# TECHNICAL EVALUATION REPORT

Indian Point Unit No. 2
Consolidated Edison Company of New York, Inc.
Pump and Valve Inservice Testing Program
Revision 0, Third Ten-Year Interval

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ENCLOSURE 2

## ABSTRACT

This report presents the results of Brookhaven National Laboratory's evaluation of the pump and valve relief requests, cold shutdown and refueling outage justifications and, for selected systems, a review of the scope of the Indian Point Unit No. 2, ASME Section XI Pump and Valve Inservice Testing Program.

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## 1.0 INTRODUCTION

Contained herein is a technical evaluation report (TER) of Revision 0 of the ASME Section XI Third Ten Year Program for pump and valve inservice testing (IST) submitted to the U.S. NRC by Consolidated Edison Company of New York, Inc. ("Con Edison") for its Indian Point Unit No. 2 nuclear power plant on December 30, 1993 with clarification on March 9, 1994 (Refs. 1, 2). The program for this third ten year interval is based on the requirements of Section XI of the ASME Boiler and Pressure Vessel Code, 1989 Edition (Ref. 3). The 1989 Edition of Section XI provides that the rules for inservice testing of pumps and valves are as specified in ASME/ANSI OMa-1988 Part 6 and 10 (Refs. 4, 5), respectively.

This program revision supersedes all previous submittals. The Indian Point Unit No. 2 nuclear power plant is a Westinghouse Pressurized Water Reactor (PWR) which began commercial operation on August 1 1974. The third ten year inspection interval is defined for Indian Point Unit No. 2 as beginning July 1, 1994 and ending June 30, 2004.

Title 10 of the Code of Federal Regulations, §50.55a ¶(f) (Ref. 6) requires that inservice testing of ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda, except where specific relief has been requested by the licensee and granted by the commission pursuant to §50.55a ¶(a)(3)(i), (a)(3)(ii), or (f)(6)(i). Con Edison has requested relief from certain ASME Section XI testing requirements. A review of the relief requests was performed using Section 3.9.6 of the Standard Review Plan (Ref. 7), Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," (Ref. 8), and the Minutes of the Public Meeting on Generic Letter 89-04, dated October 25, 1989 and September 26, 1991 (Refs. 9, 10), and Draft NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," (Ref. 11). The IST Program requirements apply only to component (i.e., pumps and valves) testing and are not intended to provide a basis to change the licensee's current Technical Specifications for system test requirements. As discussed in Draft NUREG-1482, section 2.2, relief requests for non-Code components do not require NRC approval and, therefore, are not included in this TER.

Section 2.0 of this report presents the evaluation of two pump relief requests. One additional pump relief request was not evaluated because it was related to a non-Code class pump. Section 3.0 presents the evaluations of nine of the thirty valve relief requests submitted. The twenty-one other valve relief requests were either authorized by Generic Letter 89-04 or were not Code class valves and, consequently, were not specifically evaluated in this Technical Evaluation Report. However, any anomalies associated with these relief requests are addressed in Section 5 of the report. The evaluation of 57 Justifications for deferral are presented in Section 4.0 in Table 1. Section 5.0 summarizes the actions required of the licensee resulting from the TER evaluations of the relief requests, the deferral justifications, and programmatic aspects while Section 6.0 lists the references.

## 2.0 PUMP IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, Con Edison has submitted three relief requests for pumps at the Indian Point Unit No. 2 nuclear power plant which are subject to inservice testing under the requirements of OMa-1988 Part 6. Two of these relief requests have been reviewed to verify their technical basis and determine their acceptability. The relief requests, along with the technical evaluation by BNL, are summarized below. The other relief request (No. 3) involves the fuel oil transfer pumps which are not ASME Code class pumps. Therefore, no evaluation is required.

### 2.1 Generic Pump Relief Requests

#### 2.1.1 Pump Relief Request No. 1

*Relief Request:* The licensee requests relief from the requirement of performing inservice testing of pumps within three months prior to placing a system in an operable status that had previously been declared inoperable, as required by ¶5.1 and ¶5.4 for the following pumps:

Safety Injection Pumps 21, 22, and 23
Auxiliary Feedwater Pumps 21, 22, and 23
Auxiliary Component Cooling Pumps 21 and 22
Residual Heat Removal Pumps 21 and 22
Containment Spray Pumps 21 and 22
Safety Injection Circulating Water Pumps 21, 22, and 23

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "It is proposed that full flow tests performed during refueling serve in lieu of ASME/ANSI OM, Part 6 required tests as credit toward maintaining the test schedule during refuelings. Upon resumption of power operations, these pumps will be tested quarterly in the mini flow mode with mini flow reference values, commencing within three months (+25%) of the corresponding full flow test. If, for any reason, a full flow test is not performed during any given refueling, a mini flow test will be performed within three months prior to placing the system in an operable status."

*Licensee's Basis for Relief:* The licensee states that: "Present Plant Technical Specifications require full flow testing of the Safety Injection and Auxiliary Feedwater Pumps prior to start-up from each reactor refueling. In addition, full flow tests may be performed on the other pumps listed during refueling outages.

These full flow tests differ from the ASME/ANSI OM, Part 6 required tests of these pumps which may be performed under minimum flow conditions using recirculation loops. Full flow tests are maximum capability tests and serve to verify pump operability at conditions closely approximating those for which the pumps are designed. It is intended that these full flow tests serve in lieu of the OM, Part 6 required tests during refuelings. Subsequent recirculation flow tests will commence three months (+25%) from the corresponding full flow test."

*Evaluation:* OMa-1988 Part 6, ¶5.1 requires that an inservice test be run on each pump, nominally every 3 months, except as provided in ¶5.3, ¶5.4 and ¶5.5. OMa-1988, Part 6, ¶5.4 states that for a pump in a system declared inoperable or not required to be operable, the test schedule need not be followed. Within 3 months prior to placing the system in an operable status, the pump shall be tested and the test schedule followed in accordance with the requirements of this part. Pumps which can only be tested during plant operation shall be tested within 1 week following plant startup.

The licensee's relief request, proposed alternate testing, and basis for relief are not completely clear, however it appears that the licensee is seeking relief in order to perform full flow tests at refueling outages for those pumps with mini-flow loops. OMa-1988 Part 6 is not an impediment for performing full flow tests nor any sequence of mini-flow and full flow tests. The Code allows two sets of reference values. OMa-1988, Part 6, ¶4.5 states "If it is necessary or desirable, for some reason other than stated in para. 4.4 to establish an additional set of reference values, an inservice test shall first be run at the conditions of an existing set of reference values and the results analyzed. If operation is acceptable per para. 6.1, a second test run at the new reference conditions shall follow as soon as practicable. The result of this test shall establish the additional set of reference values. Whenever an additional set of reference values is established, the reasons for so doing shall be justified and documented in the record of tests (see Section 7). The requirements of para. 4.3 apply."

If the mini-flow tests establish the reference values, then the additional set of reference values would apply to the full flow tests. If the licensee wishes to test on a quarterly basis using mini-flow values except at refueling outages when the full flow test would be performed on a refueling outage frequency, then that approach is not only acceptable it is preferable, and, relief is not required provided the requirements of ¶4.5 are met.

If the licensee is also seeking blanket relief from testing the pumps within three months prior to placing the system in an operable status, then the licensee should revise this relief request and submit additional information to justify the reasons.

## 2.2 Chemical and Volume Control System (CVCS)

### 2.2.1 Pump Relief Request No. 2: Charging Pumps 21, 22, and 23

*Relief Request:* Relief is requested from the requirements of OMa-1988 Part 6, ¶5.2 with respect to comparing discharge pressure to reference values and using the flow acceptance criteria of Part 6, Table 3b.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "The parameters identified in OM, Part 6, Table 2 will be measured quarterly. A minimum operability criterion of 75 gpm per pump (nominal flow path) has been established. Experience with data trending has permitted synthesizing alert and action ranges for this parameter. These ranges are wider than specified in Table 3b of OM, Part 6. The ranges of Q in Table 3b will be set as follows:

| | | |
|---|---|---|
| Flow Action Low | = | 75 gpm |
| Flow Alert Low | = | 80 gpm |
| Flow Action High | = | 110 gpm |

| | | |
|---|---|---|
| Vibrations Action High | = | 6.0 mil. (p-p) |
| Vibrations Alert High | = | 4.0 mil. (p-p)" |

*Licensee's Basis for Relief:* The licensee states that: "The charging pumps are positive displacement, 98 gpm design flow rate variable speed pumps, employed in a variable resistance system. They serve to maintain chemistry control, provide Reactor Coolant Pump Seal Injection flow and Reactor Coolant Pump Lower Radial Bearing Cooling Flow. They also provide a means of reactivity control via boron addition.

With regard to the emergency boration function, the Chemical and Volume Control System malfunction resulting in dilution, as analyzed in the FSAR, is relevant. Three cases are analyzed, including dilution during refueling, dilution during startup and dilution at power. The analysis concludes that because of the procedures involved in the dilution process, an erroneous dilution is considered incredible. Nevertheless, if an unintentional dilution of boron in the reactor coolant does occur, numerous alarms and indications are available to alert the operator to the condition. The maximum reactivity addition due to dilution is slow enough to allow the operator to determine the cause of the addition and take correction action before excessive loss of shutdown margin can occur. Since there is only a single, common source of reactor makeup water to the reactor makeup water system, corrective action can be readily accomplished by isolating this single source, thereby terminating the dilution. Thus, emergency boration capability is not required to mitigate a dilution event. Should the operator wish to maintain the plant in a shutdown condition following a dilution event, he may reborate using any one of the three boration paths available.

Since the safety analysis in the FSAR did not take credit for the operation of the charging pumps, charging pumps are not required to mitigate an accident. However, it is highly desirable to be able to maintain Reactor Coolant Pump (RCP) Seal Water Supply as well as to cope with small Primary System leaks without actuating safeguards equipment. The former requires 32 gpm while the latter is dependent on the break size and location. A 3/8" (equivalent diameter hole), cold leg break (with FL/D = O) has been established as the maximum size for which it would be both desirable, and reasonable, to mitigate without safety injection initiation. Total charging flow of 130 gpm has been calculated as permitting the RCS to reach equilibrium pressure above the low pressure reactor trip setpoint (1928 pig) for such a break. Since the Technical Specification permits normal operation with two charging pumps available, 130 gpm results in 65 gpm per charging pump. Allowing an additional 10 gpm for conservatism results in the 75 gpm acceptance criteria.

There are no instrumented bypass loops available to facilitate quarterly testing of these pumps. The normal flow path precludes adjusting system resistance to a reference value in subsequent quarterly tests due to the demands of the Reactor Coolant Pump Seals and the Normal Pressure Variations of the Reactor Coolant System. As such, no comparison of discharge pressure to reference values can be made."

*Evaluation:* OMa-1988 Part 6, ¶5.2 requires that "An inservice test shall be conducted with the pump operating at specified test reference conditions. The test parameters shown in Table 2 shall be determined and recorded as directed in this paragraph. The test shall be conducted as follows:

a) The pump shall be operated at nominal motor speed for constant speed drives and at a speed adjusted to the reference speed for variable speed drives.

b) The resistance of the system shall be varied until the flow rate equals the reference value and the flow rate shall be determined and compared to the reference flow rate value.

c) Where system resistance cannot be varied, flow rate and pressure shall be determined and compared to their respective reference values.

d) Pressure, flow rate, and vibration (displacement or velocity) shall be determined and compared with corresponding reference values. All deviations from the reference values shall be compared with the limits given in Table 3 and Corrective Action taken as specified in Para. 6.1."

The previous SER dated November 20, 1987 (Ref. 12) recommended relief for a similar request for these charging pumps because IWP-3210 allowed the expansion of ranges for pump acceptance criteria. However, with regard to OMa-1988 Part 6, as discussed in Draft NUREG-1482, "The OM-6 Working Group stated that it could not endorse the IWP philosophy in letting the owner specify any acceptance criteria deemed appropriate when the limits of the applicable table could be met. OM-6 requires the acceptance criteria to be met." The basis for relief does not include an adequate discussion of why the widened ranges are acceptable indicators of potential pump degradation in relation to Tables 3a and 3b nor why these pumps should be treated differently than other reciprocating charging pumps. The safety performance of these pumps at the time of the tests is not at issue here, rather it is degradation during the time interval between tests. Because the licensee has not provided adequate detail for widening the acceptance criteria ranges for these pumps nor provided the reference flow rate, relief cannot be recommended.

The licensee states that system resistance cannot be varied and therefore no comparison of discharge pressure can be made. OMa-1988, Part 6, ¶5.2(c) recognizes that system resistance cannot always be varied and then requires that both flow rate and discharge pressure be compared to their reference values. The licensee has not provided sufficient basis for not complying with the Code. The licensee may also consider the use of a pump curve, that is, the use of variable reference values for flow rate and differential pressure during pump testing as discussed in section 5.2 of Draft NUREG-1482. The licensee must perform the seven (7) elements in preparing the pump curve as described in that section. Alternatively, the licensee could utilize a new set of reference values as described in OMa-1988 Part 6, ¶4.5 to test the pumps at a flow rate that, e.g., maintains constant pressurizer level which may require manual operation of normal makeup. (That is the approach Commonwealth Edison uses for its Zion Station centrifugal charging pumps.) (Ref. 18). In using this approach consideration needs to be given to the allowable variance from reference points as discussed in Draft NUREG-1482, section 5.3. Should either of these methods or some other acceptable method be decided upon, the acceptance criteria given in Tables 3a and 3b must be met which includes discharge pressure.

## 3.0 VALVES IST PROGRAM RELIEF REQUESTS

In accordance with §50.55a, Con Edison has submitted eighteen (18) relief requests for valves at the Indian Point Unit No. 2 nuclear power plant which are subject to inservice testing under the requirements of OMa-1988, Part 10. Nine (9) of these relief requests have been reviewed to verify their technical basis and determine their applicability. These relief requests, along with their technical evaluation by BNL, are summarized below. The other nine (9) relief requests have been granted generic approval with the issuance of NRC Generic Letter 89-04, dated April 3, 1989 and have not specifically been evaluated. Additionally, there were twelve (12) relief requests related to non-Code class components that were not evaluated.

### 3.1 Reactor Cooling System (RCS)

#### 3.1.1 Valve Relief Request No. 2: Low-Temperature Over-Pressurization Protection System Pressure Relief and Block Valves

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1 for full-stroke and partial-stroke exercising of the pressure relief valves, PCV-456 and PCV-455C, in the Low-Temperature Over-Pressurization Protection System during normal operation. The licensee also requests relief from ¶4.2.1 for full-stroke and partial-stroke exercising of the block valves, 535 and 536, in the Low-Temperature Over-Pressurization System during normal operation.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "Part-stroke exercising these valves at any time is impractical because these are open or close only valves. Consistent with the criteria contained in NRC's SER for the Remote Reactor Head Vent (NRC, Varga to Con Ed, O'Toole, dated September 9, 1983) valves PCV-455C and PCV-456 will be exercised at cold shutdowns. Valves 535 and 536 will be exercised and stroke timed quarterly when maintained in the closed position for durations of 90 days or greater. When maintained in the open position for durations less than 90 days, exercising and stroke timing will be at a cold shutdown frequency."

*Licensee's Basis for Requesting Relief:* The licensee states that: "These valves function as part of the Low Temperature Over-Pressurization Protection System. They also operate during power operation to limit any pressure excursion and thus limit the operation of the spring loaded Pressurizer Safety Valves. Valves 535 and 536 are motor operated block valves and are normally open. PCV-456 and PCV-455C are normally shut pressure operated relief valves (PORVs).

Valves 535 and 536 are closed when leakage from the downstream power operated relief valves (PCV-456, PVC-455C) exists. These valves are required to function, as part of the Overpressure Protection System and the RCS Vent System, post-accident."

*Evaluation:* As the licensee indicates, PORVs PCV-456 and PCV-455C and their associated MOV block valves 535 and 536 are required to function as part of the Low Temperature Over-Pressurization Protection System, and also function to vent the pressurizer steam space as part of the Reactor Coolant System Vents, post accident.

The September 1983 Safety Evaluation Report (SER) (Ref. 16) for the remote reactor head vent (RRHV) system requires "the licensee to exercise the remote reactor head vent (RRHV) system valves during cold shutdown or each refueling outage, and not every three months." PORVs PCV-456 and PVC-455C and block valves 535 and 536 are used in the RRHV system which the licensee calls the RCS Vent system.

In Generic Letter (GL) 90-06 (Ref. 13), the NRC staff included PORVs, valves in PORV control air systems, and block valves within the scope of a program covered by the ASME Section XI, Subsection IWV. Stroke testing of PORVs should only be performed during Mode 3 (HOT STANDBY) or Mode 4 (HOT SHUTDOWN) and in all cases prior to establishing conditions where PORVs are used for low-temperature overpressure protection (LTOP). Stroke testing of PORVs should not be performed during power operation. Additionally, the PORV block valves should be included in the licensees' expanded MOV test program discussed in NRC Generic Letter 89-10, "Safety-Related Motor Operated Valve Testing and Surveillance", dated June 28, 1989.

For the PORVs, the alternative of providing full-stroke exercising to the open and closed positions including stroke timing during cold shutdowns is in accordance with OMa-1988, Part 10, ¶4.2.1.1(c) and ¶4.2.1.4, and relief is not required. This portion of the relief request is acceptable and may be reclassified and accepted as a deferral.

MOV block valves 535 and 536 are only closed when their respective series PORV is leaking. Otherwise, these MOVs are open. If either of the block valves is closed due to a leaking PORV it must maintain its electrical power so that it can be readily opened from the control room upon demand.

Should a block valve be closed due to associated excessive seat leakage in its series PORV, the block valve them becomes part of the reactor coolant pressure boundary. In that case, opening the block valve will likely invoke the technical specification limiting condition for operation for identified leakage, and perhaps, cause further degradation to the PORV. If the block valve had been closed because of a stuck open series PORV, then opening that block valve will cause a small LOCA. In the modified Standard Technical Specifications (enclosed with GL 90-06), the block valves are exempt from the surveillance requirements to cycle the valves when they have been closed to comply with ACTION requirements. The licensee's alternative testing of exercising and stroke timing the block valves quarterly when maintained in a closed position for durations of 90 days or greater, and exercising and stroke timing these block valves at a cold shutdown frequency when maintained in the open position for durations less than 90 days is not consistent with the STS nor the logic for not testing the block valves during operation when they are closed. Full-stroke exercising and timing quarterly when the block valves have been open for durations of 90 days or greater, and exercising and stroke timing at a cold shutdown frequency when the block valves have been closed to prevent PORV leakage is consistent with the NRC staff position.

However, it is possible that the licensee considered that the requirements of the Low-Temperature Over-Pressurization Protection System took precedence in determining the block valve alternate testing. It is the staff position of the NRC (as documented in GL 90-06) that the reactor coolant pressure boundary integrity takes priority over the capability of the PORV to mitigate an overpressure event. Therefore, the portion of the proposed alternative for testing these valves when they are being maintained closed due to PORV leakage should not be performed.

Relief to test the block valves as proposed is unacceptable and is therefore denied. The licensee should revise and submit a justification for testing deferral for the block valves to provide further information and evaluation of why the block valve alternate testing should be acceptable.

## 3.2 Auxiliary Feedwater System (AFW)

### 3.2.1 Valve Relief Request No. 5: Auxiliary Feedwater Pump Discharge Flow Control Valves to Steam Generators

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1.4 for stroke time testing of the flow control valves, FCV-405A, FCV-405B, FCV-405C, FCV-405D, FCV-406A, FCV-406B, FCV-406C, and FCV-406D, in the discharge lines of the Auxiliary Feedwater Pump to the Steam Generators. Valves will be stroked quarterly but not timed.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "These valves will be stroke tested quarterly. No timing will be performed."

*Licensee's Basis for Requesting Relief:* The licensee states that: "These are flow control valves in the lines to the Steam Generators from the Auxiliary Feedwater Pump discharge. They are normally open and fail-open valves. Their function is to remain open during the auxiliary feedwater to steam generator operation. Their stroke time is manually adjustable in the control room. The stroke-time testing is of no consequence. Complying with the full Code requirement would not provide trendable results."

*Evaluation:* Flow control valves FCV-405A, FCV-405B, FCV-405C, FCV-405D, FCV-406A, FCV-406B, FCV-406C, and FCV-406D are 2 inch air operated gate valves, that are normally open in the discharge headers of the auxiliary feedwater pumps to the steam generators. Their fail safe position is open and they have position indication in the control room.

The Safety Evaluation Report (SER) of November 20, 1987 stated the following: "The reviewer agrees that these valves cannot be accurately stroke timed because they are controlled with a "thumb-wheel" type controller and initiation of valve movement is subject to considerable variation. The stroke time measurements of these valves would be very difficult to repeat due to the absence of valve control switches and would not contribute meaningful data to utilize in monitoring valve degradation. The reviewer concludes that full-stroke exercising these valves quarterly without stroke timing should be sufficient to demonstrate proper valve operability and, therefore, the requested relief should be granted from the stroke time measurement requirements of Section XI and no alternate testing should be imposed." Although that was the appropriate evaluation under IWV for the time period of the second ten year interval, the licensee has since adopted OMa-1988, Part 10, for the third ten year interval, and valve diagnostic technology has advanced.

It is not acceptable for the long term to not have an objective means to monitor valve condition and detect degradation. Stroke time measurements are required for monitoring changes which could be indicative of degrading conditions in a power operated valve. However, the design of the valve control system does not allow for accurately measuring the stroke time, making it impractical to meet the Code requirements for testing this valve with the current design.

Although the proposed alternative provides a level of assurance of the operational readiness of the valve for an interim period, long term relief cannot be granted because the alternative has no means of monitoring for degrading conditions in the operation of the valve. In the interim period the licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. Draft NUREG-1482, Section 4.2.9, recommends that the licensee investigate alternatives that include enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify the stroke times of the valves. The alternative method proposed by the licensee should be described in detail in the relief request, if required, in order for the staff to determine the acceptability of the alternative method.

Based on the determination that immediate compliance with the Code testing method is impractical and burdensome because there is no means to monitor stroke times and time is required to develop and implement a program, and considering the licensee's proposal, it is recommended that interim relief be granted pursuant to §50.55a ¶(f)(6)(i) for a period of one year or until the next refueling outage, whichever is longer. Before the end of the interim period the licensee should propose to NRC an alternate method of stroke timing these valves that allows monitoring for valve degradation, or an enhanced maintenance program.

## 3.3 Main Steam (MS)

### 3.3.1 Valve Relief Request No. 8: Steam Generator Reverse Current Check Valves

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.3.2 for quarterly exercising and ¶4.3.2.4(b) for measuring breakaway force for the reverse current check valves, MS-2A, MS-2B, MS-2C, and MS-2D, in the main steam line from each steam generator.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "These valves will be verified closed at cold shutdowns."

*Licensee's Basis for Requesting Relief:* The licensee states that: "These valves are reverse current check valves in the main steam line from each steam generator. The four main steam lines are headered together. A steam line break of an MS-2 valve would permit the other three steam generators to feed the break. Closure of the MS-2 upstream valves under such a scenario limits the break flow (and the cooldown) to that associated with a single steam generator. As such, the safety function of these valves is to close.

These valves are normally open during power operation passing nuclear generated steam to the turbine-generator unit. There are no means available to physically stroke these valves either on-line or off-line. However, as they are normally open check valves and are equipped with external position indication that is physically observable, physical observation to assure these valves are in the closed position can be verified at cold shutdown. In addition, these valves are equipped with an external counterweight. For a steam line break upstream of an MS-2, the check valve closes by the extreme differential pressure. Occasionally, on a controlled cooldown, the counterweight is assisted by hand to provide valve closure (due to lack of differential pressure). The torque to assist the counter weight is not measured since it is negligible when compared to steam line break differential pressure.

*Evaluation:* MS-2A, MS-2B, MS-2C, and MS-2D are 28 inch, reverse current check valves, that are normally open in the main steam lines from the steam generators to the turbine-generator. They are located upstream of the main steam header. These valves close upon cessation of steam flow. During controlled shutdowns, sufficient differential pressure may not exist to close these valves, whereby these valves are closed manually.

It is impractical to exercise these valves closed quarterly because this would involve interrupting main steam line flow. OMa-1988, Part 10, ¶4.3.2.2(c) allows testing to the closed position to be deferred to cold shutdowns if it is impractical to perform exercising during plant operation.

OMa-1988, Part 10, ¶4.3.2.4(a) states that exercising the valve and observing that the obturator travels to the seat on cessation of flow by a direct indicator such as a position indicating device is a valid demonstration of obturator movement. In cases where valves cannot be exercised with flow, the Code allows the use of a mechanical exerciser and requires the measurement of force or torque. The purpose of ¶4.3.2.4(b) is specify the force or torque required to initiate movement of the obturator. For these check valves differential pressure is the initiator and valve obturator movement will be verified by the use of an external position indicator. Therefore, the licensee does not need to additionally comply with the requirements of ¶4.3.2.4(b).

The alternative testing provides full-stroke exercising to the closed and open positions during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c) and observation of obturator movement in accordance with ¶4.3.2.4(a). This relief request may be reclassified and is acceptable as a deferral.

## 3.4 Service Water (SW)

### 3.4.1 Valve Relief Request No. 10: Service Water Flow Control Valves to Containment Fan Coolers

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1 for quarterly exercising the Service Water flow control valves, TCV-1104, and TCV-1105, to the Containment Fan Coolers when operated normally open.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "When operated normally closed, these valves will be quarterly exercised as per OM-10, Para. 4.2.1. When operated normally open there is no testing required as per OM-10 (passive valve)."

*Licensee's Basis for Requesting Relief:* The licensee states that: "These valves are flow control valves for the Service Water flow through the Containment Fan Coolers. The original system configuration maintained these valves in the normally closed position and provided a safety injection signal to open these valves fully in the event of an accident. Experience with the system has demonstrated the desirability of maintaining these valves open during normal operation, maximizing system flow in order to minimize material degradation due to the brackish water being pumped.

When operated normally closed, these valves will be exercised quarterly. However, when operated normally open these valves are considered passive as their safety function is to open. Therefore, when operated normally open, no valve exercising need be required."

*Evaluation:* TCV-1104 and TCV-1105 are 18 inch, air operated butterfly valves used as flow control valves, normally open or closed, in the service water supply to the five fan cooler units. Their fail safe position is open and they have position indication.

The SER of November 20, 1987 stated the following: "The licensee has categorized these valves Category B or Category B, passive, depending on valve position during system operation and is testing each valve in accordance with the appropriate requirements in effect at the time of testing. Since the valve category changes with the position of each valve, and the valve position changes with system demand and configuration, the deviation from the Code is that each valve may not be exercised each quarterly interval. The reviewer agrees with the licensee's proposed testing because the valves are in their safety position when open and do not have to change position. If the valves are closed, they cannot be considered to be passive because they are required to change to the open position. The licensee is testing the valves in accordance with the Section XI, Category B, requirements when the valves are operated in the normally closed position. The reviewer concludes that the licensee's proposed alternate testing of full-stroke exercising, measuring stroke time, and fail-safe testing these valves when they are operated in the closed (active) position should be sufficient to demonstrate valve operability and, therefore, the requested relief should be granted from the requirements of Section XI and the licensee's proposed alternate testing should be imposed.".

OMa-1988, Part 10 defines passive valves as those which are not required to change obturator position to accomplish their required function and active valves as those that are required to change obturator position. Part 10, ¶3.6 requires that active and passive valves be tested in accordance with Table 1. For Category B passive valves the only IST requirement is for valve position verification to be performed at least once every two years as specified in ¶4.1. For Category B active valves that requirement is the same, but, in addition, the requirements of ¶4.2.1 must also be met.

The licensee's alternate testing to only quarterly exercise these valves when they are closed (i.e., active) as per OMa-1988, Part 10, ¶4.2.1 is in agreement with the Code and relief is not required.

Strictly speaking, this relief request deals with a valve classification issue but otherwise meets the Code. Therefore, no relief is required. The licensee should ensure that when these control valves are open, they are fully open and not modulating. If these valves are partially open and fail to the full-open position, they cannot be considered passive. The licensee should ensure that there are administrative controls to trace the active/passive status of these valves and associated testing.

## 3.5 Containment Isolation Valves (CIVs)

### 3.5.1 Valve Relief Request No. 25: Post Accident Containment Air Sampling System, Reactor Coolant System, Waste Disposal System, and Hydrogen Recombiner System - Valcor Solenoid Valves

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.1 for Valve Position Verification for the solenoid operated containment isolation valves in the Hydrogen Recombiner System. The licensee states that the Hydrogen Recombiner valves are the only ASME Code Class valves in this relief request. The valves listed in this request are:

Post Accident Containment Air Sampling

| | | | |
|---|---|---|---|
| SOV-5018 | SOV-5019 | SOV-5020 | SOV-5021 |
| SOV-5022 | SOV-5023 | SOV-5024 | SOV-5025 |

Reactor Coolant

| | |
|---|---|
| SOV-3418 | SOV-3419 |

Waste Disposal

| | |
|---|---|
| SOV-3416 | SOV-3417 |

Hydrogen Recombiner

| | | | |
|---|---|---|---|
| SOV-3420 | SOV-3421 | SOV-3422 | SOV-3423 |
| SOV-IV-lA | SOV-IV-lB | SOV-IV-2A | SOV-IV-2B |
| SOV-IV-3A | SOV-IV-3B | SOV-IV-5A | SOV-IV-5B |

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "These valves will have their remote position indicators verified correct during the 10 CFR 50 Appendix J (Type C) leak testing requirements at refueling frequency. This will be adequate to satisfy the two year frequency required by OM-10, Para. 4.1."

*Licensee's Basis for Requesting Relief:* The licensee states that: All valves listed are Containment Isolation Valves and as such must function to isolate the primary containment.

All the valves listed are Valcor Solenoid Valves. The valves are totally sealed making a visual, physical verification of valve position impossible. This indication together with the Leak Rate Test conducted in accordance with Appendix J will allow for actual valve position verification. Imposition of the Code requirements would require significant system redesign and modifications."

*Evaluation:* SOV-3420, SOV-3421, SOV-3422, and SOV-3423 are 3/4 inch solenoid operated gate Category A, normally closed isolation valves, that fail closed and have remote position indication. SOV-IV-1A, SOV-IV-1B, SOV-IV-2A, and SOV-IV-2B are 1 inch solenoid operated gate, category A, normally closed isolation valves, that fail closed and have remote position indication. SOV-IV-3A and SOV-IV-3B are 3/4 inch solenoid operated gate, category A, normally closed isolation valves, that fail closed and have remote position indication. SOV-IV-5A and SOV-IV-5B are 2 inch solenoid operated gate, category A, normally closed isolation valves, that fail closed and have remote position indication. The other valves identified in this request are not ASME Code class valves, and, therefore no evaluation was performed.

OMa-1988, Part 10, ¶4.1 requires that local valve position verification be performed every 2 years. Where local observation is not possible, the Code allows other indications to be used for verification of valve operation. Due to the valve design (i.e., enclosed), local observation is not possible without replacement or significant redesign of the valves. Leak testing should provide an adequate method to verify obturator position. Part 10, ¶4.2.2.2 for containment isolation valves requires that they be leak tested in accordance with 10 CFR 50, Appendix J, which requires a refueling outage frequency.

A nominal fuel cycle of 18 months is within the frequency range required by ¶4.1, as is a nominal fuel cycle of 2 years. The licensee's alternate testing for position indication verification for these solenoid-operated containment isolation valves is in agreement with the Code. No relief is required provided the refueling outage frequency is no greater than 2 years.

## 3.6 Main Steam (MS)

### 3.6.1 Valve Request No. 26: Atmospheric Dump Valves

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1.4 for measuring stroke times of the atmospheric dump valves, PCV-1134, PCV-1135, PCV-1136, and PCV-1137.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "These valves will be full-stroke exercised during cold shutdowns. These valves will not be timed during this exercise test. Timing is inconsequential since the valves are rheostat controlled.

*Licensee's Basis for Requesting Relief:* The licensee states that: "These valves are atmospheric steam dump valves and are located outside of containment. They are used to manually control reactor cooldown and are used during the natural circulation mode of reactor cooldown.

These valves are remote manual rheostat controlled valves and are operated from the control room. It is impractical to exercise these valves during normal plant operations due to the steam flow that would ensue. It is impractical to time these valves because they can act as throttle valves and are fully opened or closed only by operator action. Due to the rheostat control of these valves, reproducible times would not be obtainable. Complying with the full Code requirement would not provide trendable results."

*Evaluation:* Atmospheric dump valves PCV-1134, PCV-1135, PCV-1136, and PCV-1137 are 6 inch, air-operated angle valves, category B, normally closed, with no remote position indication. Their fail safe position is closed. These power operated relief valves are automatically controlled by pressure and may be manually operated from the control room.

The SER of November 20, 1987 stated the following: "The reviewer agrees that these valves cannot be accurately stroke timed because they are controlled with a "thumb-wheel" type controller and initiation of valve movement is subject to considerable variation. The stroke time measurements of these valves would be very difficult to repeat due to the absence of valve control switches and would not contribute meaningful data to utilize in monitoring valve degradation. The reviewer also agrees that these valves should not be exercised during power operation because a reactor trip and uncontrolled cooldown could result if one were to fail open while testing. The reviewer concludes that the proposed alternate testing of full-stroke exercising these valves during cold shutdowns without stroke timing should be sufficient to demonstrate proper valve operability and, therefore, the requested relief should be granted from the stroke timing requirements of Section XI and the licensee's proposed alternate testing should be imposed." Although that was the appropriate evaluation under IWV for the time period of the second ten year interval, the licensee has since adopted OMa-1988, Part 10, for the third ten year interval, and valve diagnostic technology has advanced.

With regard to deferring full-stroke exercising to cold shutdowns the reasoning of the previous SER is still valid. OMa-1988, Part 10, ¶4.2.1.2(c) allows deferral to cold shutdowns if it is not practical to full-stroke exercise during plant operation; and, relief is not required. The issue of concern relates to stroke timing.

The atmospheric dump valves have a fail safe position to close to prevent a main steam line break accident. Their safety function is to open to relieve pressure above 1020 psig.

It is not acceptable for the long term to not have an objective means to monitor valve condition and detect degradation. Stroke time measurements are required for monitoring changes which could be indicative of degrading conditions in a power operated valve. However, the design of the valve control system does not allow for accurately measuring the stroke time, making it impractical to meet the Code requirements for testing this valve with the current design.

Although the proposed alternative provides a level of assurance of the operational readiness of the valve for an interim period, long term relief cannot be granted because the alternative has no means of monitoring for degrading conditions in the operation of the valve. In the interim period, the licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. Draft NUREG-1482, Section 4.2.9, recommends that the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify the stroke times of the valves. The alternative method proposed by the licensee would typically be described in detail in the relief request, if required, in order for the staff to determine the acceptability of the alternative method.

Based on the determination that immediate compliance with the Code testing method is impractical and burdensome because there is no means to monitor stroke times and time is required to develop and implement a program, and considering the licensee's proposal, it is recommended that interim relief be granted pursuant to §50.55a ¶(f)(6)(i) for a period of one year or until the next refueling outage, whichever is longer. Before the end of the interim period the licensee should propose to NRC an alternate method of stroke timing these valves that allows monitoring for valve degradation, or an enhanced maintenance program.

## 3.7 Hydrogen Recombiner (HR) System

### 3.7.1 Valve Relief Request No. 27: Hydrogen Recombiner Flow Control Valves

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1.4 for measuring stroke times of the Hydrogen Recombiner flow control valves, FCV-1A, FCV-1B, FCV-2A, and FCV-2B.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "These valves are stroke tested quarterly but timing will not be performed."

*Licensee's Basis for Requesting Relief:* The licensee states that: "These are flow control valves in the Hydrogen and Oxygen lines to the Hydrogen Recombiners inside Containment. They are normally closed valves and fail-closed. Their function is flow control during Recombiner operation.

Their stroke time is adjustable based on demand signal from the Recombiners Temperature Controls. As such, the stroke-time testing is of no consequence. Complying with the full Code requirement would not provide trendable results.

*Evaluation:* FCV-1A and FCV-1B, are 1 inch, air-operated gate valves, Category B, normally closed in the oxygen lines, with remote position indication, and whose fail safe position is closed. FCV-2A and FCV-2B, are 3/4 inch, air-operated gate valves, category B, normally closed in the hydrogen lines, with remote position indication, and whose fail safe position is closed. All four valves are located outside of containment.

The licensee's request for relief is based on a concern that stroke time measurement is meaningless from an adjustable (or a modulating) demand signal.

It is not acceptable for the long term to not have an objective means to monitor valve condition and detect degradation. Stroke time measurements are required for monitoring changes which could be indicative of degrading conditions in a power operated valve. However, the design of the valve control system does not allow for accurately measuring the stroke time, making it impractical to meet the Code requirements for testing this valve with the current design.

Although the proposed alternative provides a level of assurance of the operational readiness of the valve for an interim period, long term relief cannot be granted because the alternative has no means of monitoring for degrading conditions in the operation of the valve. In the interim period the licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. Draft NUREG-1482, Section 4.2.9, recommends that the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify the stroke times of the valves. The alternative method proposed by the licensee would typically be described in detail in the relief request, if required, in order for the staff to determine the acceptability of the alternative method.

Based on the determination that immediate compliance with the Code testing method is impractical and burdensome because there is no means to monitor stroke times and time is required to develop and implement a program, and considering the licensee's proposal, it is recommended that interim relief be granted pursuant to §50.55a ¶(f)(6)(i) for a period of one year or until the next refueling outage, whichever is longer. Before the end of the interim period the licensee should propose to NRC an alternate method of stroke timing these valves that allows monitoring for valve degradation, or an enhanced maintenance program.

## 3.8 Auxiliary Feedwater System

### 3.8.1 Valve Relief Request No. 28: Steam Driven Auxiliary Boiler Feed Pump Bearing Cooling Pressure Control Valve

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1.4 for measuring stroke time of the Steam Driven Auxiliary Boiler Feed Pump bearing cooling Pressure Control Valve, PCV-1213.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "PCV-1213 will be stroke tested quarterly but timing will not be performed."

*Licensee's Basis for Requesting Relief:* The licensee states that: "PCV-1213 is the pressure control valve in the bearing cooling lines to the Steam Driven Auxiliary Boiler Feed Pump. The valve provides a control function.

PCV-1213 controls pressure from a signal generated by the downstream pressure controller. This valve is stroked by manually activating the valve positioner. As such, the stroke time testing is of no consequence. Complying with the full Code requirement would not provide trendable results."

*Evaluation:* Valve PCV-1213 is a 1 inch, air-operated normally closed gate valve, with remote position indication, which controls the pressure of cooling water to the AFW steam turbine-driven pump bearings. Its fail safe position is open.

The licensee states that the valve is stroked by manually activating the valve positioner, and that, as such, the stroke time testing is of no consequence and would not provide trendable results. It is not clear from the licensee's justification whether the valve stroking is performed by locally pushing a control button which causes the valve's air-operator to open the valve or whether the stroking is performed by manually turning an operating handle on the valve positioner.

OMa-1988, Part 10, ¶4.2.1.8(e) states that, for valves that stroke in less than 2 seconds, the maximum limiting stroke time shall be 2 seconds. Part 10 does not require trending of these valves. If the stroke time of this 1 inch AOV meets the 2 second maximum limiting stroke time criteria, wherein the stroking is performed by locally pushing a control button which causes the valve's air operator to open the valve, or some similar means of actuating the air operator which would properly simulate the valve's actual response upon failing to the open position. The licensee should record the stroke time and ensure that it meets the 2 second limit for all future testing and relief would not then be required.

If the valves cannot be considered rapid acting or if stroking can only be performed by manually turning an operating handle on the valve positioner or operating stem, only interim relief is recommended for the licensee to test this valve without trending the stroke time.

Although the proposed alternative provides a level of assurance of the operational readiness of the valve for an interim period, long term relief cannot be granted because the alternative has no means of monitoring for degrading conditions in the operation of the valve. In the interim period the licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. Draft NUREG-1482, Section 4.2.9, recommends that the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify the stroke times of the valves. The alternative method proposed by the licensee would typically be described in detail in the relief request, if required, in order for the staff to determine the acceptability of the alternative method.

Based on the determination that immediate compliance with the Code testing method is impractical and burdensome because there is no means to monitor stroke times and time is required to develop and implement a program, and considering the licensee's proposal, it is recommended that interim relief be granted pursuant to §50.55a ¶(f)(6)(i) for a period of one year or until the next refueling outage, whichever is longer. Before the end of the interim period the licensee should propose to NRC an alternate method of stroke timing these valves that allows monitoring for valve degradation, or an enhanced maintenance program.

## 3.9 Auxiliary Feedwater System

### 3.9.1 Valve Relief Request No. 29: Steam Driven Auxiliary Feed Pump Governor Valve

*Relief Request:* The licensee requests relief from OMa-1988 Part 10, ¶4.2.1.4 for measuring the stroke time of Steam Driven Auxiliary Feed Pump governor valve, HCV-1118.

*Proposed Alternate Testing:* The licensee's proposed alternate testing is as follows: "HCV-1118 will be stroke tested quarterly but timing will not be performed."

*Licensee's Basis for Requesting Relief:* The licensee states that: This valve modulates to allow steam supply into the turbine of the Steam Driven Auxiliary Feed Pump. This is a governor valve.

This is a normally closed and fail-closed valve. The stroke time is manually adjustable from the speed change controller in the Control Room. As such, the stroke-time testing is of no consequence. Complying with the full Code requirement would not provide trendable results.

*Evaluation:* HCV-1118 is a normally closed air-operated throttle valve, with remote position indication. Its fail safe position is closed. It is located outside of containment.

The licensee's request for relief is based on a concern that stroke time measurement is meaningless from a manually adjustable speed controller.

It is not acceptable for the long term to not have an objective means to monitor valve condition and detect degradation. Stroke time measurements are required for monitoring changes which could be indicative of degrading conditions in a power operated valve. However, the design of the valve control system does not allow for accurately measuring the stroke time, making it impractical to meet the Code requirements for testing this valve with the current design.

Although the proposed alternative provides a level of assurance of the operational readiness of the valve for an interim period, long term relief cannot be granted because the alternative has no means of monitoring for degrading conditions in the operation of the valve. In the interim period the licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. Draft NUREG-1482, Section 4.2.9, recommends that the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify the stroke times of the valves. The alternative method proposed by the

licensee would typically be described in detail in the relief request, if required, in order for the staff to determine the acceptability of the alternative method.

Based on the determination that immediate compliance with the Code testing method is impractical and burdensome because there is no means to monitor stroke times and time is required to develop and implement a program, and considering the licensee's proposal, it is recommended that interim relief be granted pursuant to §50.55a ¶(f)(6)(i) for a period of one year or until the next refueling outage, whichever is longer. Before the end of the interim period the licensee should propose to NRC an alternate method of stroke timing these valves that allows monitoring for valve degradation, or an enhanced maintenance program.

## 4.0 DEFERRED TESTING JUSTIFICATIONS

Con Edison has submitted 57 justifications for deferral which document the impracticality of testing valves quarterly, during operation, as required by OMa-1988, Part 10. Of the 57 deferral requests, 11 deal with non-Code class valves and are listed in Table 4.1, but are not evaluated. The remaining 46 justifications were reviewed to verify their technical basis. Generally, those tests involving a plant trip, damage to a system or component, or excessive personnel hazards are not considered practical. Removing one train for testing or entering into a limiting condition of operation is not sufficient basis alone for not performing required tests, unless some other justification is provided, such as that the testing renders systems inoperable for extended periods of time. As discussed in Generic Letter 91-18 (Ref. 17), it is not the intent of IST to cause unwarranted plant shutdowns or to unnecessarily challenge other safety systems. Other factors, such as the effect on plant safety or risk and the difficulty of the test may be considered.

For all of the check valve justifications the licensee states that the valve(s) will be full-stroked exercised at cold shutdowns or refueling outages as the case may be. Although that alternate testing statement is consistent with the licensee's Valve Table, the licensee has not identified the safety function nor test direction of the check valve. In general, the licensee's justification for deferring testing addresses only the open position. If the valve also has a safety function in the closed position, the licensee must provide a discussion of the impracticality of verifying closure during plant operation or cold shutdowns if that is the case. The licensee should revise its Valve Table and Valve Table Legend.

There were a number of deferrals that lacked sufficient technical information for the reviewer to perform a self-contained evaluation without looking elsewhere for supporting material. As a rule of thumb the licensee's justification should contain the same detail and quality of technical information as relief requests. For example, consider deferrals RCS-5 and RCS-6 dealing with the isolation and check valves in the normal and alternate charging lines. The reason given for deferral relates to "fatigue which may result in exceeding the fatigue usage factor design limits". No explanation is given for the type of fatigue; whether this fatigue applies specifically to these valves or to the piping or both. Con Edison received relief for these valves in the November 20, 1991 SER (Ref. 14) but this is not referenced in the deferral justification. These deferrals have been accepted but should be revised in future submittals.

BNL's evaluation of the 46 deferral justifications is provided in Table 4.1. The justifications have been grouped by system and given an alpha-numeric designation by BNL to aid in our evaluations. The anomalies associated with the specific justifications are presented in section 5 of this TER.

**Table 4.1 Indian Point Unit No. 2**
**Justification of Deferrals**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **REACTOR COOLANT SYSTEM (RCS)** | | | | |
| RCS-1 | HCV-3100, 3101, 3/4 inch motor operated gate valves, Category B, normally closed, Remote Reactor Head Vent Valves | 9321-F-2738-72, Flow Diagram of Reactor Coolant System | "These valves were installed as part of the TMI action items and are required to be operable during normal plant operations. Consistent with NRC's SER for this system (NRC, Varga to Con Ed, O'Toole, dated September 9, 1983) these valves will be stroked at cold shutdowns." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** These valves are motor operated pressure isolation valves in the reactor coolant system, and act as part of the vessel head vent portion. These valves are normally closed during normal plant operation and are opened when it is necessary to vent the reactor vessel head.

As stated in the above referenced letter: "With respect to inservice testing, the NRC staff requires the licensee to exercise the remote reactor head vent (RRHV) system valves during cold shutdown or each refueling outage, and not every 3 months." HCV-3100 and HCV-3101 are the head vent valves and the licensee chose exercising at cold shutdown. It is impractical to exercise these valves to the open position quarterly because testing of these valves during power operation could jeopardize the integrity of the RCS pressure boundary.

The alternate testing provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-2 | 838A, 838B, 838C, and 838D, 6 inch check valves, Category A/C, normally closed, Low Pressure SI Header Check Valves | A235296-22, Flow Diagram of Safety Injection System | "Valves 838A through 838D are in the flow paths from the recirculation pumps and RHR pumps. The system configuration is such that the only practical way the valves can be exercised is by putting flow through them from one of the above listed pumps." | Valves 838A through 838D will be full-stroke exercised open during cold shutdowns when the RHR mode of cooling is in progress. |

**Evaluation:** Valves 838A, 838B, and 838C, and 838D are pressure isolation valves in the cold leg injection lines from the recirculation pumps and Residual Heat Removal pumps. These valves open to permit flow in the LPSI mode following a LOCA.

It is impractical to full-stroke exercise these valves open quarterly because neither the RHR pumps nor the recirculation pumps can overcome RCS pressure and the containment sump is normally dry. The valves cannot be part-stroke exercised quarterly during the RHR pump test because these valves are located downstream of the RHR pumps' minimum flow recirculation line return to the RWST.

The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-3 | 857A, 857B, 857C, 857D, 857G, 857H, 857M, 857F, 2 inch check valves, Category A/C, normally closed, Hot Leg SI Header Check Valves | A235296-22, Flow Diagram of Safety Injection System | "During normal plant operation, valves 857A, 857B, 857C, and 857D are held closed by RCS pressure of approximately 2200 psig. The HPSI pumps do not have the pressure capability (design discharge pressure approximately 1700 psig) to overcome the RCS pressure and establish flow through the check valves. In addition, during cold shutdowns, part of the temperature and overpressure protection requirements provides that HPSI pumps be deactivated when the RCS is pressurized and below 1900 psig. This prevents an inadvertent pressurization of the RCS by HPSI pumps at this time. Therefore, flow cannot be established through the check valves by the HPSI pumps during these cold shutdowns. Since valves 857M, 857F, 857G and 857H are upstream and in series with 857A, 857B, 857C, and 857D, respectively, the same basis for relief applies." | Valves 857A, 857B, 857C, 857D, 857M, 858F, 857G, and 857H will be full-stroke exercised open at refuelings. |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** Valves 857A, 857B, 857C, and 857D are pressure isolation check valves in the hot leg injection lines to the RCS and are at the interface of the RCS and the Safety Injection System. Valves 857M, 857F, 857G, and 857H are upstream and in series with 857A, 857B, 857C, and 857D, respectively. All valves open in order to permit flow from the High Pressure Safety Injection (HPSI) pumps into the RCS following a LOCA.<br><br>As stated by the licensee it is impractical to part-stroke or full-stroke exercise these valves open quarterly because the high pressure safety injection (HPSI) pumps cannot overcome RCS pressure. It is also impractical to full or partial-stroke these valves at cold shutdowns because the HPSI pumps are required to be deactivated when the RCS is pressurized below 1900 psig for low temperature overpressurization concerns.<br><br>The alternative provides full-stroke exercising to the open position during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-4 | 857J, 857K, 2 inch check valves, Category A/C, normally closed,<br><br>857E, 857L, 2 inch check valves, Category C, normally closed,<br><br>Cold Leg SI Header Check Valves | A235296-22, Flow Diagram of Safety Injection System | "The SIS configuration is such that the only practical way the valves can be exercised is by activating the HPSI pumps and establishing flow through the valves. During normal plant operation, the RCS pressure is approximately 2200 psig. The HPSI pumps do not have the pressure capability (design discharge pressure approximately 1700 psig) to overcome the RCS pressure and establish flow through the check valves. In addition, part of the temperature over pressure protection requirements at cold shutdowns is that the HPSI pumps be deactivated when the RCS is pressurized and below 1900 psig. This is to prevent an inadvertent pressurization of the RCS by the HPSI pumps at this time. Therefore, flow cannot be established through the check valves by the HPSI pumps during cold shutdowns." | Valves 857J, K, E and L will be full-stroke exercised open at refuelings. |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** Valves 857J and 857K, are pressure isolation check valves in the cold leg injection lines from the HPSI pumps. Valves 857E and 857L are their respective upstream series check valves. They are closed during normal plant operation and their emergency function is to open to permit flow from the HPSI pumps to the RCS following a LOCA.<br><br>As stated by the licensee it is impractical to part-stroke or full-stroke exercise these valves open quarterly because the high pressure safety injection (HPSI) pumps cannot overcome RCS pressure. It is also impractical to full or partial-stroke these valves at cold shutdowns because the HPSI pumps are required to be deactivated when the RCS is pressurized below 1900 psig for low temperature overpressurization concerns.<br><br>The alternative provides full-stroke exercising to the open position during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-5 | 204A, 3 inch, air-operated globe valve, Category B, normally closed, fail open,<br><br>204B, 3 inch air-operated globe valve, Category B. normally open, fail open,<br><br>Normal and Alternate Charging Lines Isolation Valves | A208168-29, Flow Diagram of Chemical & Volume Control System | "Cycling valves 204A and 204B during plant operation has been identified as a possible contributor to fatigue which may result in exceeding the fatigue usage factor design limits for components in the charging lines." | These valves will be tested at cold shutdown. |

**Evaluation:** These valves are the isolation valves for the normal and alternate charging lines, respectively. During normal operation, either the normal or alternate charging path is selected to provide borated water from the charging pumps to the Reactor Coolant System. The selected path isolation valve remains open and the unselected path remains closed.

The licensee has not provided sufficient technical information in its justification for an appropriate evaluation. However, a relief request for these valves was evaluated in a November 20, 1991 SER (Ref. 14) that provided additional information. It is impractical to cycle these valves during operation because cold water would be injected into the charging lines while the lines were at normal operating temperatures with the potential result of reducing design life through a thermal fatigue mechanism.

The alternative provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c). In future deferral requests the licensee should provide technical information of the same detail and quality as that of a relief request.

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-6 | 210A, 3 inch check valve, Category C, normally closed,<br><br>210B, 3 inch check valve, Category C, normally open,<br><br>Normal and Alternate Charging Lines Isolation Check Valves | A208168-29, Flow Diagram of Chemical & Volume Control System | "These valves are full stroked to pass full charging flow whenever the respective isolation valve is open during normal operation. The isolation valves will no longer be cycled during normal operation. Cycling of the charging and letdown isolation valves during plant operation has been identified as a possible contributor to fatigue which may result in exceeding the fatigue usage factor design limits for components in the charging and letdown lines." | The check valve downstream of the isolation valve (204A or 204B) which is closed during normal operation will be full stroke exercised open at cold shutdown. |

**Evaluation:** These check valves open to admit borated water from the CVCS into the RCS. The check valves are downstream of the isolation valves 204A and 204B on the normal and alternate charging lines from the Chemical Volume and Control System to the Reactor Coolant System.

The licensee has not provided sufficient technical information in its justification for an appropriate evaluation. However, a relief request for these valves was evaluated in a November 20, 1991 SER (Ref. 14) that provided additional information. It is impractical to cycle these valves during operation because cold water would be injected into the charging lines while the lines were at normal operating temperatures with the potential result of reducing design life through a thermal fatigue mechanism.

The alternative provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c). In future deferral requests the licensee should provide technical information of the same detail and quality as that of a relief request.

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-7 | 211, 2 inch check valve, Category C, normally closed, Auxiliary Spray Isolation Check Valve | A208168-29, Flow Diagram of Chemical & Volume Control System | "This Check Valve is normally closed due to back pressure from the RCS. Stroking on line is impractical. Pressurizer temperature and pressure instrumentation will indicate check valve malfunctions and there is also a flow transmitter available for detection." | The valve will be full-stroke exercised open and closed at cold shutdown. |

**Evaluation:** This check valve is normally closed and is required to open to provide Auxiliary Pressurizer Spray. This spray path is a backup for Normal Spray from Reactor Coolant Loops 3 and 4. During Auxiliary Pressurizer Spray this check valve is required to close for an upstream pipe break to prevent RCS leakage into containment.

Stroking check valve 211 during normal operation would require opening flow control valve 212 (see deferral CVCS-10). Opening valve 211 during normal operation would cause an RCS pressure transient from the spray of cooler water into the pressurizer, which in turn might cause a plant trip and may impose thermal stresses on the pressurizer spray piping. This valve is located inside containment and there are no test connections that could be used to verify closure. Verifying closure during operation would necessitate containment entry which could result in radiation exposure to plant personnel.

The alternative of full-stroke exercising at cold shutdowns is in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RCS-8 | PCV-455A, PCV-455B, 3 inch air-operated globe valves, normally closed, fail closed, Pressurizer Spray Valves | 9321-F-2738-72, Flow Diagram of Reactor Coolant System | "If valves PCV-455A and PCV-455B are unavailable for pressurizer control, then the Power Operated Relief Valves would be used to reduce RCS pressure and cool down the pressurizer. It is not desirable to full-stroke PCV-455A and PCV-455B on line due to the transients caused in RCS pressure and pressurizer temperature." | Valves PCV-455A and PCV-455B will be exercised at cold shutdown. |

**Evaluation:** The pressurizer spray valves, PCV-455A and PCV-455B, are used to control RCS pressure and pressurizer temperature. They modulate as necessary to spray the Pressurizer with RCS water from either Loop 23 Cold Leg or Loop 24 Cold Leg.

During normal plant operation, these normally closed pressurizer spray valves, PCV-455 A & B, open to direct water from the two of cold legs to the pressurizer spray nozzle, thus limiting the pressure increase to prevent lifting the PORVs. During transients, these valves assist the relief and safety valves to control pressure. Full stroke exercising these valves closed during operation requires the establishment of flow thru the spray nozzles, which would result in a pressure decrease, and could interfere with plant operation, and could cause a power transient or a plant shutdown.

The alternate provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **CHEMICAL AND VOLUME CONTROL SYSTEM** | | | | |
| CVCS-1 | 201 and 202, 2 inch air-operated globe valves, Category A, normally open, fail closed,<br><br>Letdown Line Outboard Isolation Valves | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Part-stroke exercising of these valves is impractical since these are open or close only valves. Full-stroke exercising of these valves is also impractical during normal plant operation because it would inhibit the control of the reactor coolant level control system." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** Valves 201 and 202 are the letdown line outboard containment isolation valves and function as remote manual letdown flow isolation valves in the letdown line to the nonregenerative heat exchanger.

These valves are also in series with and redundant to the 3 air-operated valves inside containment on the letdown line. Upon receipt of a safety injection signal these valves close. Exercising these valves during operation would introduce upsets in the operation of the letdown, charging, and seal injection subsystems. If closure of either valve during a quarterly test lasts too long or fails in that position, the pressurizer level would be affected with the likelihood of a Unit trip. It is, therefore, impractical to part-stroke of full-stroke these valves closed quarterly because of the resulting RCS transients that can challenge the reactor protection system. The alternative provides for full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

The valve table also shows that these valves will be stroke timed and fail safe tested at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.4 and ¶4.2.1.6.

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-2 | 205 and 226, 3 inch motor operated gate and globe valves respectively, Category A, normally open, Charging Line Flow Control and Outboard Isolation Valves | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Part-stroke exercising of these valves is impractical since these are open or close only valves Full-stroke exercising of these valves is also impractical during normal plant operation because it would inhibit the control of the reactor coolant level control system. Closing these valves at any time during normal plant operation would shut down the charging flow creating a potential for a low level reactor trip." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** Valves 205 and 226 are remote manual flow control and outboard isolation valves in the charging line leading to the regenerative heat exchangers.

These valves are open during normal operation and for emergency boration. In a LOCA the letdown and seal water return lines are isolated but the charging pump in operation continues flow. Hence, in a LOCA, the charging line flow control valves do not isolate closed but remain open. It is impractical to full-stroke exercise these valves to the open or closed positions quarterly because this action could cause a pressurizer level transient and possible plant trip. The alternative provides full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-3 | 222, 4 inch motor operated gate valve, Category A, normally open, Seal Water Return Isolation Valve | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Valve 222 is an open or closed only valve; therefore, part-stroke testing of this valve is impractical. This valve cannot be full-stroke exercised during normal plant operation because a loss of RC pump seal water flow could result in damaging the RC pumps." | This valve will be full-stroke exercised at cold shutdowns provided the RC pumps are secured. If one or more RC pumps are not secured at cold shutdowns, the associated valves will be tested at intervals no greater than refuelings. |

**Evaluation:** Valve 222 is a flow shutoff valve in the RC pump seal water return line. Upon receipt of a safety injection signal this valve closes.

It is impractical to exercise this valve to the closed position quarterly because this action could damage the reactor coolant pumps seals. Draft NUREG-1482, Section 3.1.1.4 states that RCPs need not be stopped for cold shutdown testing. The NRC recommends that affected valves be tested during plant outages when RCPs are stopped for a sufficient period of time and on a refueling outage schedule, but not more than once every 92 days. The alternative is consistent with Draft NUREG-1482 and the full-stroke exercising at cold shutdowns is in accordance with OMa-1988 Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-4 | 4925, 4926,4927, 4928, 1 inch motor operated gate valves, Category A, normally open, Seal Water Injection Isolation Valves<br><br>250A, 250B, 250C, 250D, 2 inch motor operated globe valves, Category A, normally open, Seal Water Injection Isolation Valves | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Because these valves are open and close only valves, it is impractical to part-stroke these valves. Full-stroke exercising the valves quarterly during normal plant operation is also impractical since this action would isolate RC pump seal water flow and thus could damage the seals." | These valves will be full-stroke exercised at cold shutdowns provided the RC pumps are secured. If one or more RC pumps are not secured at cold shutdowns, the associated valves will be tested at intervals no greater than refuelings. |

**Evaluation:** These valves are outboard isolation valves and open to supply seal water injection flow to the RC pump seals. They are normally open valves during plant operation and for emergency boration. In a LOCA the letdown and seal water return lines isolate but the normal charging and seal water injection lines remain open.

It is impractical to exercise this valve to the closed position quarterly because this action could damage the reactor coolant pumps seals. Draft NUREG-1482, Section 3.1.1.4 states that RCPs need not be stopped for cold shutdown testing. The NRC recommends that affected valves be tested during plant outages when RCPs are stopped for a sufficient period of time and on a refueling outage schedule, but not more than once every 92 days. The alternative is consistent with Draft NUREG-1482 and the full-stroke exercising at cold shutdowns is in accordance with OMa-1988 Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-5 | 333, 2 inch motor operated globe valve, Category B, normally closed, Emergency Boration Isolation Valve | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Valve 333 is associated with the emergency boration path from the boric acid storage tanks. The boric acid storage tanks contain high concentrations of borated water for emergency shutdown purposes. Cycling 333 would result in aligning this source of high concentrated boric acid solution to the charging pump suction Charging pump flow must be maintained to provide injection flow to the reactor coolant pump seals. Hence cycling this valve would result in a reactivity transient due to the injection of high concentrated boric acid solution which, if left unchecked, would cause a reactor shutdown. Such cycling during power operation is undesirable; hence, cold shutdown cycling has been proposed. Cold shutdown testing will provide assurance that these valves will function as required." | This valve will be full-stroke exercised at cold shutdowns. |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** Valve 333 is a motor-operated valve in the emergency boration line at the suction side of charging pumps. Its opening allows boric acid addition to the reactor coolant system at the maximum rate available, if a reactivity excursion occurs.<br><br>It is impractical to full-stroke open emergency boration isolation valve 333 quarterly because this would introduce highly concentrated boric acid solution from the boric acid tanks to the suction of the charging pumps. This, in turn, would result in the addition of excess boron to the RCS which would adversely affect plant power level and operational parameters with the potential for an undesirable plant transient and a plant trip or shutdown.<br><br>The alternative provides full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-6 | LCV-112B, 4 inch air-operated butterfly valve, Category B, normally closed, fail closed,<br><br>290, 4 inch check valve, Category C, normally closed,<br><br>Charging Pump Suction Isolation and Check Valves from RWST | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Valves LCV-112B and 290 are associated with the emergency boration path from the refueling water storage tank. The refueling water storage tank contains high concentrations of borated water for emergency shutdown purposes. Cycling LCV-112B and 290 would result in aligning these sources of high concentrated boric acid solution to the charging pump suction. Charging pump flow must be maintained to provide injection flow to the reactor coolant pump seals. Hence, cycling these valves would result in a reactivity transient due to the injection of high concentrated boric acid solution which, if left unchecked, would cause a reactor shutdown. Such cycling during power operation is undesirable; hence, cold shutdown cycling has been proposed. Cold shutdown testing will provide assurance that these valves will function as required." | This valve will be full-stroke exercised open at cold shutdowns. |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** Valve 290 is a check valve In series with LCV-112B. Valve LCV-112B is a normally closed air-operated valve in the refueling water supply line to the charging pump suction. Its opening may be necessary to allow refueling water supply to the reactor coolant system in certain emergency conditions.<br><br>It is impractical to full-stroke open the alternate emergency boration valve LCV-112B and thereby actuating check valve 290 quarterly because this would introduce highly concentrated boric acid solution from the Refueling Water Storage Tank (RWST) to the suction of the charging pumps. This, in turn, would result in the addition of excess boron to the RCS which would adversely affect plant power level and operational parameters with the potential for an undesirable plant transient and a plant trip or shutdown.<br><br>The alternative provides full-stroke exercising open at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c) for LCV-112B and ¶4.3.2.2(c) for check valve 290. The valve table also indicates that LCV-112B will be stroked timed and fail-safe tested at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.4 and ¶4.2.1.6. | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-7 | LCV-112C, 4 inch motor operated gate valve, Category B, normally open, Volume Control Tank (VCT) Outlet Valve | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "