on each pump bearing housing. The only reciprocating pumps in the IST program are the SBLC and diesel fuel oil transfer pumps. Since the speed of the SBLC pumps is under 600 RPM, the vibration measurements will be taken in mils displacement per OM-6. No vertical pumps are in the Dresden IST program.

Alternate Testing: Centrifugal pump vibration measurements will be taken in vibration velocity (inches/second). The limit for vibration readings will not exceed ANSI/ASME OM-6 (Draft 11) with the exception of the HPCI pumps. The following vibration limits are applicable for all centrifugal pumps at Dresden Units 2 and 3 with the exception of the HPCI pumps. The vibration limits for the HPCI pumps are specified in Relief Request RP-23A.

TABLE RP-00A
RANGES OF VIBRATIONS

PUMP TYPE	ALERT RANGE LOW	ALERT RANGE HIGH	REQUIRED ACTION RANGE
Centrifugal	$>2.5V_{vref}$ But not >0.325 in/sec	$6V_{vref}$	$>6V_{vref}$ But not >0.70 in/sec
Reciprocating	$>2.5V_{ref}$	$6V_{ref}$	$>6V_{ref}$

NOTES:
a. V_{vref} is the reference velocity in inches per second.
b. V_{ref} is the reference displacement in mils if the pump speed is < 600rpm or; the reference velocity in inches/second of the pump speed is $\geq$ 600 rpm.
C. Any vibration measurement value below the low alert range is acceptable.
d. All of Dresden's centrifugal pumps in the IST program operate at a speed of greater than 600 rpm.

2.1.1.2 Evaluation. The vibration monitoring program in ANSI/ASME OM-6, Draft 11, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," is better than the vibration monitoring program in Section XI, which measures and evaluates vibration in units of displacement. The OM-6 program provides an acceptable level of quality and is acceptable to NRC as an alternate to the vibration monitoring requirements of Section XI. Draft 11 was formally issued as ASME/ANSI OMa-1988. The vibration program requirements are in Part 6 of that standard. The 1989 addenda to that standard provides Table 3 "Ranges for Test Parameters," which was erroneously omitted from OMa-1988. The NRC approves the use of the vibration monitoring programs in OMa-1988, Part 6, as corrected by the 1989 addenda. However, the licensee must comply with all the Part 6 vibration measurement requirements except those for which specific relief has been requested and granted.

The licensee's proposal differs slightly from that presented in Part 6 and is not described completely. The differences have not been technically justified to show that the proposal will provide adequate assurance of operational readiness for all pumps in the IST program. However, the licensee should be allowed to test these pumps utilizing the vibration monitoring program provided in Part 6. This allows an adequate assessment of operational readiness and provides a reasonable alternative to the Code requirements.

Based on the determination that testing pumps in accordance with the vibration program described in Part 6, provides an acceptable level of quality and safety, the proposed alternative is authorized pursuant to §50.55a ¶(a)(3)(i) provided the licensee utilizes all the criteria regarding vibration testing contained in ASME/ANSI OMa-1988, Part 6, as corrected by the 1989 addenda, with the exception of the instrument response range requirements for the SBLC pumps and the vibration limits for the HPCI pumps as discussed in Sections 2.1.2.1 and 2.3.1.1 of this report.

2.1.2 <u>Vibration Instrument Frequency Response</u>

RP-00A requests relief from the vibration measurement instrument frequency response requirements of OMa-1988, Part 6, Paragraph 4.6.1.6 and Table 1, for the SBLC pumps, 2(3)A-1102 and B-1102, and proposes to use available instruments to measure vibration.

2.1.2.1 <u>Licensee's Basis for Requesting Relief</u>. (The licensee's basis for requesting relief and proposed alternate testing is provided in Section 2.1.1.1 of this report.)

2.1.2.2 <u>Evaluation</u>. The SBLC pumps operate at a very low speed, 250 rpm. The vibration instrument frequency response range requirement of Part 6 for low frequency is to 1/3 minimum pump shaft rotational speed. 250 rpm equates to 4.17 Hz, 1/3 of 4.17 Hz is 1.4 Hz. The frequency range of the vibration measuring system used at Dresden is 2 to 10K Hz, which slightly exceeds the requirement (1.4 Hz) for these pumps. Dresden is not aware of equipment that is available to meet that requirement. To require them to obtain instrumentation with improved response characteristics at such a low frequency immediately would be a hardship without a compensating increase in the level of quality and safety. However, recent advances in technology may make it feasible to obtain instruments that are sufficiently accurate in this range. Alternately, the licensee might be able to show that there are no vibration phenomena in the affected frequency range that are of particular interest for these pumps and that compliance would not materially improve their ability to detect pump degradation and assess operational readiness. The licensee's proposal should allow an adequate assessment of pump operational readiness for an interim period of one year or until the next refueling outage. During that period the licensee should determine if instruments can be obtained that meet the requirements or if the response range requirement is a hardship that is not compensated for by an increase in quality for the subject pumps.

Based on the determination that requiring immediate compliance with the frequency response range specified in Part 6 would be a hardship without a compensating increase in the level of quality, the proposed alternative is authorized pursuant to §50.55a ¶(a)(3)(ii) for an interim period of one year or until the next refueling outage, whichever is longer. By the end of that period the licensee should either comply with the requirements or justify an alternate approach.

2.1.3 Pump Bearing Temperature Measurements

RP-00B requests relief from the Section XI, Paragraph IWP-3300 requirements to measure pump bearing temperature annually for all pumps in the IST program and proposes to measure pump vibration quarterly using a program patterned after OM-6 (See Section 2.1.1 of this report).

2.1.3.1 Licensee's Basis for Requesting Relief. Bearing temperature measurements will not provide significant additional information regarding bearing condition than that already obtained by measuring vibration. Measurement of vibration provides more concise and consistent information with respect to pump and bearing condition. Vibration measurements can provide information as to a change in the balance of rotating parts, misalignment of bearings, worn bearings, changes in internal hydraulic forces and general pump integrity prior to the condition degrading to the point where the component is jeopardized. Bearing temperature does not always predict such problems.

An increase in bearing temperature most often does not occur until the bearing has deteriorated to a point where additional pump damage may occur. Bearing temperatures are also affected by the temperatures of the medium being pumped, which could yield misleading results. Vibration readings are not affected by the temperature of the medium being pumped, thus the readings are more consistent.

Alternate Testing: Pump vibration measurements will be taken quarterly.

2.1.3.2 Evaluation. The Code requires annual measurement of pump bearing temperatures. This measurement can indicate degradation of pump bearings. However, it is widely recognized that pump bearing temperatures taken annually are unlikely to aid in the detection of bearing degradation. A temperature rise in a failing bearing usually occurs only just before failure. This makes detecting impending bearing failure by annual bearing temperature measurement very unlikely. Bearing temperatures taken yearly provide little statistical basis for determining the incremental degradation of a bearing.

The licensee proposes to measure pump vibration quarterly using a program similar to that in Part 6. The Part 6 vibration program incorporates a sensitive vibration velocity measurement procedure in addition to monitoring at more locations on bearing housings. Additionally, Part 6 does not require bearing temperature measurement. Performance of quarterly testing in accordance with part 6 allows a better evaluation of pump condition than performing pump bearing vibration and annual measurement of temperature in accordance with Section XI. Therefore, the proposed testing allows an adequate assessment of operational readiness and provides an acceptable level of quality and safety and an adequate alternative to the Code requirements.

Based on the determination that the licensee's testing provides an acceptable level of quality and safety, the proposed alternative is authorized pursuant to §50.55a ¶(a)(3)(i).

2.2 Standby Liquid Control System

2.2.1 Inlet and Differential Pressure Measurements

RP-11A requests relief from the Section XI, Paragraph IWP-4200 and Table IWP-3100-1, requirements to measure inlet and differential pressure for the SBLC pumps, 2(3)A-1102 and 2(3)B-1102, and proposes to measure the test tank level (suction pressure source) prior to pump testing and to evaluate these pumps utilizing pump discharge pressure.

2.2.1.1 Licensee's Basis for Requesting Relief. In the test mode, the SBLC pumps pump water from a test tank through a closed loop back to the test tank. The level of the test tank is verified prior to each test. The tank is less than 5 feet high and therefore the maximum pressure developed by this head is less than 2 psig. The SBLC pumps take their suction from the bottom of the tank and therefore the suction pressure cannot exceed 2 psig.

The discharge pressure for the test is set at 1275 psig. The discharge pressure gauge reads in 10 psig increments. Two psig is not readable on this gauge and therefore the suction pressure is insignificant in this case. Also, since the reference suction pressure is approximately 1.3 psi, an extremely accurate and sensitive pressure gauge is needed to meet the Code requirements of having the full-scale reading of the gauge be less than three times the reference value. This type of gauge becomes unreadable due to the reciprocating action of the positive displacement SBLC pumps. Since the tank level is verified prior to testing, the only way to lose suction pressure would be either if the suction line became plugged or if there was a line break in the test piping. In either case the 1275 psig discharge pressure would not be achieved and the test would be terminated and the pump declared inoperable.

Because of the reasons stated above, the requirements to record suction pressures for these pumps are not practical.

Alternate Testing: The level of the test tank will be monitored prior to each inservice test and the discharge pressure will be set at 1275 psig.

2.2.1.2 Evaluation. The Code requires measurement of inlet and differential pressure. These measurements can be used to assess changes in the condition of centrifugal pumps. However, these SBLC pumps are positive displacement type. Their outlet pressure is dependant on the pressure of the system into which they are pumping and is not affected significantly by either inlet pressure (providing adequate net positive suction head exists) or flow rate. For these pumps, differential pressure and flow rate are not dependant variables as they are for centrifugal type pumps. Differential pressure is not a meaningful parameter in determining if hydraulic degradation is occurring.

