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INSERVICE TESTING PROGRAM SAFETY EVALUATION REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

METROPOLITAN EDISON COMPANY

THREE MILE ISLAND, UNIT NO. 1

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1.0 INTRODUCTION

1.1 Background

The revision to 10 CFR 50.55a, published in February 1976, required that Inservice Inspection and Testing (ISI/IST) Programs be updated to meet the requirements to the extent practical of the Edition and Addenda of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code* incorporated in the Regulation by reference in paragraph (b). This updating of the programs was required to be done periodically, i.e., every forty months for inservice inspection and twenty months for inservice testing, to reflect the new requirements of the later editions of Section XI.

As specified in the February 1976 revision, for plants with Operating Licenses issued prior to March 1, 1976, the Regulations became effective after September 1, 1976, at the start of the next regular 40 month inspection period. The initial inservice examinations conducted during the first 40 month period, and the initial inservice tests of pumps and valves conducted during the first 20 month period were to comply with the requirements in editions of Section XI and addenda in effect no more than 6 months prior to the date of start of facility commercial operation.

The Regulation recognized that the requirements of the later editions and addenda of the Section XI may not be practical to implement at facilities because of limitations of design, geometry, and materials of construction of components and systems. It therefore permitted determinations of impractical examination or testing requirements to be evaluated and relief granted provided health and safety of the public were not endangered giving due consideration of the burden placed on the licensee if the requirements were imposed. The Regulation also allowed the Commission to require the licensee to follow an augmented inspection or testing program for which it deems that added assurance of structural or system reliability is necessary.

The revision to 10 CFR 50.55a, effective November 1, 1979, modified the time interval for updating ISI/IST programs and incorporated by reference a later edition and addenda of Section XI. The updating intervals for inservice examinations and for inservice testing of pumps and valves were extended from 40 months and 20 months, respectively, to 120 months in order to be consistent with intervals as defined in Section XI. Inservice examinations and inservice tests

*Hereinafter referred to as Section XI.

conducted during the initial 120 month interval are to comply with the requirements of the latest edition and addenda of Section XI, incorporated by reference in the Regulation, in effect 12 months prior to the date of issuance of the operating license.

For plants with Operating Licenses issued prior to March 1, 1976, the provisions of the November 1, 1979 revision are effective after September 1, 1976 at the start of the next one-third of the 120-month interval. During the one-third of an interval and throughout the remainder of the interval, inservice examinations and inservice testing of pumps and valves shall comply with the latest edition and addenda of Section XI, incorporated by reference in the Regulation, on the date 12 months prior to the start of that one-third of an interval.

1.2 Discussion

Our letter dated April 22, 1976 to Metropolitan Edison Company (the licensee) called attention to the February 1976 revision to 10 CFR 50.55a and requested that we be notified of the dates that the next 40 month inspection period would begin. In addition, our letter pointed out that the revised regulations require inservice inspection and testing to be performed in accordance with the examination and testing requirements set forth in Section XI and addenda thereto. A review of the 1974 edition of ASME Section XI indicated that conflicts may occur between these requirements and the Technical Specifications presently in effect for the licensee's facility. To avoid these and future conflicts, the licensee was advised, in accordance with 10 CFR 50.55a(g)(5)(ii) to apply to the Commission for amendment of the facility Technical Specifications. Further, any such conflicting Technical Specifications should be replaced with a reference to 10 CFR 50.55a. Sample language for such Technical Specification changes was provided.

The licensee was further advised that if it was determined that conformance with certain Section XI inservice inspection and testing requirements were impracticable, the licensee should submit information to support the determinations in accordance with 10 CFR 50.55a (g)(5)(iii) and (iv). The determinations should separately identify the specific Section XI requirement that is impracticable for each affected component. We indicated that the staff would evaluate each determination and, if appropriate, grant relief pursuant to 10 CFR 50.55a(g)(6)(i).

The licensee was also advised that, as required by the revised regulations, requests for amendment of Technical Specifications and information to support determinations that conformance with certain Section XI requirements was impracticable were to be submitted at least 6 months prior to the start of the inspection period during which the provisions would become applicable for the facility.

The licensee's responses on August 17 and September 30, 1977 indicated that the next 40 month period would begin on January 2, 1978 and by letter dated July 1, 1977 the licensee requested to amend Appendix A of the license. The licensee's response on December 13, 1978 addressed our concerns on the proposed ISI/IST program and proposed to revise the program as needed. By letters dated October 26, 1979 and January 31, 1980 the licensee submitted a completely revised ISI/IST program upon which we have based our review. On May 7, 1980 the Commission issued amendment No. 54 to Facility Operating License DPR-50 revising the technical specifications' inservice inspection program for components to meet the requirements of 10 CFR 50.55a. This safety evaluation covers the pump and valve testing phase of the Program known as Inservice Testing Program (IST).

Guidelines for the IST program were provided by our letters dated March 21, 1977 and November 20, 1978 and during working sessions with the licensee dated October 18 and October 19, 1978.

2.0 MANAGEMENT SUMMARY

We have reviewed the licensee's submittal and discussed with the licensee the proposed IST Program. Our review has been limited to the aspects of IST within the NRC's jurisdiction; i.e., those aspects related to the protection of public health and safety. We have not considered aspects of IST associated with life safety of onsite personnel and with property protection unless they impact the health and safety of the public due to the potential release of radioactive material.

As required by 10 CFR 50.55(a) paragraph (g)(5)(i), the licensee has updated the IST Program for this facility. The update reflects the requirements of Section XI of the 1974 ASME Boiler and Pressure Vessel Code through the 1975 Addenda. Approximately 95 percent of safety-related components covered under the IST Program have been found to be fully in compliance with Code requirements. The remaining components are discussed in detail in the following sections of this Safety Evaluation.

The items which are not in full compliance with Section XI, as discussed herein, can be grouped into two categories: (1) items for which the licensee has requested relief and the staff has granted same, (2) items which remain open because the licensee has requested relief but has not provided sufficient justification. This report summarizes the status of our evaluation of the IST Program.

TABLE 2.1

ITEMS FOR WHICH RELIEF HAS BEEN GRANTED

Item	Affected Equipment	SER Section
A. Pump Testing		
1. Measuring pump bearing temperature and lub. oil levels	RBP1A/1B, SWP1A/1B, SWP2A/2B, DRP1A/1B, NRP1A/1B/1C	3.1
2. Measuring bearing temperature	AHP3A, AHP3B	3.2
3. Measuring Vibration	RRP1A/1B, SWP1A/1B, SWP2A/2B, DRP1A or 1B, NRP1A/1B/1C	3.3
4. Measuring Flowrates	SWP1A/1B, MUP1A/1B/1C, NSP1A/1B/1C	3.4 a, d, e
B. Valve Testing		
1. Stroke testing of motor operated valves	All motor operated valves	4.1.8
2. Leak Testing Category A valves	Containment isolation valves	4.2.1
3. Exercising valves	DHV64, DHV69, IAV6, SAV2, SFV23	4.2.2
4. Testing Non Safety Related Valve	Category A, B, C	4.2.3
5. Valve Stroke Timing	CFV19A/B, CFV20A/B CAV2, V5A/B, 189, CMV1, V4, NRV45A/C, SWVIIA/B, V17A/B, WDGV4, WDLV49, V50, V89, V90, WDLV91, V92 V62, V61	4.2.4
6. Valve stroke time	AHV11A/B, MSV10A/B, V6, SWV24A/B	4.2.5
7. Valve exercising	DHV6A/B	4.3.1.1

TABLE 2.1
(Continued)

8.	Valve exercising	EFV4, V5	4.4.2.1
9.	Valve stroking	MUV86A/B, MUV95, MUV107A/C/D	4.6.1.1
10.	Valve stroking	RRV8A/B RRV9A/D	4.7.1.1

TABLE 2.2

ITEMS WHICH REMAIN OPEN PENDING LICENSEE JUSTIFICATION

Item	Affected Equipment	SER Section	Licensee's Resolution Date	Licensee Effective Implementation Date
A. Pump Testing				
1. Measuring Flowrates	SWP2A/2B, AH-P3A/3B	3.4 b&c	6/30/82	90 days*
2. Monthly testing of pumps	EFP1, EFP2A/2B, BSP1A/1B, DHP1A/1B, DCP1A/1B, CAP1A/1B	3.5/3.6	3/1/82	90 days*
B. Valve testing				
1. Valve test (Pressure Isolation)	CFV4A/B,RCV4, RCV23, DHV1,DHV2,MUV107A/C/D,MUV86A/B,MUV95	4.1.1	12/31/81	End of Cycle 1st cycle after restart
2. Stroke Testing Check Valve	CFV4A/B, COV16A/B, DHV14A/B, EFV11A/B, EFV13, EFV12A/B, MSV 9A/B, BSV21A/B, BSV52A/B, Fluid Block System, MUV 94, MUV 73 A/B/C, MUV 14 A/B, DHV 16 A/B, MUV107A/C/D,MUV95, MUV86A/B	4.1.2	9/30/82	" "
3. Full Stroke Requirement Cat. C. Valves	EFV3	4.4.1.1	9/30/82	" "
4. Check Valves Exercising Requirements	FWV12A/B	4.5.1.1	9/30/82	" "
5. Full Stroke Bldg Spray Valves	BS-V30A/B	4.8.1.1	9/30/82	" " "

* The effective implementation date is the number of days shown from the date the NRC finds the resolution acceptable.

2.1 Relief Granted

Certain relief requests have been granted. These items are itemized in Table 2.1. The evaluation of these relief requests are provided in Sections 3.0, pump testing and Section 4.0 valve testing.

2.2 Relief Not Granted Pending Licensee Justification

Certain items remain open because the licensee has not provided sufficient justification for the relief requested. These items are delineated in Table 2.2. The licensee has agreed to either commit to Section XI requirements or to propose alternatives with sufficient justification on or before the dates indicated. Background information for these items is provided in Sections 3.0 and 4.0.

3.0 PUMP TESTING PROGRAM

3.1 The licensee requests relief from measuring pump bearing temperature and observing lubrication levels on the following pumps:

a. Reactor Building Emergency Cooling (RR-P1A, RR, P1B),
b. Screen Wash (SW-P1A, SW-P1B),
c. Screen House Ventilation Equipment (SW-P2A, SW-P2B),
d. Decay Heat River Water (DR-P1A, DR-P1B),
e. Nuclear Service River Water (NR-P1A, NR-P1B, NR-P1C).

Code Requirements: The bearing temperature of all centrifugal pump bearings and main shaft bearings of reciprocating pumps shall be measured at points selected to be responsive to changes in the temperature of the bearing. Bearing temperature measurements shall be performed at least once during an inservice test each year. Lubrication level or pressure is to be observed during monthly testing.

Licensee Basis for Relief Request: These pumps are vertical deep well type pumps with the pump submerged under water at all times. Pump bearings are lubricated by the water being pumped. There are no installed means to measure bearing temperature, and the pump design/installation makes it impractical to measure bearing temperature by any other means.

Evaluation

The performance of bearing temperature measurements is impractical for the pumps listed because they are vertical submersible type design pumps. The pumps operate under water with the bearings being inaccessible for temperature measurements. The information gained by vibration amplitude measurements and other parameters for detection of mechanical degradation of the pumps will provide adequate assurance of the mechanical acceptability of the pumps for continued operation. Observation of lubricant level or pressure is not applicable to these pumps.

Conclusion

Furthermore, on this basis we agree with the licensee that measuring the bearing temperature is impractical. The staff concludes that deletion of the bearing temperature measurement will not significantly decrease the capability of determining the pumps' mechanical condition or the plants' margin of safety. Thus, this relief does not endanger public health and safety. Therefore, relief from this requirement may be granted.

3.2 The licensee requests relief from measuring bearing temperatures of the following pumps:

a. Control Building Chilled Water (AH-P3A, AH-P3B),
b. Spent Fuel (SF-P1A, SF-P1B).

Code Requirement: The temperature of all centrifugal pump bearings and main shaft bearings of reciprocating pumps shall be measured at points selected to be responsive to changes in the temperature of the bearing. Oil temperature prior to the oil entering a cooler shall be considered the bearing temperature. Bearing temperature measurement shall be performed at least once during an inservice test each year.

Licensee's Basis for Relief Request: Pump bearing temperature cannot be measured on the pumps since the bearings are located deep inside the pumps casing and are surrounded by an oil reservoir. An exception is requested per 10 CFR 50, 50.55a(g)(4) in that measurement of parameter T_b is not practical within the limits of design of this pump.

Evaluation

Because of the design of the pumps, it is impractical to perform the yearly bearing temperature measurements. The bearing temperature measurement is one of the parameters required to be evaluated in order to determine the mechanical acceptability of the pumps. Vibration amplitude is another parameter that is monitored to detect mechanical changes in a pump and is required by Section XI to be monitored once each month. The information gained by the monthly measurements of vibration amplitude is sufficient to determine the pumps' mechanical characteristics.

Conclusion

The staff concludes that the mechanical characteristics of the pumps can be adequately evaluated by the information obtained from the monthly vibration amplitude measurements and that deletion of the bearing temperature measurements will not significantly affect the capability of detecting adverse mechanical changes in the pumps or the plants safety margin. Thus, on this basis we have judged that measuring the bearing temperature annually is impractical. This relief does not endanger public health and safety. Therefore, relief from the requirements may be granted.

3.3 The licensee requests relief from measuring vibration amplitude on the bearing housing or structural support for the following pumps:

a. Reactor Building Emergency Cooling Pumps (RR-P1A, RR-P1B),
b. Screen Wash Pumps (SW-P1A, SW-P1B),

c. Screen House Ventilation Equipment (SW-P2A, SW-P2B),
d. Decay Heat River Water Pumps (DR-P1A, or DR-P1B),
e. Nuclear Service River Water (NR-P1A, NR-P1B, NR-P1C).

Code Requirement: The location of vibration measurement shall generally be on a bearing housing or its structural support, provided it is not separated from the pump by any resilient mounting.

Licensee's Basis for Relief Request: These pumps are vertical deep well type pumps with the pump submerged under water at all times. It is not possible to measure vibration on pumps in this type installation. Past operating experience has shown that motor vibration is indicative of pump mechanical problems in this type installation. Therefore, motor vibration will be measured in lieu of pump vibration.

