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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM

COMMONWEALTH EDISON COMPANY

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to 10 CFR 50.55a, Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i). In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. Section 50.55a(f)(4)(iv) provides that IST of pumps and valves may meet subsequent code editions and addenda that are incorporated by reference in Section 50.55a (or portions of such later editions or addenda) subject to Commission approval and provided that all related requirements of the respective editions or addenda are met.

NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," indicates acceptable alternatives to the Code requirements. Alternatives that conform with the guidance in GL 89-04 may be implemented without additional NRC approval, but are subject to review during inspections. Further guidance was given in Generic Letter 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

Generic Letter 89-04, Supplement 1, approved the use of the 1989 Edition of Section XI which references Part 6 (OM-6) and Part 10 (OM-10) of the ASME Operations and Maintenance (OM) Standards. The licensee has elected to use certain of the approvals for portions of OM-6 and OM-10 as allowed by the generic letter. For the pump program, the licensee has used OM-6 in its entirety; therefore, all related requirements have been included in the pump testing. Relief Requests RP-11 B and C and RP-14, which are evaluated below,

ENCLOSURE

take exception to certain requirements of OM-6 as discussed herein. The portions of OM-10 that have been approved by the generic letter under Section 50.55a(f)(4)(iv) are discussed in the applicable sections of NUREG-1482 (as referenced in the relief requests) and all related requirements, if any, are listed in NUREG-1482. In addition, OM-10 allows licensees to defer quarterly testing until cold shutdown or refueling outages, based on a license determination of impracticality. Section 3.1.1 of NUREG-1482 indicates the related requirements for each category of value. Relief Requests RV-02G, RV-02H, RV-14C, RV-23D, RV-23E, and RV-37A relate to test deferrals as allowed by OM-10 and endorsed by NUREG-1482 Section 3.1.1 and Generic Letter 89-04, Supplement 1, with additional guidance, as applicable, in Sections 4.1.4 and 4.2.4 for conditions that are considered an acceptable basis for test deferrals. Each of these relief requests is discussed in the evaluation section of this Safety Evaluation.

The NRC staff's findings with respect to authorizing alternatives and granting or not granting the reliefs requested as part of the licensee's IST program are contained in this safety evaluation (SE).

2.0 BACKGROUND

In its letter of August 31, 1995, Commonwealth Edison Company (ComEd, the licensee) submitted Revision 3 to the Third Ten-Year IST Program for Pumps and Valves for the Dresden Nuclear Power Station, Units 2 and 3. A revision to Relief Request RP-11C was subsequently submitted in a letter dated November 30, 1995. Revisions 1 and 2 were submitted June 30 and September 10, 1993, respectively. Revision 3 superseded Revisions 1 and 2; however, several relief requests were approved in NRC's safety evaluations for the third ten-year interval program dated September 11, 1992, and December 17, 1992, that remain in effect. Those relief requests that have been approved in these previous SE, and that have been revised in such a manner that the approval remains valid for the reasons stated in the previous SEs, are as follows:

- RV-00A — No changes.
  Reference SE dated December 17, 1992.
- RV-00B — No changes.
  Reference SE dated December 17, 1992.
- RV-00C — Removed references to valves 2(3)-2301-7.
  Reference SE dated December 17, 1992.
- RV-02C — No changes.
  Reference SE dated December 17, 1992.
- RV-02E — No changes.
  Reference SE dated December 17, 1992.
- RV-02F — No changes.
  Reference SE dated December 17, 1992.

•RV-03B Removed specific frequencies to refer to Technical Specification frequency for the control rod drive hydraulic control units. The frequency remains consistent with GL 89-04, Position 7.
Reference SE dated December 17, 1992.

•RV-11A No changes.
Reference SE dated December 17, 1992.

•RV-13A Deleted two valves (per unit) from the scope of the relief request.
Reference SE dated December 17, 1992.

•RV-14A No changes.
Reference SE dated December 17, 1992.

•RV-15A No changes.
Reference SE dated December 17, 1992.

•RV-23A Removed discussion on performing a partial-stroke exercise of the high pressure coolant injection (HPCI) torus suction check valves which are disassembled and inspected consistent with the guidance of GL 89-04, Position 2.
Reference SE dated December 17, 1992.

•RV-23B The dose rate level given in the basis for relief was changed to indicate significant dose rates versus a specific number previously given.
Reference SE dated December 17, 1992.

•RV-23F No changes.
Reference SE dated December 17, 1992.

•RV-23G No changes.
Reference SE dated December 17, 1992.

•RV-24A Revised to include discussion in NUREG-1482, Section 4.1.4, on deferring closure testing to refueling outages. No longer addresses verification of opening capability. No changes in the basis for approval in prior SE.
Reference SE dated September 11, 1992.

3.0 NEW OR SUBSTANTIALLY REVISED RELIEF REQUESTS

The IST program for inservice testing of pumps has been updated to the requirements of the 1989 Edition of Section XI which references Part 6 of the ASME *Operations and Maintenance Standards* (OM-6) for pump testing. NUREG-1482 recommended that licensees implement OM-6 in its entirety under the provisions of 10 CFR 50.55a (f)(4)(iv). Relief Requests RP-00A (vibration monitoring), RP-00B (bearing temperature measurements), and RP-11A (use of tank level and

discharge pressure for monitoring standby liquid control pumps) were deleted as they are no longer necessary for compliance with OM-6. RP-19A (non-Code fuel pool cooling pumps) and RP-52A (non-Code diesel fuel oil transfer pumps) were converted to technical positions in response to the NRC safety evaluation issued December 17, 1992. Two new pump relief requests were added to the program and are evaluated below. Several changes were made to the valve program which necessitated revised or new valve relief requests which are also evaluated below.

3.1 RELIEF REQUEST NUMBER RP-11B AND RP-11C

During review of RP-11B the staff raised several concerns with the relief request. By letter dated November 30, 1995 the licensee revised RP-11B. The relief request has been renumbered RP-11C. Relief from the requirements for the frequency response range of vibration monitoring equipment is requested for the Standby Liquid Control (SBLC) pumps. ANSI/ASME OMa-1988, Part 6, Paragraph 4.6.1.6, "Frequency Response Range," requires that the frequency response range of the vibration measuring transducers and their readout system shall be from one-third minimum pump shaft rotational speed to at least 1000 Hz.

3.1.1 BASIS FOR RELIEF

The licensee states:

> The SBLC pumps are Model No. TD-60 triplex reciprocating positive displacement pumps which were supplied by Union Pump Company. The crankshaft bearings are tapered roller bearings. Reduction gears attached to the motor reduce the SBLC pump speed to 420 rpm, which corresponds to a frequency of 7 Hertz (Hz).
>
> The frequency response range required by the OMa-1988, Part 6, for these pumps is 2.3 Hz to 1000 Hz. Dresden Station has 2 vibration measurement systems. The very low frequency (VLF) system has a calibrated response range of 1 Hz to 500 Hz. The other vibration measurement system has a calibrated response range of 5 Hz to 10K Hz. Neither system [alone] satisfies the Code frequency response range requirement for the SBLC pumps.
>
> Vibration measurements taken with two instruments with different frequency response ranges cannot be combined to provide a single number for comparison to the acceptance criteria of Part 6. The IRD FFT [Fourier fast transform] dataloggers in use at Dresden Station integrate measured vibrations over specific frequency ranges, or "bins", to obtain an overall [root-mean square] (RMS) vibration levels. The datalogger then multiplies the RMS vibration values of each frequency bin by the square root of 2, sums the vibration values from all bins, and displays the measured vibration as a single overall peak value. Therefore, the indicated value is dependent not only on the amplitude of the

measured vibrations, but also on the frequency range and the datalogger's analysis parameters (i.e, lines of resolution, maximum frequency of interest, types of averaging, number of averages, etc.). The licensee has determined that vibration analysis below pump running speed would not provide any additional insight regarding degradation of the slow speed SBLC pumps. The licensee has also consulted with technical experts from the Union Pump Company and they concur with this determination. The primary vibration response peaks for a triplex reciprocating pump would be at 1x and 3x [1 times and 3 times] pump running speed. Peaks would also be expected at 2x and 6x running speed due to the natural unbalance of the 3 connecting rods on the crankshaft. Higher frequency responses would be expected at gear mesh and bearing ball pass frequencies, and multiples thereof. In general, running of mechanical components could be indicated at multiples of 1/2x running speed. However, Union Pump Company stated that it is doubtful that the energy generated by rubs (at the connecting rod bushings or plunger seals) would be sufficient to provide indications at frequencies less than running speed because of the slow speed of the SBLC pumps. There are no other known pump degradation mechanisms that would be detected at frequencies less than running speed for the SBLC pumps. Since these pumps do not have journal bearings, oil whip (which would be indicated at slightly less than 1/2x running speed) need not be considered.

Dresden Station has one VLF transducer and datalogger. However, additional VLF vibration equipment would have to be procured in case the current components break or require calibration. Additional VLF components would cost approximately $15,000 plus additional costs for calibration. It may be possible to procure a transducer that could be calibrated from 2 to 1000 Hz. However, the use of such a sensor with the Dresden IRD vibration measurement equipment would require the addition of a signal conditioner in the instrument loop, would require a special calibration procedure to be developed, and would unnecessarily complicate the taking of vibration readings. The cost of this alternative would be well in excess of $15,000.

Measurement of SBLC pump vibration with a frequency response range from minimum pump speed to at least 1000 Hz would provide reasonable assurance of operational readiness because no useful indications of degradation would be detected by measurement of vibration at frequencies less than pump running speed. The costs to procure, maintain, and calibrate the components needed to comply with the frequency response range requirements of Part 6 would be a burden for the utility without a compensating increase in quality or safety.

3.1.2 ALTERNATIVE TEST

The licensee proposes:

> The calibrated frequency response range of the transducers and readout system for vibration measurements of the SBLC pumps will be from minimum pump running speed to at least 1000 Hz.

3.1.3 EVALUATION

Part 6 changed the frequency response range for vibration monitoring from one-half minimum pump shaft rotational speed to at least maximum pump shaft rotational speed (IWP-4520(b)) to one-third minimum pump shaft rotational speed to at least 1000 Hz. John Zudans paper, "Introduction to ASME/ANSI OMa-1989a, Part 6 - Inservice Testing of Pumps in Light-Water Reactor Power Plants - and Technical Differences Between Part 6 and ASME Section XI, Subsection IWP," in NUREG/CP-0111, "Proceedings of the Symposium on Inservice Testing of Pumps and Valves," states that the change in the frequency response range "corresponds with B&K publication on measuring vibration for velocity testing" and that the Part 6 range more adequately envelops all potential noise contributors. In addition, Part 6 separated reciprocating pumps into their own category for assigning the acceptable values.

As the licensee states, the subsynchronous (less than one times running speed) frequencies for the SBLC pumps are not critical for monitoring the pumps for degrading conditions. The typical problems identified for subsynchronous frequencies are associated with journal bearings (which are not the type of bearings in the SBLC pumps) or mechanical rubbing (with slow speed and low energy which is not expected to be indicated at less than running speed for these pumps). For reciprocating pumps, the sources of vibration from unbalanced forces and moments/couples will generally give rise to vibrations at the running speed or higher order multiples of the running speed. The licensee indicates that the peaks are expected at 1-, 2-, 3-, and 6-times running speed.

With the current instrumentation, the licensee would have to use two different measurements to cover the range from 2 Hz to 1000 Hz. To cover the range with a single instrumentation system, the licensee would have to procure additional sensors and signal conditioners would have to be added to the instrument loop. Calibration procedures would have to be developed for the new instrument system. Because the design of the pump means that the vibration frequencies of concern are at synchronous or supersynchronous frequencies, and the licensee will be monitoring these frequencies, it would be a hardship without a compensating increase in the level of quality and safety to impose the Code requirements.

3.1.4 CONCLUSION

Pursuant to 10 CFR 50.55a(a)(3)(ii), the alternative to use existing vibration equipment covering 5 Hz to 1000 Hz (as opposed to covering 2 Hz to 1000 Hz) is

authorized based on the hardship that would ensure if the requirements for the very low frequency responses were imposed when there would not be a compensating increase in the level of quality and safety in the vibration monitoring of the SBLC pumps.

3.2 RELIEF REQUEST NUMBER RP-14A

Relief is requested from establishing and measuring differential pressure and flow rate for the Units 2 and 3 Emergency Core Cooling System (ECCS) Keep-Fill Pumps. OMa-1988, Part 6, Section 5.2, requires that an inservice test be conducted with the pump operating at specified test reference conditions. The differential pressure and flow rate are to be measured.

3.2.1 BASIS FOR RELIEF

The licensee states:

> Instrumentation does not exist for measuring pressures or flow rates. Pump output varies with system operation and with system leakage. Establishing set flow rates for vibration measurement purposes is not practicable. System modification to provide test measuring locations and a standard test flow path places undue burden on the utility without demonstrating any increase in the level of plant safety. These pumps are in continuous operation.
>
> The condensate transfer system provides an additional non-safety related source of water for maintaining the ECCS pump discharge headers in a filled condition.

3.2.2 ALTERNATIVE TEST

The licensee proposes:

> Vibration measurements will be taken under normal operating conditions. Additionally, the LPCI [low-pressure coolant injection] and Core Spray [CS] systems are vented prior to each pump run and these systems have alarms that indicate if the discharge lines are not maintained full which gives further indication that the system is performing acceptably.

3.2.3 EVALUATION

The design of the keep-fill pumps and system does not enable inservice testing in accordance with the Code. The necessary instrumentation is not installed in the system and a modification would be required for measuring flow and differential pressure. The licensee proposes to monitor the pumps for mechanical degradation only (i.e., vibration monitoring) without monitoring for hydraulic degradation. Because the pumps operate continuously, rather than in standby as is the case for the majority of pumps monitored via the inservice testing program, a hydraulic problem would be more easily identified

by an operational anomaly for these pumps over standby pumps. While the inservice testing would not be as complete as it would be if the Code requirements were imposed, Section 50.55a does include provisions for impracticalities due to design limitations, as the initial imposition of the Code requirements was subsequent to the design and construction of a number of nuclear plants.

The NRC has stated that the installation of instrumentation to meet a later edition of the Code is not considered a backfit (see Minutes of the Public Meetings on GL 89-04, Question 105 and Response). However, for the keep-fill pumps, which are continuously operating pumps, the function is merely to keep the ECCS pump discharge header piping in a filled condition. The actual output and performance of the keep-fill pumps are not critical to the safety function, as long as the pumps are capable of maintaining the piping full. Alarms alert plant operators to the condition when the keep-fill pumps do not maintain the piping full to a set alarm level. As noted by the licensee, the keep-fill pump output varies with the operation of the ECCS pumps and is dependent on the total system leakage; therefore, the operation of the keep-fill pumps is not at the same operating point from one inservice test to another when vibration measurements are to be taken. Notwithstanding the fact that the vibration data may vary over the range of pump operating conditions, the data will be indicative of levels trending toward unacceptable values and should allow time for the licensee to take corrective actions before the pumps fail.

The licensee did not discuss whether the pumps are included in a preventative maintenance program because of the impracticalities of full compliance with the inservice testing requirements. If the pumps are not already included in such a program, it is recommended that an assessment of the past operating history of the pumps be performed and a determination be made as to whether or not periodic maintenance is warranted. The granting of the relief is not, however, dependent on the licensee's prior performance of such an assessment. The monitoring during continuous operation via the level alarms and vibration measurements will provide a level of assurance of the operational readiness for operation in an accident mitigation condition.

3.2.4 CONCLUSION

Relief from the Code requirements for measuring pump flow and differential pressure is granted for the impracticalities of the design (i.e., lack of instrumentation). The granting of relief is pursuant to 10 CFR 50.55a(f)(6)(i). The staff has considered the burden on the licensee if the Code requirements were imposed and has determined that the relief may be granted as requested.

3.3 RELIEF REQUEST NUMBER RV-02A

Relief from the Code requirements for timing and valve exercising during cold shutdown is requested for the main steam safety relief valves and electromatic relief valves listed below:

VALVE	SIZE	CAT	CLASS	CORD	P&ID/ FUNCTION
2-0203-3A	6"	BC	1	12-1/7F	Main Steam Target Rock Safety Relief Valve
2-0203-3B	6"	BC	1	12-1/7E	Main Steam Electromatic Relief Valve
2-0203-3C	6"	BC	1	12-1/7C	"
2-0203-3D	6"	BC	1	12-1/7B	"
2-0203-3E	6"	BC	1	12-1/6E	"
3-0203-3A	6"	BC	1	345-1/7F	Main Steam Target Rock Safety Relief Valve
3-0203-3B	6"	BC	1	345-1/7E	Main Steam Electromatic Relief Valve
3-0203-3C	6"	BC	1	345-1/7C	"
3-0203-3D	6"	BC	1	345-1/7B	"
3-0203-3E	6"	BC	1	345-1/6E	"

Paragraph IWV-3411,"Test Frequency," requires that category A and B valves be exercised at least once every three months. Paragraph IWV-3412, "Exercising Procedure," requires that valves be exercised during plant operations. Paragraph IWV-3413, "Power Operated Valves," requires that limiting values of full-stroke times be specified by the owner.

3.3.1 BASIS FOR RELIEF

The licensee states:

Valve Timing

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 indirectly verified open by observing a compensating turbine bypass valve or control valve closure, positive indication of steam flow change, and by indication from discharge acoustic monitors or tailpipe temperature monitors. Consistent timing of this event for the purpose of determining the operational readiness of these valves is not practical because they are not equipped with direct position indication. Additionally, these valves are rebuilt after every other outage.

Valve Exercising

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. Thus, the plant must 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.

Exercising and timing these valves beyond technical specification requirements places undue burden on the utility and provides no corresponding increase in the level of plant safety.

3.3.2 ALTERNATE TEST

The licensee proposes:

These valves will be full stroke exercised at least once per operating cycle in accordance with the Technical Specifications. Enhanced maintenance activities as recommended in NUREG 1482, Section 4.3.4, including examination for degradation, will be conducted on each valve while being rebuilt every other outage. In lieu of the Code stroke timing requirements, a limiting stroke time will be assigned to each valve. Each valve will be verified to stroke in less than the limiting stroke time based on indirect indications of SRV position, such as turbine bypass/control valve position change, steam flow change, and acoustic or temperature monitors. The limiting stroke times will be based on a reasonable deviation from the reference or average stroke times determined during the next inservice test. The SRVs will be declared inoperable if the limiting stroke time is exceeded.

3.3.3 EVALUATION

Valves that are categorized as "B" are subject to the stroke timing and periodic exercising requirements of the Code. Valves categorized as "C" are subject to the set pressure verification Code requirements. The dual function

relief valves at Dresden are categorized as "B/C" and are, thus, subject to the periodic testing and set pressure verification. NUREG-1482, Section 4.3.4, "Frequency and Method of Testing Automatic Depressurization Valves in Boiling-Water Reactors," indicates that the NRC considers the period between refueling outages a reasonable alternative frequency for verifying the Category B function of these valves. The staff had previously recommended reducing the number of challenges for these valves and has indicated that other methods such as enhanced maintenance in combination with stroke timing of the pilot valves (here the licensee proposes to stroke time the valves in place using indirect indications) are acceptable when stroke timing in accordance with the Code is not practical (see NUREG-1482, Section 4.3.4). The design limitations make it impractical to stroke time the valves in a manner that gives consistent, repeatable results that are useful for monitoring degrading conditions. Testing more often than once per cycle is not recommended and is, therefore, considered a hardship without a compensating increase in the level of quality and safety, in that testing these valves at power or during cold shutdowns increases the potential for damaging the valves and creating a higher probability of valve failure in an open position which creates a small-break loss of coolant event.

3.3.4 CONCLUSION

Pursuant to 10 CFR 50.55a(f)(6)(i), relief is granted to not measure the stroke time of the automatic depressurization system valves in accordance with the Code provisions. The licensee will monitor the valves for degrading conditions by periodic maintenance and stroke timing using indirect indications. Pursuant to 10 CFR 50.55a(a)(3)(ii), the alternative frequency for testing is authorized based on the hardship without a compensating increase in the level of quality and safety that ensues if testing is performed quarterly at power or during cold shutdowns. The authorization of this alternative considered the NRC's guidance on minimizing the challenges on these valves (see NUREG-0123 and NUREG-0626 as referenced in NUREG-1482, Section 4.3.4).

3.4 RELIEF REQUEST NUMBER RV-02G

Relief Request RV-02G documents the test deferral for the close stroke testing of the Reactor Vessel Water Indication System keep-fill check valves in accordance with the provisions of GL 89-04, Supplement 1, and NUREG-1482, Section 4.1.4. The test deferral is consistent with the guidance and is, therefore, authorized pursuant to 10 CFR 50.55a(f)(4)(iv) consistent with GL 89-04, Supplement 1, given that the related requirements, where applicable, have been met or are subject to confirmation by NRC inspection. Documenting the use of the NUREG-1482 section by development of the relief request completes the actions required of the licensee.

3.5 RELIEF REQUEST NUMBER RV-02H

Relief Request RV-02H represents a cold shutdown outage justification test deferral for the main steam isolation valves. The licensee has followed the guidance in NUREG-1482, Section 4.2.4, noting that the revised standard technical specifications bases states that the main steam isolation valves "should not be tested at power, since even a part-stroke exercise increases the risk of a valve closure when the unit is generating power." Therefore, the test frequency is allowed by the ASME Code and is consistent with NRC guidance. The test deferral is, therefore, authorized pursuant to 10 CFR 50.55a(f)(4)(iv) given that related requirements, as identified in NUREG-1482, have been met or are subject to confirmation by NRC inspection.

3.6 RELIEF REQUEST NUMBER RV-14B

Relief is requested from individually stroke testing the CS keep-fill check valves in accordance with the provisions of IWV-3521 and IWV-3522 for check valve exercising.

3.6.1 BASIS FOR RELIEF

The licensee states:

> Independently exercising closed the Core Spray keep-fill check valves is not possible because two check valves are in series combination and both cannot be back pressurized during normal Core Spray pump tests. In addition, test connections between the valves do not exist, therefore, no method of independent valve position verification exists.

3.6.2 ALTERNATE TEST

The licensee proposes:

> These valves will be tested closed as a series combination. Should the series combination fail to operate satisfactory, both valves in the series will be disassembled, inspected, and repaired or replaced as necessary as described in NUREG 1482 Section 4.1.1.

3.6.3 EVALUATION

The licensee has followed the guidance in NUREG-1482, Section 4.1.1, for keep-fill check valves. The keep-fill valves are considered a special case in that they are redundant valves in redundant systems in which only one valve of a series is actually necessary to perform the system's intended function. Rather than exclude the upstream valve from the IST program, the NUREG recommends that licensees include both valves in the program and test the two series valves as a pair to prevent reverse flow. Upon observing leakage, the licensee must disassemble, inspect, and repair or replace both valves as necessary before the return to service. Additionally, both valves must be

subject to equivalent quality assurance criteria, whether the upstream valve was originally obtained "Q" or not. The recommendations in NUREG-1482, Section 4.1.1, were in recognition that the valves and the systems are not designed such that reverse flow closure verification can be performed for the individual valves. Therefore, the basis for the approval of the testing in series is the impractical design configuration. Imposition of the Code requirements for individual valves would be a burden in that a design modification would be necessary.

3.6.4 CONCLUSION

Relief is granted and the alternative test pairs of series keep-fill valves is imposed pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing reverse flow closure verification of individual valves. The burden on the licensee if the Code requirements were imposed has been considered.

3.7 RELIEF REQUEST NUMBER RV-14C

Relief Request RV-14C represents a refueling outage justification for deferral of full-stroke exercising closed the CS injection check valves. The testing is accomplished by performing a leak test. NUREG-1482, Section 4.1.4, recommended that verification of check valves closure by means of a leakage test be performed on a refueling outage frequency. The deferral is consistent with NRC's guidance and GL 89-04, Supplement 1, endorsed the use of the recommendation; therefore, the request is authorized pursuant to 10 CFR 50.55a(f)(4)(iv) given that related requirements, as identified in NUREG-1482, have been met or are subject to confirmation through NRC inspection.

3.8 RELIEF REQUEST NUMBER RV-15B

Relief is requested from individually stroke testing the Low Pressure Coolant Injection keep-fill check valves.

3.8.1 BASIS FOR RELIEF

The licensee states:

> Independently exercising closed the Low Pressure Coolant Injection keep-fill check valves is not possible because two check valves are in series combination and both cannot be back pressurized during normal Low Pressure Coolant Injection pump tests. In addition, test connections between the valves do not exist, therefore, no method of independent valve position verification exists.

3.8.2 ALTERNATE TEST

The licensee proposes:

> These valves will be tested closed as a series combination. Should the series combination fail to operate satisfactory, both valves in the series will be disassembled, inspected, and repaired or replaced as necessary as described in NUREG 1482 Section 4.1.1.

3.8.3 EVALUATION

The licensee has followed the guidance in NUREG-1482, Section 4.1.1, for keep-fill check valves. The keep-fill valves are considered a special case in that they are redundant valves in redundant systems in which only one valve of a series is actually necessary to perform the system's intended function. Rather than exclude the upstream valve from the IST program, the NUREG recommends that licensees include both valves in the program and test the two series valves as a pair to prevent reverse flow. Upon observing leakage, the licensee must disassemble, inspect, and repair or replace both valves as necessary before the return to service. Additionally, both valves must be subject to equivalent quality assurance criteria, whether the upstream valve was originally obtained "Q" or not. The recommendations in NUREG-1482, Section 4.1.1, were in recognition that the valves and the systems are not designed such that reverse flow closure verification can be performed for the individual valves. Therefore, the basis for the approval of the testing in series is the impractical design configuration. Imposition of the Code requirements for individual valves would be a burden in that a design modification would be necessary.

3.8.4 CONCLUSION

Relief is granted to test pairs of series keep-fill valves pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing reverse flow closure verification of individual valves. The burden on the licensee if the Code requirements were imposed has been considered.

3.9 RELIEF REQUEST NUMBER RV-23C

Relief is requested from individually stroke testing the HPCI keep-fill check valves.

3.9.1 BASIS FOR RELIEF

The licensee states:

> Independently exercising closed the High Pressure Coolant Injection keep-fill check valves is not possible because two check valves are in series combination and both cannot be back pressurized during normal Low Pressure Coolant Injection pump tests. In addition, test connections between the valves do not

exist, therefore, no method of independent valve position verification exists.

The keep-fill line to HPCI discharge piping is normally isolated and is not required to be operable under normal conditions. The discharge piping is maintained full from the static head of the Condensate Storage Tank.

3.9.2 ALTERNATE TEST

The licensee proposes:

When required to be operable, these valves will be tested closed as a series combination. Should the series combination fail to operate satisfactory, both valves in the series will be disassembled, inspected, and repaired or replaced as necessary as described in NUREG 1482 Section 4.1.1.

3.9.3 EVALUATION

The licensee has followed the guidance in NUREG-1482, Section 4.1.1, for keep-fill check valves. The keep-fill valves are considered a special case in that they are redundant valves in redundant systems in which only one valve of a series is actually necessary to perform the system's intended function. Rather than exclude the upstream valve from the IST program, the NUREG recommends that licensees include both valves in the program and test the two series valves as a pair to prevent reverse flow. Upon observing leakage, the licensee must disassemble, inspect, and repair or replace both valves as necessary before the return to service. Additionally, both valves must be subject to equivalent quality assurance criteria, whether the upstream valve was originally obtained "Q" or not. The recommendations in NUREG-1482, Section 4.1.1, were in recognition that the valves and the systems are not designed such that reverse flow closure verification can be performed for the individual valves. Therefore, the basis for the approval of the testing in series is the impractical design configuration. Imposition of the Code requirements for individual valves would be a burden in that a design modification would be necessary.

3.9.4 CONCLUSION

Relief is granted to test pairs of series keep-fill valves pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing reverse flow closure verification of individual valves. The burden on the licensee if the Code requirements were imposed has been considered.

3.10 RELIEF REQUEST NUMBER RV-23D

Relief Request RV-23D represents a refueling outage justification for test deferral for individual partial and full stoke exercising the HPCI turbine exhaust vacuum breakers quarterly or at cold shutdown. The valves can be

individually exercised during each refueling outage. The relief request documents the impracticality of performing testing during power operations or cold shutdown outages. Therefore, the test deferral meets the guidance for using NUREG-1482, Section 3.1.1 for deferral to refueling outages in accordance with GL 89-04, Supplement 1, pursuant to 10 CFR 50.55a(f)(4)(iv) given that related requirements, as identified in NUREG-1482, have been met or are subject to confirmation through NRC inspection.

3.11 RELIEF REQUEST NUMBER RV-23E

Relief Request RV-23E represents a refueling outage justification for test deferral from exercising closed the HPCI turbine exhaust valves quarterly or during cold shutdowns. Following the guidance of GL 89-04, Supplement 1, and NUREG-1482, Section 4.1.4, the relief request documents the impracticality of performing testing during power operations or during cold shutdowns, and is approved pursuant to 10 CFR 50.55a(f)(4)(iv), Supplement 1, pursuant to 10 CFR 50.55a(f)(4)(iv) given that related requirements, as identified in NUREG-1482, have been met or are subject to confirmation through NRC inspection.

3.12 RELIEF REQUEST NUMBER RV-23H

Relief is requested from stroke timing the HPCI drain pot solenoid valves.

3.12.1 BASIS FOR RELIEF

The licensee states:

> These valves function as a backup to the exhaust line drain pot steam trap. During normal operation of the turbine using high quality steam, the drain path from the drain pot to the torus via the steam trap is adequate to remove condensate from the turbine exhaust line. However, during turbine operation with low pressure and low quality steam (which is seen during HPCI surveillance testing during plant startup and as would be expected during HPCI operation during a small break LOCA), condensate collects in the drain pot faster than it can be drained through the trap. Under these conditions, valve 2301-32 opens automatically to drain to the gland seal condenser upon receipt of a signal from a drain pot level switch when the drain pot level reaches the high level alarm setpoint. A high level condition sounds an alarm in the control room.
>
> These valves are equipped with hand switches to enable remote manual operation from the control room; however, they are not equipped with position indicators and the valves are totally enclosed, so valve position cannot be verified by direct observation. Therefore, it is impractical to exercise and stroke time these valves in accordance with Code requirements. Valve actuation may be indirectly verified by removing the HPCI system from service, filling the drain pot with water until the high

level alarm is received, and observing that the high level alarm clears. It is impractical to assign a maximum limiting stroke time to these valves using this test method because the time for the alarm to clear would depend primarily on variables such as the rate of filling and the level of the drain pot when the filling is secured. The steam line drain pot is not equipped with direct level indication; therefore, the time required for the alarm to clear may vary significantly and operation of valve 2301-32 cannot be verified by operation of the hand switch.

Failure of these valves to perform their safety function would be indicated by a drain pot high level alarm during operation with low pressure steam. Functional tests are conducted on the drain pot level alarm switches at least once each cycle to verify their operability. Additionally, condensate entrapped in the steam would cause significant fluctuations in exhaust steam header pressure.

Compliance with the quarterly exercising and stroke timing requirements of the Code would require either system modifications to replace these valves with ones of testable design, or to purchase non-intrusive test equipment and develop new test methods and procedures. These alternatives would be burdensome due to the costs involved.

3.12.2 ALTERNATE TEST

These valves will be exercised quarterly using the handswitch. They will also be functionally tested each refueling outage by filling the drain pot and verifying that valve 2301-32 actuates as indicated by the high level alarm clearing.

Because exercising of these valves without stroke timing provides no measure of valve degradation, maintenance activities were instituted to compensate for testing deficiencies. Following discussions with the manufacturer regarding valve design and application, it was decided to disassemble, inspect and repair or replace these valves every third cycle in addition to the above testing.

3.12.3 EVALUATION

Due to design limitations, it is impractical to measure a stroke time for these valves using the traditional methods of position indication because the control system does not include position indication. To compensate for the impracticality, the licensee proposes to enhance the maintenance activities for the valves (i.e., disassembly, inspection, repair, or replacement every third cycle). In addition, the licensee will ensure that the valves are capable of fulfilling their safety function by monitoring the drain pot high level alarm during operation with low pressure steam as an indirect means of verifying movement of the valve obturator. Imposition of the Code

requirements to measure stroke times of the valves as a means of monitoring valve degradation would be burdensome to the licensee in that modifications to the valves, valve replacement, or the purchase of more advanced testing equipment would be necessary to comply.

3.12.4 CONCLUSION

Relief from the requirements to measure the stroke times of the drain pot solenoid valves is granted pursuant to 10 CFR 50.55a(g)(6)(i) based on the impractical design configuration of the valves and the valve actuation system (i.e., no position indication). The burden that would be imposed on the licensee if the Code requirements were met has been considered.

3.13 RELIEF REQUEST NUMBER RV-25A

Relief Requested RV-25A represents a refueling outage justification for ensuring closure during exercising the Atmospheric Containment Atmosphere Dilution (ACAD) containment isolation valves during refueling outage rather than quarterly or during cold shutdowns. Following the guidance of GL 89-04, Supplement 1, and NUREG-1482, Section 4.1.4, the relief request documents the impracticality of performing testing during power operations or during cold shutdowns. The valves are verified capable of opening by disassembly and inspection in accordance with GL 89-04, Position 2. These actions are in accordance with NRC guidance and is approved pursuant to 10 CFR 50.55a(f)(4)(iv), Supplement 1, pursuant to 10 CFR 50.55a(f)(4)(iv) given that related requirements, as identified in NUREG-1482, have been met or are subject to confirmation through NRC inspection.

3.14 RELIEF REQUEST NUMBER RV-37A

Relief Request RV-37A represents a refueling outage justification for ensuring closure during exercising of the Reactor Building Cooling Water supply check valve during refueling outages rather than quarterly or during cold shutdowns. Following the guidance of GL 89-04, Supplement 1, and NUREG-1482, Section 4.1.4, the relief request documents the impracticality of performing testing during power operations or during cold shutdowns, and is approved pursuant to 10 CFR 50.55a(f)(4)(iv), Supplement 1, pursuant to 10 CFR 50.55a(f)(4)(iv) given that related requirements, as identified in NUREG-1482, have been met or are subject to confirmation through NRC inspection.

3.15 RELIEF REQUEST NUMBER RV-57A

RV-57A requests relief for full stroke exercising the Control Room Heating, Ventilation, and Air Conditioning (HVAC) Refrigerant Heat Exchanger Cooling Water Outlet Flow Control Valve.

3.15.1 BASIS FOR RELIEF

The licensee states:

> This valve controls the cooling water flow through the Control Room HVAC Refrigerant heat exchanger. The valve receives a signal from a pressure transmitter located on the refrigerant side. When the pressure increases due to the refrigerant temperature rising, the 2/3-5741-62 throttles open further to allow more cooling. Similarly, the valve throttles flow down when the pressure drops.
>
> Since the valve opens and closes based on a signal from a pressure transmitter, the valve cannot be accurately timed. Forcing the valve to stroke by disconnecting the air tubing from the transducer and connecting an external air source is cumbersome and will not yield repeatable data. The valve stem is readily visible and can easily be observed for degrading conditions.

3.15.2 ALTERNATE TEST

The licensee proposes:

> This valve will be exercised and fail safe tested quarterly by isolating the air to the valve. Stem conditions and motion will be observed for evidence of degrading conditions.

3.15.3 EVALUATION

The valve can not be tested in accordance with the provisions of the Code because of limitations in the design of the control system. Because it is a control valve and responds to pressure changes in the system, it can not be stroked from full opened or full closed and timed. It can only be stroked from an intermediate position depending on the system conditions. While the stem can be observed during testing, observation of stem movement does not give a very good indication of degrading conditions. The proposed alternative should be enhanced by establishing a preventative maintenance program for the valve. Therefore, the relief can be granted only with the provision that the licensee establish a preventive maintenance for the valve based on the operating, testing, and maintenance history. Imposition of the Code requirements would be a burden to the licensee in that a design modification would be necessary to enable testing in accordance with the Code.

3.15.4 CONCLUSION

Relief is granted to not measure the stroke time for the control room HVAC refrigerant heat exchanger cooling water outlet flow control valve pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of measuring the stroke

time with the existing design configuration, with the provision that the licensee include the valve in a preventive maintenance program. The burden of imposing the Code requirements has been considered.

4.0 CONCLUSION

The staff has reviewed the new and revised relief requests. Relief Requests RP-14A, RV-02A (in part), RV-14B, RV-23C, RV-15B, RV-23H, and RV-57A, are granted pursuant to 10 CFR 50.55a(f)(6)(i) due to impracticalities and in consideration of the burden on the licensee if the Code requirements were imposed. Relief Requests RP-11C, RV-02A (in part) are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) due to the hardship without a compensating increase in the level of quality and safety. Relief Requests RV-02G, RV-02H, RV-14C, RV-23D, RV-23E, RV-25A and RV-37A, conform to guidance in GL 89-04 or its Supplement 1 and NUREG-1482 and are approved pursuant to 10 CFR 50.55a(f)(4)(iv) based on related requirements being met or confirmed through inspection.

Principal Contributor: P. Campbell, DE/EMEB

Date: April 16, 1996

consideration of the burden on the licensee if the Code requirements were imposed. Relief Requests RP-11C and RV-02A (in part) are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) due to the hardship without a compensating increase in the level of quality and safety. Relief Requests RV-02G, RV-02H, RV-14C, RV-23D, RV-23E, RV-25A and RV-37A, conform to guidance in GL 89-04 or its Supplement 1 and are approved accordingly.

The staff is granting relief from certain testing requirements that are impractical to perform and authorizing proposed alternatives where compliance with the ASME Code would result in a hardship without a compensating increase in safety or where alternative testing provides an adequate level of quality and safety. The relief granted is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden that could result if the requirement were imposed on the facility. The specific details are contained in the enclosed SE.

Sincerely,

Original signed by:

Robert A. Capra, Project Director
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249

Enclosure: Safety Evaluation

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