The licensee proposes to monitor the pumps' suction source before the test and to set the pump discharge pressure at 1275 psig during the test. This will provide adequate information for use with flow rate to evaluate the hydraulic condition of these positive displacement pumps. Therefore, the proposal gives an adequate level of quality and safety and presents a reasonable alternative to the Code requirements. Additionally, the proposal is consistent with the test method requirements for positive displacement pumps of Part 6, which has recently been referenced in 10 CFR 50 and is acceptable to NRC.

Based on the determination that the licensee's testing is essentially equivalent to the Code and provides an acceptable level of quality and sa[illegible]y, the proposed alternative is authorized pursuant to §50.55a ¶(a)(3)(i).

2.3 High Pressure Coolant Injection System

2.3.1 Vibration Velocity Acceptance Criteria

RP-23A requests relief from the ASME/ANSI OM, Part 6, vibration velocity acceptance criteria requirements for the high pressure coolant injection (HPCI) pumps, 2(3)-2302, and proposes to use the ranges described in Table RP-23A (as follows).

2.3.1.1 Licensee's Basis for Requesting Relief. During both Unit 2 and Unit 3 outages for 1988, the HPCI pump impellers were replaced with a newly designed impeller. This new impeller has cut the vibration levels in half on both the HPCI main and booster pumps. Even though the overall vibration levels are much lower, in some cases the readings exceed the acceptable ranges established by Relief Request RP-00A and therefore ANSI/ASME OM-6.

The actual reference values are retained at Dresden Station and the limits are sp[illegible]fied in Table RP-23A.

Alternate Tes[illegible]: Pursuant to the letter dated September 1, 1988, "Safety Evaluation by [illegible] Office of Nuclear Reactor Regulation Supporting IST Program Relief Requests, Commonwealth Edison Company, Dresden Nuclear Power Station, Unit Nos. 2 and 3, Docket Nos. 50-237 and 50-249," Section 1.2., Relief Request PR-1A, Inservice Test Procedure, Temperature Measurement; This relief request is being submitted to establish velocity alert and action limits based on the actual pump vibration readings specific to these pumps.

The new vibration limits, though higher than those placed on the other pumps in the IST program, are modeled similar to the other limits in the program and are indicative of HPCI pump degradation. On points still showing high vibrations, the required action multiplier limit was calculated so that the required action range would be close to the previous vibration level prior to impeller replacement. This will ensure that the vibrations are not allowed to substantially increase over time. The vibration limits for each HPCI pump are listed in the following table.

2.3.1.2 Evaluation. The licensee proposes to use a vibration monitoring program similar to the program in OM Part 6, which incorporates vibration velocity (see Section 2.1.1 of this report). Part 6 specifies acceptance criteria for vibration velocity in both relative (as a multiple of the reference value) and absolute terms. When the criteria for the alert range is exceeded Part 6 requires an increased frequency of testing. Upon exceeding the required action levels, the pump must be declared inoperable.

Table RP-23A
HPCI Multipliers
Unit 2

Point	Alert Range Low High	Required Action Range	Required Action Not to Exceed (in/sec)
3H	>1.5V_r to 6V_r	>6V_r	0.700
3V	>1.5V_r to 2V_r	>2V_r	0.732
4H	>1.5V_r to 6V_r	>6V_r	0.700
4V	>2.5V_r to 6V_r	>6V_r	0.700
4A	>2.5V_r to 6V_r	>6V_r	0.700
9H	>2.5V_r to 6V_r	>6V_r	0.700
9V	>2.5V_r to 6V_r	>6V_r	0.700
10H	>2.5V_r to 6V_r	>6V_r	0.700
10V	>1.5V_r to 2V_r	>2V_r	0.832
10A	>2.5V_r to 6V_r	>6V_r	0.700

Unit 3

Point	Alert Range Low High	Required Action Range	Required Action Not to Exceed (in/sec)
3H	>1.5V_r to 2V_r	>2V_r	1.348
3V	>1.5V_r to 6V_r	>6V_r	0.700
4H	>1.5V_r to 2V_r	>2V_r	0.892
4V	>2.5V_r to 6V_r	>6V_r	0.700
4A	>2.5V_r to 6V_r	>6V_r	0.700
9H	>2.5V_r to 6V_r	>6V_r	0.700
9V	>2.5V_r to 6V_r	>6V_r	0.700
10H	>1.5V_r to 6V_r	>6V_r	0.700
10V	>1.5V_r to 6V_r	>6V_r	0.700
10A	>1.5V_r to 6V_r	>6V_r	0.700

NOTES: V_r is the reference velocity in inches per second.

These requirements help to ensure that appropriate actions are taken to address pump degradation, primarily bearing mechanical.

These HPCI pump/booster pump combinations have been modified to reduce vibration levels, however, due to their design and construction, they still experience high levels of vibration. To require additional modifications to these pumps or the driver to reduce vibration levels would be burdensome to the licensee. The high vibration levels can make strict adherence to some of the vibration velocity acceptance criteria of Part 6 impractical (particularly the absolute limits). Vibration readings for these HPCI pumps routinely fall into the alert range, >0.325 inches per second, as specified in Part 6. This could require an unnecessary increase in the test frequency for these pumps with little or no increase in vibration. Therefore, the licensee has not designated absolute limits for the alert range, but has assigned multipliers that are conservative or equivalent to those of Part 6 in that range.

The licensee also proposes to use modified absolute limits (see Table RP-23A) for the required action range for some measurement locations. The licensee set the required action multiplier limits so that the range would be close to the vibration limits in effect prior to pump modification and to ensure that vibrations are not allowed to increase substantially over time. However, the specific bases for the proposed action limits that exceed the Part 6 limits, are not provided with the relief request. The proposed acceptance criteria may not allow an adequate assessment of pump condition and require corrective action prior to bearing and consequently, pump failure. Therefore, long term relief should not be granted as requested. The licensee should provide justifications for the expanded required action limits that demonstrate that they are appropriate for the pump installations. The justifications should show that the cause of the high vibration levels is understood and that the pump can perform its function provided the vibration levels are within the assigned limits.

High vibration levels can be introduced by the driver, other rotating parts, or hydraulic conditions and could mask pump bearing-related vibrations and make it difficult to assess changes in bearing condition. The pump might fail completely prior to reaching the assigned limits. Therefore, assigning limiting values of vibration velocity for these HPCI pumps that will ensure corrective action is taken prior to pump failure is essential. Although the licensee has not demonstrated that the proposed limits that exceed those of Part 6 are adequate for the long term, using these limits should provide reasonable assurance of pump operational readiness for an interim period of one year or until the next refueling outage, whichever is longer.

Based on the determination that immediate compliance with the Part 6 acceptance criteria requirements is impractical and burdensome, and considering the licensee's proposal, interim relief should be granted pursuant to §50.55a ¶(f)(6)(i) for one year or until the next refueling outage, whichever is longer. By the end of this interim period, the licensee should establish vibration required action absolute value acceptance criteria for these pumps that ensure corrective action is taken prior to pump failure. The licensee should also provide the basis and justification for the acceptance criteria assigned to these pumps.

3. VALVE TESTING PROGRAM

The following relief requests were evaluated against the requirements of the ASME Code, Section XI, 10 CFR 50.55a, and applicable NRC positions and guidelines. A summary of the licensee's basis for each relief request is presented followed by an evaluation and reviewer's recommendation. Relief requests are grouped according to system and Code Category.

3.1 Various Systems

3.1.1 Excess Flow Check Valves

3.1.1.1 Relief Request. RV-00B requests relief from the exercising frequency requirements of Section XI, Paragraph IWV-3521, for all excess flow check valves, and proposes to perform check valve functional testing in accordance with plant Technical Specifications each refueling outage.

3.1.1.1.1 Licensee's Basis for Requesting Relief--These are reactor process instrument line excess flow check valves that are tested in accordance with Technical Specification 4.7.D.1.B. requirements which consist of a leakage test conducted every reactor refueling outage. The testing involves uncoupling the instrument lines and verifying that each valve strokes to the closed position. The test also verifies that the valve limits flow to an acceptable level. These excess flow check valves are designed to automatically close in the event of a down stream line rupture. Valving operations and instrument line disconnections during the performance of the inservice testing can result in a reactor scram and an emergency core cooling system initiation, or other automatic actions during the time the vessel is pressurized. This would result in uncontrolled rapid pressure transients in the reactor vessel and/or other undesirable consequences. The optimum time for the inservice testing of these valves is during reactor refueling.

Alternate Testing: The valves will be exercised during reactor refueling in accordance with Technical Specification 4.7.D.1.B.

3.1.1.1.2 Evaluation--These are excess flow check valves on instrument sensing lines which penetrate the primary containment. Their function is to provide containment isolation by closing to prevent excessive flow in case of a sensing line rupture. The testing specified in Dresden Technical Specifications is a modified leak test which is performed once each reactor refueling outage. Performance of valve closure verification on a quarterly or cold shutdown basis is impractical since this would isolate various instruments and could result in loss of control signals to vital instrumentation and subsequent reactor scram or initiation of automatic safety systems. Given these concerns, testing these valves each quarter or during cold shutdowns would be burdensome to the licensee. The licensee's proposal to leak test these valves each reactor refueling outage utilizing the procedures and acceptance criteria outlined in the plant Technical Specifications gives adequate assurance of operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome and considering that the licensee's proposal provides reasonable assurance of valve operational readiness, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.2 Main Steam System

3.2.1 Category BC Valves

3.2.1.1 Relief Request. RV-02A requests relief from the test frequency requirements of Section XI, Paragraph IWV-3411, for the main steam automatic depressurization system (ADS) Target Rock safety relief valves, 2(3)-0203-3A, and electromatic relief valves, 2(3)-0203-3B, -3C, -3D, and -3E. The licensee proposes to full-stroke exercise these valves on the return to operation from refueling outages and to verify proper valve operation by monitoring turbine or compensating valve position for appropriate response (the stroke time measurement portion of this request is evaluated in Section 3.2.1.2).

3.2.1.1.1 Licensee's Basis for Requesting Relief--Each relief valve discharges at one location in the torus and should the valve remain open for longer than five minutes, there is a concern that the extended blowdown at a given point could overheat the water locally, resulting in the release of free steam. This can create localized problems with the interior coating.

Manually exercising these valves requires steam pressure behind the disk before cycling and thus must be performed with the reactor at pressure. This requires the plant to be in an operating or startup condition with the required steam pressure in the main steam lines.

Additionally, under IST Category C safety valve and relief valve tests, all these valves are rebuilt every other outage or approximately 36 months. Dresden Station believes the combination of rebuilding (once every 36 months) and insitu exercising (once each operating cycle) adequately verifies the valves operational readiness.

Alternate Testing: These valves will be full-stroke exercised without timing at least once per operating cycle in accordance with Technical Specification 4.5.D.1.b.

3.2.1.1.2 Evaluation--These valves are connected to the main steam lines upstream of the main stream isolation valves (MSIVs) and discharge to the suppression pool. Full-stroke exercising them quarterly during power operations is impractical as this may result in a loss-of-coolant accident and an increase in suppression pool temperature. Reactor steam pressure is necessary to full-stroke exercise these valves, therefore, exercising is not practical during cold shutdowns when the reactor pressure is low. NUREG-0626 "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near Term Operating License Applications" recommends reduction of challenges to relief valves to lessen the risk of a small break LOCA (see also NUREG-0737, Section II.K.3.16).

Valve or system redesign would be necessary to permit testing these valves at the Code specified frequency. Making these modification would be burdensome for the licensee. The licensee proposes to exercise these valves once each operating cycle with the reactor at power by passing reactor steam through the valves and to verify the valve opens by monitoring turbine bypass and control valve position. This testing along with rebuilding these valves every other refueling outage allows an adequate assessment of operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted from the exercising frequency requirements as requested pursuant to §50.55a ¶(f)(6)(i).

3.2.1.2 <u>Relief Request</u>. RV-02A requests relief from the stroke time measurement requirements of Section XI, Paragraph IWV-3413, for the main steam automatic depressurization system (ADS) Target Rock safety relief valves, 2(3)-0203-3A, and electromatic relief valves, 2(3)-0203-3B, -3C, -3D, and -3E. The licensee proposes to full-stroke exercise these valves on the return to operation from refueling outages, but will not measure valve stroke times (the test frequency portion of this request is evaluated in Section 3.2.1.1).

3.2.1.2.1 <u>Licensee's Basis for Requesting Relief</u>--Relief is requested for the timing requirement for these valves. These valves provide steam blowdown (relief) to the torus which is initiated either automatically or manually by the use of a key operated switch. Because of the ability to be manually operated, they are categorized as both "B" and "C" valves.

These valves are exercised once each operating cycle with the reactor at pressure. Each valve is manually opened and is verified open by a compensating turbine bypass valve or control valve closure. Consistent timing of this event for the purpose of determining the operational readiness of these valves is not considered practical.

Additionally, under IST Category C safety valve and relief valve tests, all these valves are rebuilt every other outage or approximately 36 months. Dresden Station believes the combination of rebuilding (once every 36 months) and insitu exercising (once each operating cycle) adequately verifies the valves operational readiness.

<u>Alternate Testing</u>: These valves will be full-stroke exercised without timing at least once per operating cycle in accordance with Technical Specification 4.5.D.1.b.

3.2.1.2.2 <u>Evaluation</u>--These safety/relief valves operate rapidly, on the order of 100 milliseconds, and are not equipped with direct sensing position indication. Further, their stroke times are dependent on system parameters such as steam pressure. Therefore, trending the stroke times for these valves may not be meaningful since test-personnel response times and variations in system parameters could mask changes in valve condition. However, not monitoring for degradation of these valves is unacceptable.

The licensee should develop a method to obtain repeatable stroke times for these valves or propose some other method to adequately monitor for valve degradation. It may be possible to demonstrate that following enhanced maintenance procedures during the periodic refurbishment of these valves provides adequate assurance that the valves are not degraded. If stroke time measurements are used to monitor for valve degradation, the licensee should assign a maximum stroke time limit to these valves that is based on test data and verify that they stroke within that limit during testing. The measured stroke times need not be trended or compared to previous values, but if the maximum limit is exceeded, the valve should be declared inoperable and corrective action taken in accordance with IWV-3417(b). An interim period of one year or until the next refueling outage, whichever is longer, should be provided to allow the licensee time to develop a method to monitor for valve degradation. The licensee's proposed exercise test in addition to the testing and maintenance discussed in Section 3.2.1.1 of this report, should provide an acceptable level of quality and safety during this interim period.

Based on the determination that the combination of the proposed exercise test of these valves and the periodic maintenance and refurbishment should provide an acceptable level of quality and safety during the interim period, the proposed alternative is authorized pursuant to §50.55a ¶(a)(3)(i) for one year or until the next refueling outage, whichever is longer. At the end of the interim period, the licensee should implement a method of stroke timing these valves as discussed above or propose some other method to adequately monitor for valve degradation.

3.2.1.3 Relief Request. RV-02B requests relief from the Section XI, Paragraph IWV-3512, requirement to check set points of the main steam automatic depressurization system (ADS) Target Rock, 2(3)-0203-3A, and electromatic relief valves, 2(3)-0203-3B, -3C, -3D, and -3E, and proposes to calibrate the pressure switches and to full-stroke exercise and verify proper valve operation by observing turbine or compensating valve position each refueling outage.

3.2.1.3.1 Licensee's Basis for Requesting Relief--The electromatic relief valves and the relief function of the Target Rock valve are operated by actuation of a pilot solenoid valve which opens the main valve by creating differential pressure across the main disk. The pilot valve is actuated from an electric signal from either a control switch in the control room, the auto-depressurization logic, or a pressure switch that senses reactor system pressure.

The requirement of IWV-3512 to check relief and safety valve set points in accordance with ANSI/ASME OM-1-1981 is not applicable in this case because the set points are established by calibrating the pressure switch which senses system pressure. Therefore, relief is requested from compliance with this requirement.

The pressure setpoint of these valves is set by calibrating the pressure switch rather than testing the complete valve assembly. The combination of the pressure switch calibration and the exercising test for operability satisfies the intent of paragraph IWV-3512.

Alternate Testing: The pressure switch for each of these valves will be calibrated to verify the correct set point and the exercise test in accordance with Technical Specification 4.5.D.1.b. will verify operability of the valve.

3.2.1.3.2 Evaluation--The licensee indicated that the relief function of all of these valves is initiated by energizing their associated solenoid actuated pilot valves. The pilot valves are actuated by electrical signal from a pressure sensing device. The open safety function of the Target Rock safety/relief valves, 2(3)-0203-3A, is initiated by steam pressure above the pressure setpoint, which lifts the valve against spring pressure. This function of the Target Rock valve is not verified by setpoint calibration of the pressure switch. However, these Target Rock valves are rebuilt at least once every 36 months and set point tested after re-assembly in accordance with

ANSI/ASME OM-1-1981, therefore, relief is not necessary for the safety function of valves 2(3)-0203-3A.

Since the relief function of all of these valves is performed by the actuation of a solenoid operated pilot valve that is energized when a pressure switch setpoint is reached, they function as power actuated relief valves. To verify this function, these valves are required to be tested in accordance with the requirements of ANSI/ASME OM-1-1981, ¶ 3.3.1.1, "Main Steam Pressure Relief Valves With Auxiliary Actuating Devices." Additionally, following maintenance or refurbishment, the valve must be remotely actuated at reduced system pressure to verify open and close capability as required by ¶ 3.4.1.1. Except for the Target Rock safety function described above, no additional set point testing is required for these valves to meet IST requirements.

The relief function of these valves should be verified by testing them in accordance with ANSI/ASME OM-1-1981, ¶¶ 3.3.1.1 and 3.4.1.1. Since no additional set point testing is required to verify the relief function of these valves, this relief request does not appear to be necessary as submitted and should be deleted or modified as appropriate.

3.2.2 Category C Valves

3.2.2.1 Relief Request. RV-02E requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3522, for the main steam relief valve discharge piping vacuum breaker check valves, 2(3)-0220-105A, -105B, -105C, -105D, and -105E. The licensee proposes to manually full-stroke exercise the valve disks and visually inspect the valve internals during those cold shutdowns when the containment is de-inerted and each refueling outage.

3.2.2.1.1 Licensee's Basis for Requesting Relief--These valves provide vacuum relief on the main steam electromatic and Target Rock relief valve piping to the torus. They are normally closed and are required to open when steam is blown down to the torus. The steam condenses and creates a vacuum.

The requirements of IWV-3522 to measure the force or torque used by a mechanical exerciser to move the disk is not applicable in this case because the valve does not have a manual exerciser and can only be exercised by reaching into the valve and pushing the disk off the seat. These valves are designed to open on a differential pressure of less than 1 psid and therefore manually exercising the disk requires only slight hand pressure. Obtaining and adapting a device to measure the force exerted on the disk while exercising it is impractical.

Alternate Testing: These valves will be manually full stroke exercised during each cold shutdown when the drywell is de-inerted. Additionally, since the valve internals are visible without disassembly, the valve disk, seat, pin, and spring will be visually inspected during the stroke test.

3.2.2.1.2 Evaluation--These vacuum relief valves are located inside the primary containment which is inerted with nitrogen during power operation and during some cold shutdowns. Exercising these valves requires entry into containment. It is impractical to perform this testing quarterly during power operation or during cold shutdowns when the containment is inerted because of the personnel safety hazard posed by the oxygen deficient atmosphere. Purging and re-inerting containment involves large quantities of nitrogen gas and could result in a delay of plant startup from cold shutdown, which would be burdensome to the licensee. Exercising these valves during cold shutdowns when containment is deinerted and at each refueling outage allows an adequate assessment of valve operational readiness.

The licensee stated "Obtaining and adapting a device to measure the force exerted on the disk while exercising it is impractical." Their proposal to full-stroke exercise the valve disks and inspect the valve internals (i.e., disk, seat, pin, and spring) at each exercise as an alternative to measuring the force or torque required per IWV-3522 should give adequate assurance of operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering that the licensee's proposal provides an adequate assessment of valve operational readiness, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.2.2.2 Relief Request. RV-02D requests relief from the test frequency requirement of Section XI, Paragraph IWV-3521, for the main steam isolation valve (MSIV) operating air accumulator check valves listed below, and proposes to full-stroke exercise these valves open and closed each refueling outage.

2(3)-0220-84A	2(3)-0220-85A
2(3)-0220-84B	2(3)-0220-85B
2(3)-0220-84C	2(3)-0220-85C
2(3)-0220-84D	2(3)-0220-85D

3.2.2.2.1 Licensee's Basis for Requesting Relief--The MSIV accumulator check valves are normally open and are required to close upon loss of the pneumatic system. The only practical method of exercising these valves closed is by backpressurizing the check valve and verifying the valve closed by observing no significant loss of pressure (leak rate test).

Verifying closure of these valves during power operation or cold shutdown requires deinerting and entering the drywell and X-area to perform the appropriate leak rate tests. The average dose rates for these areas is 1.5 rem per hour during cold shutdown periods. These dose rates are considered to be extremely high. Additionally, to perform the necessary leak rate test, an extensive amount of accumulator piping must be disassembled to isolate the check valves. This extensive maintenance will delay unit startup if the unit is in cold shutdown. This test is impractical to perform during normal operation or cold shutdown due to the dose considerations and the burden of disassembling the MSIV accumulator piping.

Alternate Testing: These valves will be exercised open and closed each reactor refueling.

3.2.2.2.2 Evaluation--These valves are located inside primary containment, they shut to maintain air pressure in the MSIV accumulators upon loss of pressure in the supply header. It is impractical to verify the closure capability of these valves quarterly or during cold shutdowns since this requires isolating the air supply, disconnecting accumulator piping, and bleeding pressure from the associated instrument air header. The MSIVs would have to be removed from service to perform this testing and this cannot be done during power operation. Some of the areas that must be entered to perform this testing have high radiation levels during power operation and cold shutdowns. Performing this testing during these conditions could result in personnel being exposed to high radiation dose rates.

To verify closure of these check valves it is necessary to enter the primary containment, which is inerted during power operation and is not always de-inerted during cold shutdowns. To de-inert the containment during each cold shutdown solely to test these valves would be time consuming and use a substantial amount of nitrogen gas to re-establish the required inerted condition prior to restart. Performing this testing during cold shutdowns could result in a delay in returning to power, which would be burdensome to the licensee. The licensee's proposal to full-stroke exercise these valves open and closed each refueling outage allows an adequate assessment of operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.3 Feedwater System

3.3.1 Category AC Valves

3.3.1.1 Relief Request. RV-02C requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for the inboard, 2(3)-0220-58A and -58B, and outboard, 2(3)-0220-62A and -62B, feedwater injection header check valves and proposes to full-stroke exercise these valves closed each refueling outage.

3.3.1.1.1 Licensee's Basis for Requesting Relief--These valves are normally open and cannot be exercised closed during normal operation because the feedwater system is required to be operable to maintain reactor coolant inventory. To exercise these valves closed during cold shutdowns would require isolating the feedwater system, deinerting the drywell and backpressurizing the check valves individually to verify closure.

This testing is impractical to perform during cold shutdowns due to the reactor water cleanup path and feedwater being required (means of maintaining reactor coolant inventory) during cold shutdowns. Additionally, approximately 2,200 gallons of feedwater would need to be drained from the feedwater system headers prior to performing the necessary backflow test. This added operational and testing burden would invariably delay unit restart.

Alternate Testing: These valves will be exercised closed each reactor refueling.

3.3.1.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These valves are in the feedwater supply lines to the reactor vessel and are held open with feed flow during power operation. It is impractical to verify the closure capability of these valves during power operation since this would isolate one train of feedwater and cause a transient which could result in a reactor scram. To verify closure of these check valves it is necessary to enter the primary containment, which is inerted during power operation and is not always de-inerted during cold shutdowns. To de-inert the containment during each cold shutdown solely to test these valves would be time consuming and use a substantial amount of nitrogen gas to re-establish the required inerted condition prior to restart. Additionally, to verify individual valve closure it is necessary to leak test these valves, which requires stopping reactor water cleanup flow and draining a large amount of water from the feedwater header. This would upset the reactor water chemistry control and generate waste water to be processed. Performing this testing during cold shutdowns could result in a delay in returning to power, which would be burdensome to the licensee.

The licensee's proposal to verify the closed capability of these valves each refueling outage allows an adequate assessment of valve operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternative testing, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.3.2 Category C Valves

3.3.2.1 Relief Request. RV-00C requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for feedwater header check valves , 2(3)-0220-59, and proposes to full-stroke exercise these valves closed each refueling outage.

Relief request RV-00C also includes HPCI check valves 2(3)-2301-7 and reactor water cleanup (RWCU) check valves 2(3)-1201-158. Relief from the Code test frequency requirements for valves 2(3)-2301-7 is evaluated in Section 3.8.1.1 of this TER. Relief request RV-00C for valves 2(3)-1201-158 is evaluated in Section 3.9.1.1 of this TER.

3.3.2.1.1 Licensee's Basis for Requesting Relief--To verify these check valves closed requires quantifying leakage with a reverse flow test or seat leakage test. Because the 220-59 valve is normally open and valves 2301-7 and 1201-158 cannot be isolated, no direct or indirect methods exist for quantifying leakage during power operation or cold shutdowns.

During cold shutdowns, the condensate/feedwater system is required to be operable in order to maintain reactor water inventory. The normal makeup path to the reactor during cold shutdowns is through the 2(3)-0220-59 check valve and therefore The volume containing the above valves cannot be isolated.

Alternate Testing: Operability of these check valves in the closed position will be verified each reactor refueling outage. Closure will be verified during performance of a leakage rate test in which seat leakage will be quantified for the above valves.

3.3.2.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These 18 inch check valves are in the feedwater supply line to the reactor. They are normally held open by feedwater system flow and perform a safety function closed to prevent diversion of HPCI flow during injection. It is impractical to shut these valves during power operation since this would isolate one train of feedwater and cause a transient which could result in a reactor scram. Verification of valve closure capability during cold shutdown is impractical because it requires performance of a leak test. This leak test requires securing normal reactor coolant system makeup, draining the feedwater line, reconfiguring the system, and hook-up and removal of test equipment. Performing this testing during cold shutdowns could result in a delay in returning to power, which would be burdensome to the licensee. The licensee's proposal to full-stroke exercise this valve closed each refueling outage allows an adequate assessment of valve operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the licensee's proposed testing, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.4 Reactor Coolant Spray System

3.4.1 Category AC Valves

3.4.1.1 Relief Request. RV-02F requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for the inboard isolation reactor head spray line check valves, 2(3)-205-27, and proposes to full-stroke exercise and leak test these valves each refueling outage.

3.4.1.1.1 Licensee's Basis for Requesting Relief--These valves are normally closed during both reactor operation and extended shutdown periods. The designated safety position of these valves is closed; however, reactor head spray could be used for injecting into the vessel. Credit for this feature is not taken.

To exercise these valves during operations or cold shutdowns would require injecting approximately 70°F water into the reactor. Injecting cold water into the reactor could cause cracks in the reactor vessel due to thermal shock.

Alternate Testing: These valves will be exercised and leak tested during reactor refueling.

3.4.1.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These check valves are in the line from the rod drive water pumps to the reactor vessel head and open to allow spray flow to the vessel head. They perform a safety function in the closed position to prevent leakage of coolant from the reactor coolant system (RCS). It is impractical to full-stroke exercise these valves open either quarterly during power operation or during cold shutdown since this would require injection of a high flow rate of relatively low temperature water into the reactor vessel. This would cause thermal stresses on the injection nozzles and reactor vessel which could result in cracking and premature failure.

Verification of valve closure capability is impractical either quarterly or at cold shutdown. The only practical method is leak rate testing which would require lifting the reactor head and hook-up of leak testing equipment. These valves and the test connections for leak rate testing them are located inside the drywell which is maintained inerted during power operations and is not always de-inerted during cold shutdowns. To de-inert the containment during each cold shutdown solely to test these valves would be time consuming and use a substantial amount of nitrogen gas to re-establish the required inerted condition prior to restart. Performing this testing during cold shutdowns could result in a delay in returning to power operation, which would be burdensome to the licensee. The licensee's proposal to full-stroke exercise and leak test these valves each refueling outage allows an adequate assessment of valve operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the licensee's proposed testing, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.5 Standby Liquid Control System

3.5.1 Category AC Valves

3.5.1.1 Relief Request. RV-11A requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for the standby liquid control (SBLC) injection check valves, 2(3)-1101-15 and -16. The licensee proposes to full-stroke exercise these valves open with flow and leak test them each refueling outage.

3.5.1.1.1 Licensee's Basis for Requesting Relief--Exercising these valves requires firing the squib valves and injecting demineralized water into the reactor vessel. Injecting ambient water into the reactor vessel during operations is undesirable because the SBLC system would be inoperative during this test due to the isolation of the sodium pentaborate solution (neutron poison). In addition to SBLC being inoperative and placing the plant in a seven day Technical Specifications Limiting Condition of Operation (LCO), injecting cold water into the reactor would eventually fatigue and crack the injection nozzles due to the induced thermal shock. In addition to the nozzle cracking concerns, a cold water transient in the vessel would cause a reactor trip.

Because sodium pentaborate is a neutron poison, it is imperative that there be a physical separation between the poison and the primary system. To attempt a full flow test during a cold shutdown period would require a thorough system flushing and either removal or firing of one explosive valve. This work is beyond the scope of a normal cold shutdown period.

Alternate Testing: These valves will be exercised during reactor refueling outages. This will be done in conjunction with the firing of one explosive squib valve and injecting demineralized water into the reactor vessel at rated system flow. These valves are also leak tested during reactor refueling outages.

3.5.1.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These check valves are in the common SBLC injection line to the nuclear boiler, downstream from the explosively actuated squib valves. It is impractical to full-stroke exercise these valves open with flow, either quarterly during power operation or at cold shutdown. Initiation of system flow requires the firing of at least one squib valve, which destroys the valve. Further, the system contains highly borated water that would be introduced into the nuclear boiler system and cause a reactor shutdown if the testing were performed during power operation. Extensive flushing must be performed on the system to remove all traces of the boron solution prior to initiating flow for exercising these valves. Performance of this testing during cold shutdowns would be burdensome to the licensee since this testing could result in an extension of the cold shutdown.

The licensee's proposal to full-stroke exercise these valves open each refueling outage by firing one squib valve and injecting demineralized water into the reactor coolant system allows adequate assessment of valve operational readiness for their open function. The only practical method available to verify the closure capability of these valves is leak testing. The licensee's proposal to leak rate test these valves each refueling outage provides reasonable assurance of valve operational readiness for their closure function.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the adequacy of the proposed testing, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

3.6 Core Spray System

3.6.1 Category C Valves

3.6.1.1 Relief Request. RV-14B requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3520, for the core spray keep fill check valves, 2(3)-1402-34A and -34B, and proposes to verify the closure capability of these valves by performing sample disassembly and inspection and by leak testing them as a unit with the series stop check valves each refueling outage.

3.6.1.1.1 Licensee's Basis for Requesting Relief--Exercising closed the core spray keep fill check valves quarterly is not possible since the downstream valve (1402-36) is also a check valve (two check valves in series) and cannot be back pressurized during normal core spray pump tests.

Valves 2(3)-1402-34A and -34B cannot be verified closed independently of the 2(3)-1402-36A and -36B by any direct or indirect method during normal operations or cold shutdown periods because test connections between the valves do not exist. Valves 2(3)-1402-36A and -36B are verified closed each cold shutdown by closing the valve handwheels.

Alternate Testing: These valves will be disassembled and inspected on a refueling outage basis to verify valve operability in accordance with the sampling technique discussed in TV-00C. The series of valves will also be leak checked during each refueling outage.

3.6.1.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. The subject valves, 2(3)-1402-34A and -34B, are in series with stop check valves, 2(3)-1402-36A and -36B, and perform a safety function in the closed position to prevent diversion of core spray flow away from the reactor vessel during injection. The subject valves are simple check valves that do not have either local or remote position indication. The only practical method of verifying valve closure using pressure or flow is to leak test the valves. It is impractical to individually leak test the subject valves because they are in series with the stop check valves and there are no test taps between the series pairs. Installation of instrumentation or test taps to verify individual valve closure would involve system modifications and be burdensome to the licensee.

The licensee proposes to perform sample disassembly and inspection on the subject valves and leak test the series check valve pairs (a 1402-34 valve and its associated 1402-36 stop check valve) during refueling outages to verify their operational readiness. The licensee also proposes to exercise the downstream in-line stop check valves to the closed position using the handwheel during cold shutdowns. The staff has determined that, in cases where closure of one check valve in a series pair is sufficient to meet system requirements, testing the series pair as a unit provides adequate assurance of the pair's capability to perform its safety function. Therefore, the licensee's proposal to leak test each of these series check valve pairs during refueling outages provides adequate assessment of valve operational readiness. Excessive leakage through the pair would indicate degradation of both series check valves and both would have to be repaired or replaced as necessary.

The Staff's positions on check valve disassembly and inspection are provided in GL 89-04, Position 2. The use of disassembly and inspection to verify valve closure capability may be found to be acceptable if performed in accordance with this Generic Letter position. The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted pursuant to §50.55a ¶(f)(6)(i) with the following provision. If excessive leakage is noted during the leak test of a series check valve pair, then both valves should be declared inoperable and repaired or replaced as necessary.

3.7 Low Pressure Coolant Injection System

3.7.1 Category C Valves

3.7.1.1 Relief Request. RV-15B requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3520, for the low pressure coolant injection system (LPCI) keep fill check valves, 2(3)-1501-67A and -67B, and proposes to verify the full-stroke capability of these valves by performing sample disassembly and inspection and by leak testing them as a unit with the series stop check valves each refueling outage.

3.7.1.1.1 <u>Licensee's Basis for Requesting Relief</u>--Exercising closed the LPCI keep fill check valves quarterly is not possible since the downstream valve (1501-66) is also a check valve (two check valves in series) and cannot be back pressurized during normal LPCI pump testing.

Valves 2(3)-1501-67A and -67B can not be verified closed independently of the 2(3)-1501-66A and -66B by any direct or indirect method during normal operations or cold shutdown periods because test connections between the valves do not exist.

Valves 2(3)-1501-66A and -66B are verified closed each cold shutdown by closing the valve handwheels.

<u>Alternate Testing</u>: These valves will be disassembled and inspected on a refueling outage basis to verify valve operability in accordance with the sampling technique discussed in TV-00C. The series of valves will also be leak checked during each refueling outage.

3.7.1.1.2 <u>Evaluation</u>--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. The subject valves, 2(3)-1501-67A and -67B, are in series with stop check valves, 2(3)-1501-66A and -66B, and perform a safety function in the closed position to prevent diversion of LPCI flow away from the reactor vessel during injection. The subject valves are simple check valves that do not have either local or remote position indication. The only practical method of verifying valve closure using pressure or flow is to leak test the valves. It is impractical to individually leak test the subject valves because they are in series with the stop check valves and there are no test taps between the series pairs. Installation of instrumentation or test taps to verify individual valve closure would involve system modifications and be burdensome to the licensee.

The licensee proposes to perform sample disassembly and inspection on the subject valves and leak test the series check valve pairs (a 1501-67 valve and its associated 1501-66 stop check valve) during refueling outages to verify their operational readiness. The licensee also proposes to exercise the downstream in-line stop check valves to the closed position using the handwheel during cold shutdowns. The staff has determined that, in cases where closure of one check valve in a series pair is sufficient to meet system requirements, testing the series pair as a unit provides adequate assurance of the pair's capability to perform its safety function. Therefore, the licensee's proposal to leak test each of these series check valve pairs during refueling outages provides adequate assessment of valve operational readiness. Excessive leakage through the pair would indicate degradation of both series check valves and both would have to be repaired or replaced as necessary. If the series valve pairs are leak tested as described above, the subject valves need not be disassembled and inspected to meet IST requirements.

The Staff's positions on check valve disassembly and inspection are provided in GL 89-04, Position 2. The use of disassembly and inspection to verify valve closure capability may be found to be acceptable if performed in accordance with this Generic Letter position. The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted pursuant to §50.55a ¶(f)(6)(i) with the following provision. If excessive leakage is noted during the leak test of a series check valve pair, then both valves should be declared inoperable and be repaired or replaced as necessary.

3.8 High Pressure Coolant Injection System

3.8.1 Category C Valves

3.8.1.1 Relief Request. RV-23B requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for the HPCI system injection check valves, 2(3)-2301-7, and proposes to manually full-stroke exercise these valves open during cold shutdown and full-stroke exercise them open and closed each refueling outage.

RV-00C also requests relief from the test frequency requirements of the Code for these valves. Since relief request RV-23B provides a more detailed basis for relief, it is evaluated below and the recommendations and conclusions apply to this issue for both requests. The licensee should consider removing valves 2(3)-2301-7 from relief request RV-00C.

3.8.1.1.1 Licensee's Basis for Requesting Relief--The HPCI check valves have both an open and closed safety function. These valves are required to be closed during normal power operation to prevent flow diversion of reactor coolant (feedwater). These valves are also required to open upon a HPCI initiation to provide the injection path for HPCI.

To full-stroke exercise these valves open quarterly or during cold shutdowns requires injecting approximately 5,000 gpm of condensate storage tank water at 70°F into the reactor vessel at 540°F. This type of test is impractical because repeating this test will eventually fatigue and crack the injection nozzles due to the induced thermal shock. In addition to the nozzle cracking concerns, a cold water transient in the vessel will cause a reactor trip.

A reverse flow test (back pressurizing) is required to verify the closed position of the HPCI injection check valves. To accurately perform a reverse flow test on these valves during normal power operation (quarterly) requires entering the X-area, mounting a temporary gauge and monitoring the pressure upstream of the injection valve. This test is impractical because of the extremely high dose rates in the area coupled with the amount of time necessary to determine valve operability.

The average dose rate in the X-area during normal reactor operation is approximately 1.5 rem per hour. Two technicians will be required to perform the test. The test would take approximately 30 minutes barring any operational problems. The estimated radiation exposure of 1.5 ManRem to perform this test each quarter is considered extremely impractical.

To verify closure of the HPCI injection check valve during cold shutdown periods requires isolating the feedwater and reactor water cleanup systems, draining and venting the respective test volume and leak rate testing the HPCI injection valve. This test is impractical to conduct during cold shutdown because of the reactor water cleanup flow path and feedwater being required (means of maintaining reactor coolant inventory) during cold shutdown. Additionally, the added operational and testing burden would delay unit startup.

Alternate Testing: The 2301-7 valves will be full-stroke exercised open and closed each reactor refueling. Additionally, these valves will be full-stroke exercised open during cold shutdowns and the torque measured as required by IWV-3522.

3.8.1.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These valves perform a closed safety function to prevent loss of reactor coolant from the feedwater header into the HPCI system and an open safety function to allow HPCI injection. The licensee proposes to manually full-stroke exercise these valves open during cold shutdowns while measuring the force or torque as required by IWV-3522 and to full-stroke exercise them open with flow during refueling outages. That testing allows an adequate assessment of component operational readiness.

It is impractical to verify the closure capability of these check valves quarterly during power operation or cold shutdowns since it requires performance of leak testing. To verify valve closure quarterly during power operation it is necessary to enter high radiation areas for at least 30 minutes which would expose test personnel to high radiation dose rates. Leak testing these valves during cold shutdowns requires isolating portions of the feedwater and reactor water cleanup systems, which would disrupt the means of controlling reactor coolant inventory and chemistry. Additionally, this testing would necessitate extensive draining and realignment of the affected systems, which would likely result in delay of the return to power operation. Leak testing these valves to verify their closure capability at refueling outages gives adequate assurance of their closed operational readiness.

Based on the determination that compliance with the Code test frequency requirements for closure is impractical and burdensome, and considering the proposed testing, relief should be granted from the Code requirements as requested pursuant to §50.55a ¶(f)(6)(i).

3.8.1.2 Relief Request. RV-23C requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3520, for the HPCI keep fill check valves, 2(3)-2354-500 and proposes to verify the full-stroke exercise (closed) capability of these valves by performing sample disassembly and inspection and by leak testing them as a unit with the series stop check valves each refueling outage.

3.8.1.2.1 Licensee's Basis for Requesting Relief--Exercising closed the HPCI keep fill check valves quarterly is not possible since the downstream valve (2354-501) is also a check valve (two check valves in series) and can not be back pressurized during normal HPCI pump testing.

Valves 2(3)-2354-500A and B can not be verified closed independently of the 2(3)-2354-501A and B by any direct or indirect method during normal operations or cold shutdown periods because the connections between the valves do not exist. Valves 2(3)-2354-501A and B are verified closed each quarter by closing the valve handwheels.

Alternate Testing: The 2354-500 valves will be disassembled and inspected on a refueling outage basis to verify valve operability in accordance with the sampling technique discussed in TV-00C. The series of valves will also be leak checked during each refueling outage.

3.8.1.2.1 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. The subject valves, 2(3)-2345-500, are in series with stop check valves, 2(3)-2345-501, and perform a safety function in the closed position to prevent diversion of HPCI flow away from the reactor vessel during injection. The subject valves are simple check valves that do not have either local or remote position indication. The only practical method of verifying valve closure using pressure or flow is to leak test the valves. It is impractical to individually leak test the subject valves because they are in series with the stop check valves and there are no test taps between the series pairs. Installation of instrumentation or test taps to verify individual valve closure would involve system modifications and be burdensome to the licensee.

The licensee proposes to perform sample disassembly and inspection on the subject valves and leak test the series check valve pairs (a 2354-500 valve and its associated 2354-501 stop check valve) during refueling outages to verify their operational readiness. The licensee also proposes to exercise the downstream in-line stop check valves to the closed position using the handwheel during cold shutdowns. The staff has determined that, in cases where closure of one check valve in a series pair is sufficient to meet system requirements, testing the series pair as a unit provides adequate assurance of the pair's capability to perform its safety function. Therefore, the licensee's proposal to leak test each of these series check valve pairs during refueling outages provides reasonable assurance of valve operational readiness. Excessive leakage through the pair would indicate degradation of both series check valves and both would have to be repaired or replaced as necessary. If the series valve pairs are leak tested as described above, the subject valves need not be disassembled and inspected to meet IST requirements.

The Staff's positions on check valve disassembly and inspection are provided in GL 89-04, Position 2. The use of disassembly and inspection to verify valve closure capability may be found to be acceptable if performed in accordance with this Generic Letter position. The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted pursuant to §50.55a ¶(f)(6)(i) with the following provision. If excessive leakage is noted during the leak test of a series check valve pair, then both valves should be declared inoperable and be repaired or replaced as necessary.

3.8.1.3 <u>Relief Request</u>. RV-23D requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3521, for the HPCI turbine exhaust vacuum breakers, 2(3)-2399-76A, -76B, -77A, and -77B, and proposes to verify their open and closed capability by performing sample disassembly and inspection and testing them open and closed as a set at refueling outages.

3.8.1.3.1 <u>Licensee's Basis for Requesting Relief</u>--To full-stroke exercise these valves open/closed requires entering the torus and disassembling and manually exercising the valves to verify operability. This testing is impractical during power operations since these valves are located inside the torus and are inaccessible because the torus is inerted and at a negative pressure and would require the violation of primary containment to enter. To perform a full-stroke exercise of these valves during cold shutdowns is extremely burdensome because entering the torus requires removal of the 4.0 ft. diameter manway cover. Once the cover is replaced after testing, a local leak rate test must then be performed to verify the primary containment boundary. This added maintenance and testing burden would invariably delay unit startup.

<u>Alternate Testing</u>: These valves will be disassembled and inspected to verify valve operability in accordance with the sampling technique discussed in TV-00C. This set of valves will also be functionally tested open and closed each refueling outage.

3.8.1.3.2 <u>Evaluation</u>--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These series-parallel check valves open to relieve the vacuum created by condensing steam in the turbine exhaust line and close to prevent steam heating of the torus airspace. It is impractical to individually verify a full-stroke exercise of these valves quarterly during power operation, during cold shutdowns, or during refueling outages because there are no isolation valves, test taps, or external position indicating devices to allow this verification. System modifications would be necessary to permit individual valve testing. Making those modifications would be burdensome to the licensee.

Disassembly, inspection and manual full-stroke of the valve disk can adequately ascertain a check valve's internal condition. The Staff's positions on check valve disassembly and inspection are provided in GL 89-04, Position 2. Relief is granted by GL 89-04 to use disassembly and inspection to verify the full-stroke open capability of check valves provided the disassembly is performed in accordance with Position 2 of this Generic Letter. Therefore, the open verification is not evaluated in this report.

The use of disassembly and inspection to verify valve closure capability may be found to be acceptable if testing by pressure or flow is impractical. As discussed above, it is impractical to individually verify closure of the check valves in this series parallel arrangement using system pressure or flow. Therefore, disassembly and inspection appears to be the only practical method of verifying valve closure capability. The licensee also indicated that these valves will be functionally tested open and closed each refueling outage. This testing should be performed following valve reassembly to provide a degree of assurance that the valves have been properly reassembled and that their disks move freely. The licensee's proposal should provide reasonable assurance of valve operational readiness.

The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service. The licensee should investigate the use of non-intrusive methods of testing this set of four series-parallel check valves to verify their individual capability to function in both the forward and reverse flow directions.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the licensee's proposal, relief should be granted for valve closure verification pursuant to §50.55a ¶(f)(6)(i) with the following provision. When these valves are tested as a set, if either the forward flow or reverse flow closure capability of the set becomes questionable, all valves in the group must be declared inoperable and be repaired or replaced as necessary.

3.9 Reactor Water Cleanup System

3.9.1 Category C Valves

3.9.1.1 Relief Request. RV-00C requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for the RWCU return check valves 2(3)-1201-158, and proposes to full-stroke exercise these valves closed each refueling outage.

Relief request RV-00C also includes HPCI check valves 2(3)-2301-7 and feedwater check valves 2(3)-0220-59. The requests for these valves are evaluated in Sections 3.8.1.1 and 3.3.2.1 of this TER.

3.9.1.1.1 Licensee's Basis for Requesting Relief--To verify these check valves closed requires quantifying leakage with a reverse flow test or seat leakage test. Because the 220-59 valve is normally open and valves 2301-7 and 1201-158 cannot be isolated, no direct or indirect methods exist for quantifying leakage during power operation or cold shutdowns.

During cold shutdowns, the condensate/feedwater system is required to be operable in order to maintain reactor water inventory. The normal makeup path to the reactor during cold shutdowns is through the 2(3)-0220-59 check valve and therefore the volume containing the above valves cannot be isolated.

Alternate Testing: Operability of these check valves in the closed position will be verified each reactor refueling outage. Closure will be verified during performance of a leakage rate test in which seat leakage will be quantified for the above valves.

3.9.1.1.2 Evaluation--The Code requires these check valves to be full-stroke exercised quarterly or during cold shutdowns. This testing is to demonstrate that the valves are capable of moving to their safety function position(s) to assess their operational readiness. These check valves are in the RWCU discharge to the main feedwater header just prior to entry into the reactor vessel. They are normally open to permit RWCU flow back to the RCS. It is impractical to verify closure of these valves during power operation since it would be necessary to isolate RWCU flow, which could disrupt RCS water chemistry control and result in a reactor shutdown. Verification of valve closure capability during cold shutdown is impractical because it requires performance of a leak test. This leak test requires securing RWCU flow, isolating the feedwater line using a manual valve located inside the normally inerted drywell, reconfiguring the system, and hook-up and removal of test equipment. Performing this testing during cold shutdowns could result in a delay in returning to power, which would be burdensome to the licensee. The licensee's proposal to full-stroke exercise these valves closed in conjunction with leakage rate testing each refueling outage gives adequate assurance of operational readiness.

Based on the determination that compliance with the Code test frequency requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted as requested pursuant to §50.55a ¶(f)(6)(i).

APPENDIX A
IST PROGRAM ANOMALIES

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IST PROGRAM ANOMALIES

During the review of the licensee's submittals, inconsistencies and omissions were noted among the relief requests that are part of the licensee's Third Ten-Year Resubmittal, dated February 28, 1992. These issues are summarized below.

1. The IST program does not include a description of how the components were selected and how testing requirements were identified for each component. The review performed for this Safety Evaluation (SE)/TER did not include verification that all pumps and valves within the scope of 10 CFR 50.55a and Section XI are contained in the IST program, and did not ensure that all applicable testing requirements have been identified. Therefore, the licensee is requested to include this information in the IST program. The program should describe the development process, such as a listing of the documents used, the method of determining the selection of components, the basis for the testing required, the basis for categorizing valves, and the method or process used for maintaining the program current with design modifications or other activities performed under 10 CFR 50.59.

2. RP-00A requests relief (see Section 2.1.1 of this report) from the Code vibration measurement requirements and proposes to monitor vibration using a program patterned after ANSI/ASME OM-6, Draft 11, for all pumps in the IST program. The NRC approves the use of the vibration monitoring program in OMa-1988, Part 6, as corrected by the 1989 addenda. However, the licensee must comply with all the Part 6 vibration measurement requirements. Relief should be granted provided the licensee utilizes all the criteria regarding vibration testing contained in ASME/ANSI OMa-1988, Part 6, as corrected by the 1989 addenda, except those for which specific relief has been requested and granted.

3. RP-00A requests relief (see Section 2.1.2 of this report) from the vibration measurement instrument frequency response requirements of OMa-1988, Part 6, for the SBLC pumps and proposes to use available instruments. The range of the Dresden vibration equipment just slightly exceeds the Code requirement. The licensee's proposal should allow an adequate assessment of pump operational readiness for an interim period. During that time the licensee should determine if instruments can be obtained that meet the requirements, or if the response range requirement is a hardship that is not compensated for by an increase in quality for the subject pumps. Relief should be granted from the Part 6 response range requirement for an interim period of one year or until the next refueling outage, whichever is longer. By the end of that period the licensee should either comply with the requirements or justify an alternate approach.

4. RP-23A requests relief (see Section 2.3.1 of this report) from the Part 6 vibration velocity acceptance criteria requirements for the HPCI pumps and proposes to use the ranges described in Table RP-23A. These pump/booster pump combinations were modified to reduce vibration levels, however, due to their design and construction still experience high levels of vibration. The specific bases for the proposed action limits, that exceed the Part 6 limits, are not provided in the request. Therefore, long term

relief should not be granted as requested. The licensee should provide justifications for the expanded required action limits that demonstrate that they are appropriate for the pump installations. The justifications should show that the cause of the high vibration levels is understood and that the pump can perform its function provided the vibration levels are within the assigned limits.

Although the proposed limits that exceed those of Part 6 may not be adequate for the long term, using these limits should provide reasonable assurance of pump operational readiness for an interim period of one year or until the next refueling outage, whichever is longer. Interim relief should be granted pursuant to §50.55a ¶(f)(6)(i) for one year or until the next refueling outage, whichever is longer. By the end of this interim period, the licensee should establish vibration required action absolute value acceptance criteria for these pumps that ensure corrective action is taken prior to pump failure. The licensee should also provide the basis and justification for the acceptance criteria assigned to these pumps.

5. Valve relief requests RV-13A, -14A, -15A, -23A, -23D, and -23F are for check valves which cannot practically be full-stroke exercised open with system flow per GL 89-04, Position 1. The licensee proposes to full-stroke exercise these valves by sample disassembly, inspection, and a manual exercise. GL 89-04 grants relief to use disassembly and inspection performed in accordance with Position 2 to verify the full-stroke open capability of check valves in cases where full-stroke exercising cannot be practically performed by flow or by other positive means. The NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has some risk which may make its routine use as a substitute for testing undesirable. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition. It should be performed under the maintenance program at a frequency commensurate with the valve type and service.

   The use of non-intrusive techniques in conjunction with partial flow through a valve can be an acceptable means of verifying that a valve full-stroke exercises open. The licensee should investigate the use of non-intrusive diagnostic techniques to demonstrate whether or not check valves swing fully open during partial flow exercising.

   If the investigation reveals that verification of a full-stroke exercise with flow is feasible, then disassembly and inspection should not be used in lieu of testing and these relief requests should be modified or withdrawn. Relief is granted to use disassembly and inspection to verify full-stroke exercise open of the subject valves only when it is performed in accordance with Position 2 of the Generic Letter. This position requires that, if practical, a part-stroke exercise test be performed following reassembly but prior to returning a valve to service.

6. Valve relief requests RV-14A, -15A, and -23F are for check valves that may not be practically verified to full-stroke exercise open with system flow per GL 89-04, Position 1. The licensee proposes to full-stroke exercise these valves by sample disassembly, inspection, and a manual exercise. Disassembly and inspection, to verify the full-stroke open capability of check valves is an option only where exercising cannot be practically

performed by flow or by other positive means. The licensee indicated that full-stroke exercising these minimum flow recirculation line check valves could damage the associated pumps due to increased vibration levels when the pumps are operating with only minimum recirculation line flow. Testing should not be performed that can damage plant equipment. However, the reviewers believe that some test method may be feasible to full-stroke exercise these valves that does not damage the pumps.

The licensee should consider methods such as using non-intrusive techniques to verify that the subject check valves fully open (i.e., use acoustics to verify the disk impacts the stop when flow is initiated). Another possibility is to disable the automatic isolation of the minimum flow line during testing to allow simultaneous flow through this line and the pump test path for longer than 10 seconds so a full-stroke of the subject valves can be verified. This testing may only be practical at cold shutdowns or refueling outages. The licensee should perform their investigation and respond to this concern within one year from receipt of this report.

7. RV-14B, -15B, and -23C request relief from the test method and frequency requirements of Section XI for the core spray, LPCI, and HPCI upstream keep fill check valves (see Sections 3.6.1.1, 3.7.1.1, and 3.8.1.2 of this report). The licensee proposes to verify the closure capability of these valves by performing sample disassembly and inspection and by leak testing them as a unit with the series stop check valves each refueling outage. The subject valves and the series stop check valves perform a safety function in the closed position to prevent diversion of flow away from the reactor vessel during injection. It is impractical to individually leak test the subject valves because there are no test taps between them and the series stop check valves. The staff has determined that in cases where closure of one check valve in a series pair is sufficient to meet system requirements, that testing the series pair as a unit provides adequate assurance of the pair's capability to perform its safety function. Therefore, the licensee's proposal to leak test each of these series check valve pairs during refueling outages provides reasonable assurance of valve operational readiness and relief should be granted with the following provision. If excessive leakage is noted during the leak test of a series check valve pair, then both valves should be repaired or replaced as necessary. If the series valve pairs are leak tested as described above, the subject valves need not be disassembled and inspected to meet IST requirements.

   The Staff's positions on check valve disassembly and inspection are provided in GL 89-04, Position 2. The use of disassembly and inspection to verify valve closure capability may be found to be acceptable if testing with pressure or flow is impractical and the disassembly is performed in accordance with this Generic Letter position. Refer to Item 5 of this Appendix for further discussions on disassembly and inspection.

8. RV-02A requests relief from the stroke time measurement requirements of Section XI for the main steam automatic depressurization system (ADS) Target Rock safety relief valves, 2(3)-0203-3A, and electromatic relief valves, 2(3)-0203-3B, -3C, -3D, and -3E (see Section 3.2.1.2 of this report). The licensee proposes to full-stroke exercise these valves on the return to operation from refueling outages, but will not measure valve

stroke times (the test frequency portion of this request is evaluated in Section 3.2.1.1). These safety/relief valves operate rapidly, on the order of 100 milliseconds, and are not equipped with direct sensing position indication. Further, their stroke times are dependent on system parameters such as steam pressure. Therefore, trending the stroke times for these valves may not be meaningful since test-personnel response times and variations in system parameters could mask changes in valve condition. However, not monitoring for degradation of these valves is unacceptable.

The licensee should develop a method to obtain repeatable stroke times for these valves or propose some other method to monitor for valve degradation. It may be possible to demonstrate that following enhanced maintenance procedures during the periodic refurbishment of these valves provides adequate assurance that the valves are not degraded. If stroke time measurements are used to monitor for valve degradation, the licensee should assign a maximum stroke time limit to these valves that is based on test data and verify that they stroke within that limit during testing. The measured stroke times need not be trended or compared to previous values, but if the maximum limit is exceeded, the valve should be declared inoperable and corrective action taken in accordance with IWV-3417(b). Immediate compliance with the Code requirements would be a hardship without a compensating increase in the level of quality and safety. Interim relief should be granted for one year or until the next refueling outage, whichever is longer, during which the licensee should develop a method to monitor for valve degradation.

9. RV-23D requests relief from the test method and frequency requirements of Section XI for the HPCI turbine exhaust vacuum breakers. It is impractical to individually verify a full-stroke exercise open or closed quarterly during power operation, during cold shutdowns, or during refueling outages because there are no isolation valves, test taps, or external position indicating devices to allow this verification. The licensee proposes to verify their open and closed capability by performing sample disassembly and inspection and testing them open and closed as a set at refueling outages.

   Relief is granted for the open position by GL 89-04 as discussed in Item 5 of this Appendix. The use of disassembly and inspection to verify valve closure capability may be found to be acceptable if testing by pressure or flow is impractical. As discussed above, it is impractical to individually verify closure of the check valves in this series parallel arrangement using system pressure or flow. Therefore, disassembly and inspection appears to be the only practical method of verifying valve closure capability. These valves will also be functionally tested open and closed each refueling outage. This testing should be performed following valve reassembly to provide a degree of assurance that the valves have been properly reassembled and that their disks move freely. If either the forward flow or reverse flow closure capability of the set becomes questionable, all valves in the group must be declared inoperable and be repaired or replaced as necessary.

10. RV-00A requests relief from the leak rate testing requirements of the Code for Category A and A/C primary containment isolation valves (CIVs) and proposes to leak test these valves in accordance with plant Technical Specification and 10 CFR 50, Appendix J, leak test requirements. Testing

containment isolation valves in accordance with 10 CFR 50, Appendix J, and complying with the "Analysis of Leakage Rates" and "Corrective Action Requirements" of Section XI, Paragraphs IWV-3426 and -3427(a), provides a reasonable alternative to the Code requirements as addressed in NRC GL 89-04, Attachment 1, Position 10, "Containment Isolation Valve Testing." The licensee's proposed testing appears to comply with the CIV leakage rate requirements of Position 10. The reviewer assumes that the licensee's program is in full compliance with this Generic Letter position, therefore, deviations from these requirements are not considered and evaluated. Any deviations should be identified and justified prior to implementation.

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3
SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Pump RP-00A	2.1.1	IWP-4510 and Table IWP-3100-2: Measure vibration displacement	All pumps in IST program.	Utilize vibration testing program similar to OM-6 program, as described in IST program.	Alternative authorized with provision (a)(3)(i)
Pump RP-00A	2.1.2	OM-6, 4.6.1.6: Instrument frequency response	Standby liquid control (SBLC) pumps: 2(3)A-1102 and B-1102	Use available vibration measurement equipment with response range to 2 Hz.	Alternative authorized for one year or until the next refueling outage (RO) (a)(3)(ii)
Pump RP-00B	2.1.3	IWP-3300: Measure bearing temperature	All pumps in IST program.	Measure vibration quarterly.	Alternative authorized (a)(3)(i)
Pump RP-11A	2.2.1	IWP-4200 and Table IWP-3100-1: Measure inlet and differential pressure.	SBLC pumps: 2(3)A-1102 and B-1102	Measure test tank leve' before the test and set pump discharge pressure for the test.	Alternative authorized (a)(3)(i)
Pump RP-19A	N/A	N/A	Fuel pool cooling pumps: 2(3)-1902-A & -B	Test at existing system resistance.	Components covered are not ASME Code Class. Request not evaluated in SE/TER.
Pump RP-23A	2.3.1	OM-6, Table 3a: Vibration velocity acceptance criteria	High pressure coolant injection (HPCI) pumps: 2(3)-2302	Measure vibration velocity and use ranges provided in IST program Table RP-23A.	Interim Relief Granted (f)(6)(i) for one year or until the next RO

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3
SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Pump RP-52A	N/A	N/A	Diesel fuel oil transfer pump: 2(3)-5203, 2-5203, & 3-5203	Set discharge pressure and measure flow rate and vibration.	Components covered are not ASME Code Class. Request not evaluated in SE/TER.
Valve RV-00A	N/A	IWV-3420: Leak rate test method	All Category A and AC containment isolation valves (CIVs)	Test per 10 CFR 50, Appendix J and plant Technical Specifications.	Approved per GL 89-04, Position 10, Relief not evaluated in the SE/TER
Valve RV-00B	3.1.1.1	IWV-3521: Test frequency	All excess flow check valves	Exercise each refueling outage (RO) according to plant Technical Specifications	Relief Granted (f)(6)(i)
Valve RV-00C	3.3.2.1	IWV-3521: Test frequency	FW check valves: 2(3)-220-59 (for RWCU & HPCI check valves see TER sections 3.9.1.1 and 3.8.1.1)	Verify closure by leak rate testing each RO.	Relief Granted (f(6)(i)
Valve RV-00C	3.9.1.1	IWV-3521: Test frequency	Reactor water cleanup (RWCU) return check valves: 2(3)-1201-158	Verify closure each RO.	Relief Granted (f)(6)(i)
Valve RV-02A	3.2.1.1	IWV-3411: Test frequency	MS safety and relief valves: 2(3)-0203-3A through -3E	Full-stroke exercise at least once per operating cycle according to plant technical specifications.	Relief Granted (f)(6)(i)

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3
SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Valve RV-02A	3.2.1.2	IWV-3413: Measure stroke time	MS safety and relief valves: 2(3)-0203-3A through -3E	Verify operation each RO without measuring stroke time.	Alternate authorized for one year or until the next RO per (a)(3)(i)
Valve RV-02B	3.2.1.3	IWV-3512: Check relief valve setpoints	MS safety and relief valves: 2(3)-0203-3A through -3E	Calibrate the pressure switch to verify setpoint and exercise per Technical Specifications.	Relief does not appear to be required
Valve RV-02C	3.3.1.1	IWV-3521: Test frequency	Inboard and outboard feedwater (FW) check valves: 2(3)-0220-58A, -58B, -62A, and -62B	Full-stroke exercise closed each RO.	Relief Granted (f)(6)(i)
Valve RV-02D	3.2.2.2	IWV-3521: Test frequency	MSIV accumulator check valves: 2(3)-0220-84A through -84D and 2(3)-0220-85A through -85D	Full-stroke exercise open and closed each RO.	Relief Granted (f)(6)(i)
Valve RV-02E	3.2.2.1	IWV-3522: Test method and frequency	Main steam (MS) relief line vacuum breaker check valves: 2(3)-0220-105A through -105E	Manually exercise and visually inspect during each cold shutdown with drywell de-inerted and each RO.	Relief Granted (f)(6)(i)
Valve RV-02F	3.4.1.1	IWV-3521: Test frequency	Reactor head spray line inboard isolation check valves: 2(3)-0205-27	Full-stroke exercise and leak rate test each RO.	Relief Granted (f)(6)(i)

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3
SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Valve RV-03A	N/A	IWV-3413 & -3520: Stroke time and test method and frequency for check valves	CRD scram valves	Verify proper venting of scram header do not measure stroke time.	Components covered are not ASME Code Class Request not evaluated in SE/TER.
Valve RV-03B	N/A	IWV-3400, -3413, & -3522: Test method and frequency	control rod drive (CRD) scram valves: 2(3)-0305-114, -117, -118, -126, & -127	Exercise per plant Technical Specifications.	Relief Granted GL 89-04, Position 7. Request not evaluated in SE/TER.
Valve RV-03C	N/A	IWV-3413 & -3520: Stroke time and test method and frequency for check valves	ARI/ATWS Air header bleed off valves	Verify proper venting of header, do not stroke time.	Components covered are not ASME Code Class. Request not evaluated in SE/TER.
Valve RV-11A	3.5.1.1	IWV-3521: Test frequency	SBLC injection check valves: 2(3)-1101-15 & -16	Full-stroke exercise each RO.	Relief Granted (f)(6)(i)
Valve RV-13A	N/A	IWV-3520: Test method and frequency	Isolation condenser makeup valves	Sample disassemble and inspect during ROs.	Approved GL 89-04, Position 2, Request not evaluated in the SE/TER.
Valve RV-14A	N/A	IWV-3520: Test method and frequency	Core spray pump min-flow check valves	Sample disassemble and inspect during ROs.	Approved GL 89-04, Position 2, Request not evaluated in the SE/TER.

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3
SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Valve RV-14B	3.6.1.1	IWV-3520: Test method and frequency	Core spray keep fill check valves: 2(3)-1402-34A and -34B	Perform sample disassembly and inspection and leak test the valves as a unit each refueling outage	Provisional Relief Granted (f)(6)(i)
Valve RV-15A	N/A	IWV-3520: Test method and frequency	Low pressure coolant injection (LPCI) pump min-flow check valves	Sample disassemble and inspect during ROs.	Approved GL 89-04, Position 2, Request not evaluated in the SE/TER.
Valve RV-15B	3.7.1.1	IWV-3520: Test method and frequency	LPCI keep fill check valves: 2(3)-1501-67A & -67B	Leak test the series as a unit and sample disassemble and inspect the valves during ROs.	Provisional Relief Granted (f)(6)(i)
Valve RV-23A	N/A	IWV-3520: Test method and frequency	HPCI torus suction check valves	Sample disassembly and inspection during ROs.	Approved GL 89-04, Position 2, Request not evaluated in the SE/TER.
Valve RV-23B	3.8.1.1	IWV-3521: Test frequency	HPCI injection check valves: 2(3)-2301-7	Manually exercise open during cold shutdown, full-stroke exercise open and closed each RO.	Relief Granted (f)(6)(i)
Valve RV-23C	3.8.1.2	IWV-3520: Test method and frequency	HPCI keep fill check valves: 2(3)-2354-500	Leak test the series as a unit and sample disassemble and inspect the valves during ROs.	Provisional Relief Granted (f)(6)(i)

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SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Valve RV-23D	3.8.1.3	IWV-3520: Test method and frequency	HPCI turbine exhaust vacuum breaker check valves: 2(3)-2399-76A, -76B, -77A, & 77B	Leak test the series pair as a unit and sample disassemble and inspect the valves during ROs.	Provisional Relief Granted (f)(6)(i)
Valve RV-23E	N/A	IWV-3520: Test method and frequency	HPCI turbine exhaust check valves	Exercise open quarterly, closed each RO.	Alternative authorized for one year or until the next RO (a)(3)(i) NRC SE dated 9/11/92
Valve RV-23F	N/A	IWV-3520: Test method and frequency	HPCI min-flow check valves	Sample disassembly and inspection during ROs.	Approved per GL 89-04 Position 2 Request not evaluated in the SE/TER.
Valve RV-23G	N/A	IWV-3520: Test method and frequency	HPCI gland seal condenser check valves	Disassemble and inspect during ROs.	Approved per GL 89-04, Position 2. Reference NRC SE dated 9/11/92.
Valve RV-23H	N/A	IWV-3410 & -3515: Test frequency and fail-safe testing	HPCI drain pot solenoid valves	Test using alarm indication during ROs.	Interim Relief Granted for not measuring stroke time (f)(6)(i) NRC SE dated 9/11/92. Relief Granted for IWV-3410/3415 per (f)(6)(i) NRC 9/11/92.

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SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	RELIEF REQUEST STATUS
Valve RV-24A	N/A	IWV-3520: Test method and frequency	Containment air monitor isolation valves	Exercise open and closed each RO.	Relief Granted (f)(6)(i) NRC SE dated 9/11/92.
Valve RV-25A	N/A	IWV-3520: Test method and frequency	Containment atmosphere dilution isolation valves	Exercise each RO.	Interim Relief Granted (a)(3)(ii) NRC SE dated 9/11/92 for one year or until the next RO.
Valve RV-47A	N/A	IWV-3521: Test frequency	Traversing In-core probe nitrogen purge isolation check valves	Exercise closed each RO.	Component covered not ASME Code Class. Request not evaluated in SE/TER.
Valve RV-57A	N/A	IWV-3413: Measure stroke time	Service water flow control to control room cooling valve	Fail-safe test quarterly without measuring stroke time.	Interim Relief Granted (f)(6)(i) NRC SE dated 9/11/92 for one year or until the next RO.
Valve RV-66A	N/A	IWV-3413: Stroke time	Diesel generator air start solenoid valves	Ensure diesel generator meets start time limits during monthly testing.	Components covered are not ASME Code Class. Request not evaluated in SE/TER.