Evaluation

Because of the design of the pumps, it is impractical to measure the vibration amplitude at the locations specified by the code. The location which is accessible for measuring vibration is the pump motor. Any significant change in the mechanical characteristics of the pumps will most likely manifest itself as a change in the vibrational characteristics of the motor. Monitoring the vibration amplitude of the motor will provide adequate assurance of detection of adverse mechanical changes in the pumps.

Conclusion

The staff concludes that changes in the mechanical characteristics of the pumps can be adequately monitored by taking vibration measurements on the pumps' motor in lieu of the bearing housings or structural supports. Therefore, relief from taking measurements at the code specified locations may be granted. This relief does not endanger public health and safety.

3.4 The licensee requests relief from measuring flowrates of the following pumps:

a. Screen Wash (SW-P1A, SW-P1B),
b. Screen House Ventilation Equipment (SW-P2A, SW-P2B),
c. Control Building Chilled Water (AH-P3A, AH-P3B),
d. Makeup and Purification (MU-P1A, MU-P1B, MU-P1C),
e. Nuclear Service Closed Cooling (NS-P1A, NS-P1B, NS-P1C).

Code Requirements: Flowrate (Q) and ΔP, shall be measured in a variable resistance system. In a fixed resistance system, pump ΔP or flow rate is required but not both.

Licensee's Basis for Relief Requests:

a. Screen Wash Pumps (SW-P1A, SW-P1B):

There are no flow instruments in the flow path of these pumps and therefore, test quantity "Q" cannot be measured. As an alternative, the discharge at the spray nozzle will be observed during each test to determine if sufficient flow is available to wash the screens.

b.&c. Screen House Ventilation Equipment (SW-P2A, SW-P2B) and Control Building Chilled Water (AH-3PA, AH-3PB):

There are no flowmeters installed in the flow paths of these pumps, therefore, flowrate (Q) cannot be measured. An exception is requested per 10 CFR 50.55a(g)(4) since measurement of flow would require a design change to this system, and therefore not be within the limits of the current design.

d. Makeup and Purification (MU-P1A, MU-P1B, MU-P1C):

There are no flow meters installed in the flow path of this pump, therefore test quantity "Q" cannot be measured. An exception is requested per 10 CFR 50, 50.55a(g)(4) since measurement of system flow would require a design change to this system and therefore not be within the limits of the current design. The high pressure injection system is, however, tested during cooldown/heatup between 275°F and 380°F at cold shutdown head.

e. Nuclear Service Closed Cooling (NS-P1A, NS-P1B, NS-P1C):

Flow metering for this system is located in the common discharge lines from all three pumps. Plant operation requirements dictate the operation of at least two Nuclear Service Closed Cooling Water pumps during operations, thereby making it impossible to measure flow for a single pump. Pump flow will be measured for each pump during plant shutdown when operation of only one pump is required. During accident conditions flow to a significant portion of this system is shut off, thereby reducing the heat load. Therefore, if the system is adequate during normal operation it will be more than adequate at accident conditions when the heat load is reduced.

Evaluations

a. Screen Wash Pumps (SW-P1A, SW-P1B):

These pumps are used to wash silt and small debris from the river water inlet screens. One of the two pumps is always in operation during normal plant operation with redundancy provided by the second pump. The pumps are typically automatically cycled at 15 minute intervals. Local alarms are sounded if the pump is not started when cycling is commanded.

The licensee has proposed to measure the required pressure parameters, and has stated that a visual check will be made (on a monthly basis) at the screens to determine if the pumps are performing as required to effectively wash down the screens.

During short and long term emergency conditions, the performance of the pump can also be visually monitored in this fashion at higher frequencies. Ultimate measures for washing down the screens could be accomplished by hand held hoses.

Conclusion

The staff concludes that measurement of flowrate of the Screen Wash pumps is impractical to perform and that this parameter is not as significant as the visual observation to determine if the screens are being washed down effectively. Proposed alternate methods for washing the screens and the redundancy of the system provide adequate assurance of proper performance of the screen wash system. Therefore, relief from the requirements may be granted. This relief does not endanger public health and safety.

b.&c. Screen House Ventilation Equipment (SW-P2A, SW-P2B) & Control Building Chilled Water (AH-P3A, AH-P3B):

The licensee has indicated that these pumps are part of a variable resistance fluid system (control valve in operation). As such, the Code requires that ΔP and flowrate be measured and compared to reference values to evaluate the pumps' hydraulic performance. The licensee, in requesting relief from measuring flowrate as required by the Code, has not proposed any acceptable alternative to evaluating the pumps' performance.

Conclusion

The staff finds that the pumps' hydraulic performance cannot be evaluated properly and that therefore relief from the requirement cannot be granted. The licensee has been requested to furnish additional information regarding pump hydraulic performance. The licensee has agreed to furnish this information by the resolution date indicated in Table 2.2. In addition, the licensee has committed to implementing his position after the resolution is found acceptable by the staff within the number of days indicated in Table 2.2. During the interim period your current IST program requirements for these pumps apply.

d. Makeup and Purification Pumps (MU-P1A, MU-P1B & MU-P1C):

During normal plant operation, one of the three pumps runs continuously providing makeup and purification of reactor coolant. The other two pumps are started monthly and water recirculated through miniflow lines. Proper flow of the running pump can be determined by level instrumentation in the reactor coolant system. Flowrate measurement of the other two pumps is not required because the flow path is a fixed resistance system.

Conclusion

The staff finds that the hydraulic performance characteristics of the Makeup and Purification Pumps can be evaluated adequately in the present mode of operation and that it is impractical to install flow instrumentation. The staff therefore concludes that relief from measuring flow directly may be granted. This relief does not endanger public health and safety.

e. Nuclear Service Closed Cooling (NS-P1A, NS-P1B, & NS-P1C):

It is impractical to ascertain the flowrate of a single pump during normal plant operation because of the location of the flow instrumentation in the common header for all three pumps. Normal plant operation requires two pumps running. Establishing reference values for operation of both pumps is acceptable for determining or detecting adverse hydraulic changes in either pump. Individual flow measurements can be performed during plant shutdown when only one pump is required to carry the heat load.

Conclusion

The staff finds that the hydraulic characteristics of the pumps can be indirectly evaluated during normal plant operation by establishing reference values for two-pump operation. The staff therefore concludes that relief from the flow measurement of each pump at the frequency required by the Code may be granted. This relief does not endanger public health and safety.

3.5 Request relief from monthly testing the following pumps:

a. Emergency Feedwater Pumps EF-P1, EF-P2A & EF-P2B
b. Building Spray Pumps BS-P1A & BS-P1B
c. Decay Heat Removal Pumps DH-P1A & DH-P1B
d. Decay Heat Closed Cooling Water Pumps DC-P1A & DC-P1B

Code Requirement: An inservice test shall be run on each pump, nominally each month during normal plant operation.

Licensee Basis for Relief Request

During normal operation there are several pumps that are lined up for emergency standby and only operate during surveillance tests. For those pumps, relief is requested from monthly testing since operating experience has demonstrated that degradation of a non-operating pump is improbable. Quarterly testing will be substituted in order to ensure the operational readiness of the pumps and to obtain data for evaluation of pump degradation.

In addition, quarterly testing will enhance nuclear safety in that it reduces the number of times an emergency standby system loop is removed from service for testing.

Evaluation

An inservice test is required to be performed monthly to obtain thorough measurement or observation, to determine the operational readiness of a pump. If the frequency of testing is impractical to meet, the licensee has not adequately demonstrated such.

Conclusion

The staff finds that the testing frequency is not an impractical requirement considering the safety gained by testing. The staff concludes that relief from the requirement may not be granted. Therefore the licensee has been requested to furnish additional justification or establish an acceptable means for pump testing. The licensee has agreed to study this matter and to provide necessary information to resolve the problem by the resolution date indicated in Table 2.2. In addition, the licensee has committed to implementing his position after the resolution is found acceptable by the staff within the number of days indicated in Table 2.2. During the interim period the licensee is required to maintain the pump testing frequency specified under the current IST program.

3.6 The licensee requests relief from monthly testing of Boric Acid Pump CA-P1A & CA-P1B and instead test during refueling outage.

Code Requirement: An inservice test shall be run on each pump, nominally each month during normal plant operation.

Licensee Basis for Relief Request

The Boric Acid Pumps will be tested only during refueling outages since the only method of testing these pumps is to inject concentrated boric acid into the Reactor Coolant Makeup System. This would adversely affect plant operations and result in additional significant volumes of radioactive waste.

Evaluation

The importance of the operational readiness of the Borc Acid Pumps is such that an inservice test is warranted more frequently than during refueling outages. Drawings provided indicate the possibility of circulating borated water to the Borated Water Storage Tank. Some alternate test should be performed to provide assurance that these pumps would perform properly if initiated to do so.

Conclusion

The staff finds that the safety provided by the Boric Acid Pumps should be maintained by periodic testing to evaluate the pumps' operational readiness. The staff therefore concludes that relief from the requirement may not be granted. The licensee has been requested to provide assurance that these pumps will provide their design function or furnish additional justification for relief.

The licensee has agreed to study this matter and provide a resolution by the date indicated in Table 2.2. In addition, the licensee has committed to implementing his position after the resolution is found acceptable by the staff within the number of days indicated in Table 2.2. During the interim period the licensee agreed to continue testing the boric acid pumps in accordance with the requirements of the current IST program.

4.0 VALVE TESTING PROGRAM EVALUATION

4.1 General Considerations

4.1.1 Testing of Valves Which Perform a Pressure Isolation Function

There are several safety systems connected to the reactor coolant pressure boundary that have design pressures that are below the reactor coolant system operating pressure. There are redundant isolation valves forming the interface between these high and low pressure systems to prevent the low pressure systems from being subjected to pressures which exceed their design limit. In this role, the valves are performing a pressure isolation function.

It is our view that the redundant isolation provided by these valves regarding their pressure isolation function is important. We consider it necessary to provide assurance that the condition of each of these valves is adequate to maintain this redundant isolation and system integrity. For this reason we believe that some methods, such as pressure monitoring, radiography, ultrasonic testing, leak testing, etc. should be used to assure that their condition is sufficient to maintain this pressure isolation function.

In the event that leak testing is selected as the appropriate method for achieving this objective the staff believes that the following valves should be categorized as A or AC and leak tested in accordance with IWV-3420 of Section XI of the applicable edition of the ASME Code. These valves are:

a. Core Flooding CF-V4A/B
b. Decay Heat Spray RCV4, RCV23
c. Decay Heat Suction Line DHV1, DHV2
d. High Pressure Safety Injection MUV107A/C/D, MUV86A/B, MUV95

We have discussed this matter and identified the valves listed above to the licensee. The licensee has agreed to consider testing these valves and to categorize these valves with the appropriate designation depending on the testing method selected. Whatever the licensee selects as the testing method to be used to determine each valve's condition, the licensee will provide to the NRC for evaluation on a valve-by-valve basis the details of the methods used that clearly demonstrate the condition of each valve. The licensee has agreed to resolve this issue and implement the test methods by the dates indicated in Table 2.2. During the interim period the licensee is required to test these valves under the current IST program.

4.1.2 Stroke Testing of Check Valves

The staff position is that full-stroke testing of check valves will be required. The exercising requirements in subparagraph IWV-3520 (b)(1) (for normally open valves) and IWV-3520(b)(2) (for normally closed valves) in Section XI of the ASME Code (1974 Edition, Summer 1975 Addenda) refers to how promptly the disk responds and moves towards (or away from) its seat when flow is suspended (or initiated) and these requirements are in addition to those for full-stroking (IWV-3520(b)).

The licensee informed the staff that they may not meet the above stroking requirements for the following valves:

		MUV95	MUV86A/B
		DHV14A/B	MUV14A/B
CF-V4A/B	COV16A/B	EFV12A/B	MUV107A/C/D
EFV11A/B	EFV13	BSV52A/B	MUV73A/B/C
MSV9A/B	BSV21A/B	DHV16A/B	MUV94
Fluid Block System			

The licensee was requested by the staff to determine whether the above check valves can be fully stroke tested in accordance with the above staff position. Furthermore the licensee's proposed inservice valve test program is not acceptable if any valves that fall under Category A/C, A/C/E, C/E or C cannot be fully stroke tested. Of course the licensee may submit to the NRC a request for relief from this requirement which is to include a detail technical justification. The licensee has agreed to provide their position on this matter by the resolution date indicated in Table 2.2. In addition, the licensee has committed to implementing this position after the resolution is found acceptable to the staff, within the number of days indicated in Table 2.2. During the interim period the licensee is required to meet the testing requirements under his current IST program.

Since disk position is not always observable, the staff informed the licensee that verification of the plant's safety analysis design flow rate through the check valve would be an adequate demonstration of the full-stroke requirement. Any flow rate less than design will be considered part-stroke exercising unless it can be shown that the check valve's disk position at the lower flow rate would be equivalent to or greater than the design flow rate through the valve.

4.1.3 Test Frequency

The Code states that, in the case of cold shutdowns, valve testing need not be performed more often than once every three months for Category A and B valves and once every nine months for Category C valves. It is our position that the Code is inconsistent in that Category C valves should be tested on the same schedule as Category A and B valves. The licensee has agreed to modify his procedures on cold shutdown to read, "In the case of frequent cold shutdowns, valve testing will not be performed more often than once every three (3) months for Category A, B and C valves."

4.1.4 Review Limit to Safety-Related Valves

The review was limited to safety-related valves. Safety-related valves are defined as those valves that are needed to prevent or mitigate the consequences of an accident and/or to shutdown the reactor and to maintain the reactor in a shutdown condition. Valves in this category would typically include certain ASME Code Class 1, 2 and 3 valves and could include some non-code Class valves.

4.1.5 Licensee Request for Relief to Test Valves at Cold Shutdown

The Code permits testing of certain valves to be deferred to cold shutdown, and the Code conditions under which this is permitted is noted in Appendix A of the SER. These valves are specifically identified by the licensee and are full-stroked exercised during cold shutdowns; therefore, the licensee is meeting the requirements of the ASME Code. Since the licensee is meeting the requirements of the ASME Code, it will not be necessary to grant relief; however, during our review of the licensee's IST program, we have verified that it was not practical to exercise these valves during power operation and that we agree with the licensee's basis. It should be noted that the staff differentiates, for valve testing purposes, between the cold shutdown mode and the refueling mode. That is, for testing purposes the refueling mode is not considered as a cold shutdown. Testing done on a refueling mode interval will satisfy testing required for cold shutdown.

4.1.6 Valve Testing at Cold Shutdown

Based on our interpretation of the ASME Code Section XI on Inservice valve testing at cold shutdown, we find the conditions of the code are met, when the licensee commences valve testing at a reasonable time interval (2-48 hrs) after cold shutdown is achieved and continues testing until complete or until the plant is ready to return to power. Completion of all valve testing is not a prerequisite to return to power. Any testing not completed at one cold shutdown should be performed during any subsequent cold shutdowns that may occur before refuling to meet the Code specified testing frequency. This interpretation of the ASME Code was discussed with and agreed to by the licensee.

4.1.7 Stroke Testing of Motor Operated Valves

The licensee has requested relief from the part-stroke requirement of Section XI for all power operated valves. The licensee has stated that none of the Category A or B power operated valves of the test program can be part-stroked because of the design logic of the operating circuits. These circuits are such that when an open or close signal is received the valve must complete a full stroke before the relay is released to allow the valve to stroke in the other direction. We find that the above relief request from part-stroking is warranted because it is impractical to part stroke a valve and relief should be granted because the required function of the valves involves only full open or full closed positions. Therefore, we conclude that granting this relief does not endanger public health and safety.

4.1.8 Application of Appendix J Testing to the IST Program

The review of the testing of the valves in which tests are required by Appendix J review for this plant is a completely separate review from the IST program review. However, the determinations made by that review are directly applicable to the IST program. Our review has determined that the current IST program as submitted by the licensee correctly reflects our interpretation of Section XI vis-a-vis Appendix J. The licensee has agreed that, should in the future the Appendix J program be amended, they will amend their IST program accordingly.

4.1.9 Licensee Request for Relief to Test Valves at Cold Shutdown

The Code permits testing certain valves at cold shutdown, and the Code conditions under which this is permitted are noted in Appendix A of this SER. These valves are specifically identified by the licensee and are full stroked exercised during cold shutdowns. Therefore, the licensee is meeting the requirements of the ASME Code and it is not necessary to grant relief.

4.2 General Relief Request

4.2.1 Relief Request:

All the ASME Code Category A, containment isolation valves (CIVs), will meet Appendix J to 10 CFR Part 50 leak testing requirements in lieu of Section XI of the ASME Code requirements.

Code Requirement:

IWV-3420 of Section XI of ASME Code (1974 Edition) Valve Leak Rate Test. The Code requires that Category A valves shall be leak-tested. Tests shall be conducted at the same (or greater) frequency as scheduled refueling outages, but not less than once every two years. Valve seat leakage tests shall be made with the pressure differential in the same direction as will be applied when the valve is performing its function with the following exceptions:

1. Any globe type valve may be tested with pressure under seat.

2. Butterfly valves may be tested in either direction, provided their seat construction is designed for sealing against pressure on either side.

3. Gate valves with two-piece disks may be tested by pressurizing them between the seats.

4. All valves (except check valves) may be tested in either direction if the function differential pressure is 15 psi or less.

5. The use of leakage tests involving pressure differentials lower than function pressure differentials are permitted in those types of valves in which service pressure will tend to diminish the overall leakage channel opening, as by pressing the disk into or onto the seat with greater force. Gate valves, check valves, and globe type valves having function pressure differential applied over the seat, are examples of valve applications satisfying this requirement. When leakage tests are made in such cases using pressure lower than function maximum pressure differential, the observed leakage shall be adjusted to function maximum pressure differential value by calculation appropriate to the test media and the ratio between test and function pressure differential assuming leakage to be directly proportional to the pressure differential to the one-half power.

6. Any valves not qualifying for reduced pressure testing as defined in IWV 3420(c)(5) of Section XI of ASME Code shall be leak-tested at full maximum function pressure differential, with adjustment by calculation if needed to compensate for a difference between service and test media.

Valve seat leakage may be determined by:

1. Draining the line, closing the valve, bringing one side to test pressure, and measuring leakage through a downstream telltale connection, or

2. Measuring feed rate required to maintain pressure between two valves, or between two seats of a gate valve, provided the total apparent leak rate is charged to the valve or gate valve seat being tested, and that the conditions required by IWV-3420(c) of Section XI of the ASME Code are satisfied.

The test medium shall be specified by the Owner.

Basis for Relief Request:

All ASME Code Category A CIVs are subject to the testing requirements of Appendix J of 10 CFR 50. Met-Ed requests relief from the leak testing requirements of Section XI of ASME Code, in favor of the leak testing requirements of Appendix J. The CIV's are listed in the Met-Ed Technical Specifications, and the existing requirements and exemptions listed therein should also apply to this IST valve program.

Evaluation:

The Category A valve leak rate test requirements of IWV-3420(a-e) of Section XI of the ASME Code have been superseded by Appendix J requirements for CIVs. The staff has concluded that the applicable leak test procedures and requirements for CIVs are determined by 10 CFR 50 Appendix J. Relief from paragraph IWV-3420(a-e) for CIVs presents no safety problem since IWV-3420(a-e) is equivalent to and meets the intent of Appendix J requirements.

The licensee has stated that they meet the requirements of IWV-3420 (f and g) which are requirements concerning individual valve leak rate limits and trend analysis of leak data, respectively.

Conclusion:

Based on the considerations discussed above, we conclude that the alternate testing requirements for CIVs which meet the requirements of 10 CFR 50 Appendix J gives the same reasonable assurance of valve operability that is given vy IWV 3240(a-e) of Section XI of the ASME Code. Thus, we have judged that applying IWV 3420(a-e) of Section XI of the ASME Code in this case is impractical. We therefore grant relief from IWV 3420(a-e) of Section XI of the ASME Code and this relief will not endanger public health and safety.

4.2.2 Relief Request:

The licensee has requested relief from the exercising requirements of Section XI for the following valves:

Decay Heat System

DH-V64 DH-V69

Station Service Air System

SA-V2, SA-V6

Spent Fuel Cooling System

SF-V23

Code Requirement:

Refer to Appendix A of this SER

Licensee Basis for Requesting Relief:

These valves are locked closed during normal operation and their safety position is to remain closed.

Evaluation:

The safety function of these valves are to perform leak limiting barriers. These valves are containment isolation valves which are closed in their safety position, and are not required to open to mitigate the consequences of an accident or to safely shutdown the plant. Therefore, the operability of these valves is inconsequential with regard to the safety function for which they perform.

Conclusion:

We conclude that the quarterly stroke and stroke time measurement are meaningless for passive valves. Thus, we find the proposed relief acceptable since we have judged that stroke time measurements for this application is impractical. In addition, this judgment will not result in a decrease in the level of plant safety or endanger public health and safety. Thus, relief is granted.

4.2.3 Relief Request:

As quoted below Section XI of the ASME Code (IWV3400 and IWV3500) requires that corrective action shall be taken as a prerequisite to plant startup (IWV3410g) when Category A, B & C valves are found to be inoperable. The licensee requests relief from this requirement in that the condition for corrective action as a prerequisite to plant startup applies to those valves that are in safety related systems that are required to mitigate the consequences of an accident and bring the plant to a safe shutdown condition.

Code Requirement:

ASME Section XI Paragraph IWV 3410(g) and IWV 3520(c) address what corrective action is required when a valve fails an exercise test. "If the condition is not or cannot be corrected within 24 hours, the valve shall be declared inoperative. When corrective action is required as a result of tests made during cold shutdown, the condition shall be corrected before start-up. A retest showing acceptable operation shall be run following any required corrective action before the valve is returned to service." The ASME Code Section XI (IWV 3400) specifies this requirement applies to Category A & B valves.

Licensee Basis for Relief Request:

Constraints and limits on plant startup with an inoperable valve depend on many specific plant design features and conditions. The limiting conditions for startup and operation have been analyzed and the limiting conditions for safety related systems based on this analysis are addressed in subsection 3 of the TMI-1 technical specification.

4.2.3 Evaluation:

The staff agrees with the licensee in that conditions and constraints set forth in the licensee's technical specification in Subsection 3, covering the operability of safety related systems which include the operability of valves in these systems does meet the intent of the ASME Code. We further agree that Category A, B, & C valves that in no way are related to safety, need not meet the ASME Code operability requirement that is, they be operable as a prerequisite to plant startup.

Conclusion:

In Subsection 3, limiting conditions of operation of the Technical Specifications we have previously reviewed and accepted minimum requirements for plant start-up. On this basis we find that the proposed relief is acceptable since we have found the constraints in the licensee's Technical Specifications make the operability requirement in the ASME Code impractical. In addition, the proposed relief will not decrease the level of plant safety or endanger public health and safety and thus this relief is granted.

4.2.4 Relief Request:

The licensee has requested relief from the stroke timing requirements of Section XI for the following valves and proposes to establish a maximum time limit requirement. The maximum time limit for each valve shall be based on the valve manufacturer's recommendations which is bounded by the time limit used in the safety analysis. This time shall not exceed that used in any safety analysis.

Core Flood System

CF-V19 A/B CF-V20 A/B

Chemical Sampling System

CA-V2 CA-V5A/B

CA-189

Containment Monitoring System

CM-VI	CM-V4

Nuclear Service River Water System

NR-V45 A-C

Screen Wash and Slime System

SW-VII A/B	SW-V17 A/B

Waste Disposal Gas System

WDG-VA

Waste Disposal Liquid System

WDL-V49	WDL-V50
WDL-V89	WDL-V90
WDL-V91	WDL-V92
WDL-V62	WDL-V61

Code Requirement:

Paragraph IWV-3410(c)(2) of Section XI of the ASME Code states that the stroke time for all power-operated valves shall be measured to the nearest second or 10% of the maximum allowable stroke time, whichever is less whenever such a valve is full-stroke tested.

Basis for Requesting Relief:

Air operated valves 2" and less have full-stroke time usually less than one second. Thus, the valve stroke time cannot effectively be measured using normal test equipment such as a stopwatch. Also it is considered impractical to reliably measure changes in valve stroke times for valves which stroke open or closed in less than one (1) second. For very short stroke times, the variation in measured stroke times can be a large fraction of the established stroke time limit. Thus it is not practical to meaningfully identify or evaluate the stroke time changes considering human reaction times and the normal timing equipment used.

Evaluation:

We agree with the licensee that for valves which usually stroke in less than one second, the stroke time requirements of Section XI are impractical. The establishment of a maximum stroke time will insure that these valves are monitored for potential maintenance, as intended by code, should any eratic or abnormal action of the valve be observed.

Conclusion:

We conclude that for fast acting valves the stroke time measurements would provide no practical data to determine valve operability. We conclude that the alternate testing proposed above will give the reasonable assurance of valve operability intended by the Code and that the proposed relief will not decrease the level of plant safety or endanger public health and safety. Thus, based on the above the relief from valve stroke time requirements as per Section XI of the ASME Code is granted for the valves listed above.

4.2.5 Relief Request:

The licensee has requested relief from valve stroke time requirements of Section XI for the following valves:

Air Handling System	
Control Bldg. Vent. Unit	
Cooling Coil Discharge	AH-V11 A/B
Main Steam System	
Main Steam to Emergency	
Feedwater Pump	MS-V10 A/B
EFPT Steam Pressure	
Regulators	MS-V6
Service Water System	
Service Water Flow	SW-V24 A/B
Control Valve	

Code Requirement:

Relief is requested from paragraph IMV-3410(c)(2) which states that the stroke time for all power-operated valves shall be measured to the nearest second or 10% of the maximum allowable stroke time, whichever is less, whenever such a valve is full-stroke tested.

Basis for Requesting Relief:

These valves are temperature and pressure controlled valves whose operators depend on changes in temperature or flow/pressure to initiate valve operation or change in position. There is no practical way to determine exactly when a normally open control valve starts to close and during normal operation the valve may be only partially open which would not be a full-stroke test. Thus the time test results for these valves will not be repeatable even though the valve operates as required.

Evaluation:

Inasmuch as the full stroke of these valves is not a meaningful indication of valves operability, the measurement of stroke time is a meaningless value.

Conclusion:

The staff concludes that for control valves the maintenance of normal system operation and the quarterly functional test are adequate indication of valve operability. On this basis we find that the full stroke test for these valves is impractical for indicating valve operability. In addition, the proposed relief will not decrease the level of plant safety or endanger public health and safety. Thus, based on the above evaluation this relief from valve stroke time requirements as per Section XI of the ASME Code is granted.

4.3 Decay Heat Removal System

4.3.1 ASME Code - Category B Valves

4.3.1.1 Relief Request:

The licensee has requested to exercise the following valves during the refueling period in lieu of Section XI requirements.

Reactor Bldg., Sump Recirc. Suction	DH-V6A/B

Code Requirement:

Refer to Appendix A.

Basis for Requesting Relief:

DH-V6A/B is located outside the Reactor Building and these valves isolate the Reactor Building Sump from the low pressure injection system (LPI) and high pressure injection system (HPI). The piping from the Reactor Building Sump to DH-V6A/B slopes toward DH-V6A/B. The "A" side slopes 9 inches and is approximately 35 ft. in length and the "B" side slopes 5 inches and is approximately 21 ft. in length. Therefore, if DH-V6A/B were cycled frequently, this would admit large amounts of corrosives and "dirty" water into the LPI/HPI systems.

Evaluation:

Exercising valves DH-V6A/B at quarterly or cold shutdown frequency would introduce contaminated water to the Decay Heat system. In view of the need to maintain water chemistry in the Decay Heat System and Primary Coolant system, the staff agrees that the exercising requirements for these valves are impractical. The licensee will exercise these valves at each refueling cycle when the contaminated water can be processed.

These valves are either low in failure rate and/or redundant. The optimum test interval for operability testing low in failure rate and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of 3 months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valve occur every 12 to 18 months which is within the optimum range for operability testing of this valve.

Low in failure rate, as used in the above paragraph, means any component whose unavailability upon demand is less than or equal to 10^{-4}/demand. Check valves are considered low in failure rate since their unavailability has been found to be 10^{-4}/demand. Redundant, as used above, means the existence of more than one valve for performing a given function.

Furthermore, the ASME Code, which requires testing be done quarterly, and which has been adopted in 10 CFR 50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to each refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Conclusion:

Based on the considerations discussed above, the staff concludes that the alternate testing frequency proposed above will give the reasonable assurance of valve operability as intended by the Code and that the relief thus granted will not endanger public health and safety.

4.4 Emergency Feedwater System

4.4.1 ASME Code - Category C Valves

4.4.1.1 Relief Request:

The licensee has requested relief from the full stroke requirements of Section XI. The licensee has proposed to part-stroke this valve each quarter.

Emergency Feedwater to Emergency Feedwater Pumps	EF-V3

Code Requirement:

Refer to Appendix A of this SER.

Licensee Basis for Relief Request:

This check valve allows flow to the emergency feedwater pumps from the river only in cases when the normal supply (condensate system) is not available. It is a back-up path within an emergency system. Since the piping surrounding this valve is never used (i.e., no flow), the introduction of water through this valve would stir up sediment and corrosion products that may have accumulated and introduce them into condensate system which would result in contamination of the main steam generators.

Evaluation:

Our evaluation of the licensee's relief has been reviewed which included a study to determine other reasonable options acceptable to us to achieve the ASME Code objective for testing this valve. These options are given in Appendix B of this SER.

Conclusion:

In order to resolve this issue, the staff requested the licensee to establish the feasibility of stroke testing the valve without disrupting the secondary water chemistry conditions or commit to resolving this problem in accordance with the applicable options in Appendix B of this SER. The licensee has agreed to study this matter and provide a resolution for this problem by the date indicated in Table 2.2. Furthermore, the licensee has agreed to an effective implementation date to be by the end of the first fuel cycle after the TMI-1 restart. During the interim period the licensee is required to meet the testing requirements under his current IST program.

4.4.2 ASME Code - Category BE

4.4.2.1 Relief Request:

The licensee has requested relief to exercise the following valves once each refueling:

Emergency Feedwater to	EF-V4
Emergency Feedwater Pumps	EF-V5

Code Requirement:

Refer to Appendix A

Licensee Basis for Relief Request:

The testing of EF-V4 and EF-V5 will introduce river water, silt and corrosives into the suction piping of the three Emergency Feedwater Pumps. This is unacceptable from a chemistry control standpoint for normal operations. In order to flush the river water the suction valves of the Emergency Feedwater Pumps must be closed while performing the flushing operation. This would render the Emergency Feedwater Pumps inoperable during the flushing operation. Also, these valves are chained and locked shut. In addition, the breakers for these valves are open at the 480 volt power supply. Essentially this means that these valves are not normally powered.

Evaluation:

In view of the need to maintain water chemistry in the Steam Generator System, the staff agrees that the quarterly test requirements of Section XI are impractical.

These valves are either low in failure rate and/or redundant. The optimum test interval for operability testing low in failure rate and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of 3 months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valve occur every 12 to 18 months which is within the optimum range from operability testing of this valve.

Low in failure rate, as used in the above paragraph, means any component whose unavailability upon demand is less than or equal to 10^{-4}/demand. Check valves are considered low in failure rate since their unavailability has been found to be 10^{-4}/demand. Redundant, as used above, means the existence of more than one valve for performing a given function.

Furthermore, the ASME Code, which requires testing be done quarterly, and which has been adopted in 10 CFR 50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Conclusion

Based on the considerations discussed above, the staff concludes that the alternate testing frequency proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger public health and safety.

4.5 Feedwater System

4.5.1 ASME Code Relief - Category C Check Valves

4.5.1.1 Relief Request:

The licensee has requested relief from the exercising requirements of Section XI for the following valves:

Feedwater to OTSG FW-V12A/B

Check Valve

ASME Code Requirement:

Refer to Appendix A of this SER.

Licensee Basis for Relief Request:

These valves are normally open to allow feedwater into the steam generators. They will close under conditions which make the normal feedwater flow unavailable, and the emergency feedwater system is in use. To test them (exercise them to the closed position) would require "pressurization" of the steam generators through the emergency feedwater system. This would cause water chemistry problems since the emergency feedwater is not conditioned in the same manner, chemically, as the normal feedwater.

Evaluation:

Our evaluation of the licensee's relief has been reviewed which included a study to determine other reasonable options acceptable to us to achieve the ASME Code objectives for testing these valves. These options are given in Appendix B of this SER.

Conclusion:

In order to resolve this issue the staff requested the licensee to establish the feasibility of stroke testing the valves without disrupting the secondary water chemistry conditions or commit to resolving this problem in accordance with the applicable options in Appendix B of this SER. The licensee has agreed to study this matter and provide a resolution for this problem by the date indicated in Table 2.2. Furthermore, the licensee has agreed to an effective implementation date to be by the end of the first fuel cycle after the TMI-1 restart. During the interim period the licensee is required to meet the testing requirements under his current IST program.

4.6 Make-up System

4.6.1 ASME Code - Category C. Valves

4.6.1.1 Relief Request:

The licensee has requested relief from the stroking requirements of Section XI and proposes to exercise the following valves once each refueling.

High Pressure Injection (HPI)	MU-V86 A/B
Check Valves	MU-V95
	MU-V107 A/C/D

Code Requirement:

Refer to Appendix A of this SER.

Licensee Basis for Requesting Relief:

The HPI check valves cannot be operated during normal operation or at each cold shutdown because of the limited number (40) of allowable thermal cycles on the high pressure injection nozzles.

Evaluation:

In view of the need to limit thermal shock to the HPI nozzles, the staff agrees that the test requirements of Section XI are impractical.

These valves are either low in failure rate and/or redundant. The optimum test interval for operability testing low in failure rate and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of 3 months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valve occur every 12 to 18 months which is within the optimum range from operability testing of this valve.

Low in failure rate, as used in the above paragraph, means any component whose unavailability upon demand is less than or equal to 10^{-4}/demand. Check valves are considered low in failure rate since their unavailability has been found to be 10^{-4}/demand. Redundant, as used above, means the existence of more than one valve for performing a given function.

Furthermore, the ASME Code, which requires testing be done quarterly, and which has been adopted in 10 CFR 50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Conclusion:

Based on the considerations discussed above, the staff concludes that the alternate testing frequency proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger public health and safety.

4.7 Reactor Building Emergency Cooling System

4.7.1 ASME Code - Category C Valves

4.7.1.1 Relief Request:

The licensee has requested relief from the stroking requirements of Section XI and has proposed to exercise the following valves every refueling:

River Water to Reactor Building Cooling Units	RR-V8A/B
Reactors Building Coil Outlet	RR-V9A-D

Code Requirement:

Refer to Appendix A of this SER.

Licensee Basis for Requesting Relief:

During the functional test of RR-V8A/B and RR-V9A/B/C/D river water, silt and corrosives are introduced into the Reactor Building Emergency Cooling Coils. After the test these cooling coils must be first drained and then flushed with Nuclear Service Closed Cooling Water. The drain and flush water is drained to the Reactor Building Sump and this produces large quantities of water that must be processed through the liquid waste disposal system. Therefore, per Technical Specification 4.5.3.1B these check valves will continue to be tested on a refueling frequency (approximately every 12 months) instead of every 9 months.

Evaluation:

Inasmuch as this test produces large quantities of water that must be processed, the staff agrees that the stroking requirements of Section XI are impractical.

These valves are either low in failure rate and/or redundant. The optimum test interval for operability testing low in failure rate and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of 3 months to 27 months. Refueling intervals, which have been proposed as the exercise interval for the valve occur every 12 to 18 months which is within the optimum range from operability testing of this valve.

Low in failure rate, as used in the above paragraph, means any component whose unavailability upon demand is less than or equal to 10^{-4}/demand. Check valves are considered low in failure rate since their unavailability has been found to be 10^{-4}/demand. Redundant, as used above, means the existence of more than one valve for performing a given function.

Furthermore, the ASME Code, which requires testing be done quarterly, and which has been adopted in 10 CFR 50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Conclusion:

Based on the considerations discussed above, the staff concludes that the alternate testing frequency proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger public health and safety.

4.8 Reactor Building Spray System

4.8.1 ASME Code - Category C Valves

4.8.1.1 Relief Request:

The licensee has requested relief from the full stroke requirements of Section XI and proposes to part stroke the following valves every refueling:

Reactor Bldg. Spray Header Check Valve	BS-V30A/B

Code Requirement:

Refer to Appendix A of this SER.

Licensee Basis for Requesting Relief:

The full stroke of BS-V30A/B would require initiation of Reactor Building Spray. This would entail spraying the Reactor Building with borated water.

Evaluation:

Our evaluation of the licensee's relief has been reviewed which included a study to determine other reasonable options acceptable to us to achieve the ASME Code objectives for testing these valves. These options are given in Appendix B of this SER.

Conclusion:

In order to resolve this issue the staff requested the licensee to establish the feasibility of stroke testing the valves without causing water damage to vital components or commit to resolving this problem in accordance with the applicable options in Appendix B of this SER. The licensee has agreed to study this matter and provide a resolution for this problem by the date indicated in Table 2.2. Furthermore, the licensee has agreed to an effective implementation date to be by the end of the first fuel cycle after the TMI-1 restart. During the interim period the licensee is required to meet the testing requirements under his current IST program.

4.9 Reactor Coolant System

4.9.1 ASME Code - Category C

4.9.1.1 Relief Request:

The licensee has requested relief from the stroking requirements of Section XI and is required by Technical Specification to exercise the following valves every refueling:

Internal Vent Valves 8 valves not numbered

Code Requirement:

Refer to Appendix A of this SER.

Licensee Basis for Requesting Relief:

These valves are manually stroked each refueling. Exercising these valves requires removal of the reactor vessel head.

Evaluation:

This test requires the removal of the reactor vessel head. Removal of the reactor vessel head is impractical quarterly because it would require shutting down the plant and at cold shutdown because it would require venting of the primary system which would significantly delay start-up.

These valves are either low in failure rate and/or redundant. The optimum test interval for operability testing low in failure rate and/or redundant valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques, to be in the range of 3 months to 27 months. Refueling intervals, which have been proposed as the exercise interval for these valves occur every 12 to 18 months which is within the optimum range from operability testing of these valves.

Low in failure rate, as used in the above paragraph, means any component whose unavailability upon demand is less than or equal to 10^{-4}/demand. Check valves are considered low in failure rate since their unavailability has been found to be 10^{-4}/demand. Redundant, as used above, means the existence of more than one valve for performing a given function.

Furthermore, the ASME Code, which requires testing be done quarterly, and which has been adopted in 10 CFR 50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Conclusion:

Based on the considerations discussed above, the staff concludes that the alternate testing frequency proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger public health and safety.

5.0 CONCLUSION

Based on our review we have concluded that the proposed IST Program, with the exception of open items, conforms to the 1974 Section XI of the ASME B&PV Code through the Summer 1975 Addenda to the extent practical for the facility. Our review has resulted in items identified which: (1) are complete because the licensee has either met Code requirements or the staff has granted the relief requested, or (2) remain open because the licensee's justification for the relief request is not sufficient. This SE approves the implementation of completed items. Supplement(s) to this SE will address the open items.

Approximately 95 percent of the items covered under the IST Program are fully in compliance with the Code requirements. We conclude, therefore, that these items are acceptable. The licensee has agreed to review his IST program and modify it accordingly as it may result from any future modifications to the safety related systems or components. The licensee has further agreed that any changes to the IST program that would result from these future modifications will meet the ASME Code requirements for IST or that he will request appropriate relief.

Table 2.1 of this SE delineates those items for which relief has been granted. We are granting this relief based on our review of the information submitted to support the determinations that these ASME Code requirements would be impractical for the facility. We have given due consideration to the burden that could result if these requirements were imposed on the facility. We have concluded that the granting of this relief is authorized by law, will not endanger life or property or the common defense and security and is in the public interest considering the burden on the licensee if the relief were not granted.

Table 2.2 of this SE delineates those items for which relief has been requested but remain open pending completion of final resolution and implementation. Until such time as these items are resolved, the applicable requirements of the interim IST Program, approved by our letter of December 20, 1977 remain in effect.

We have determined that the license amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR Section 51.5(d)(4) that an environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

We have concluded, based on the considerations discussed above, that (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: AUGUST 03 1987

APPENDIX A

Code Requirements

Subsection IWV-3410(a) of the Section XI Code (which discussed full stroke and partial stroke requirements) requires that Code Category A and B valves be exercised once every three months, with exceptions as defined in IWV-3410(b)(1), (e) and (f). IWV-3520(a) (which discusses full stroke and partial stroke requirements) requires that Code Category C valves be exercised once every three months, with exceptions as defined in IWV-3520(b). In the above cases of exceptions, the Code permits the valves to be tested at cold shutdown where:

(a) It is not practical to exercise the valves to the position required to fulfill their function or to the partial position during power operation.

(b) It is not practical to observe the operation of the valves (with failsafe actuators) upon loss of actuator power.

APPENDIX B

ACCEPTABLE OPTIONS FOR RESOLVING OPEN ITEMS

The staff considers the following methods are acceptable for resolving the open items: 4.4.1.1, 4.5.1.1 and 4.8.1.1.

1. The licensee performs the necessary plant modifications so that testing can be performed to meet the ASME Code.

2. Maintain the interval for testing within a refueling cycle. This applies only to the case where relief from the test interval specified in ASME Code is being requested. For this case, the licensee needs to provide a basis for the relief for maintaining refueling cycle test interval.

3. For test intervals longer than a refueling cycle, the licensee should demonstrate by reliability analysis that when a valve (or several valves such as redundant valves) is exercised at the test intervals proposed, the increase in the system unavailability is not significant. As part of this analysis, there should be a study to identify the random, cyclic, common cause, or systematic failure types or modes which may occur to the valve(s) over the longer-than-normal testing intervals. A study of data sources such as LER's and actual recorded plant data should then be performed to establish the type of failure the valve(s) experienced and the frequency of these failures for the same or similiar applications. This "experience" failure rate should be factored into the reliability analysis. The data source for which the valves failure rates are derived should be justified. In the analysis, some use of reliability models or fault-tree methods may be used if deemed pertinent. This approach would also apply when the licensee's proposed method for exercising is a deviation from the ASME Code such as part-stroking vs. full-stroking.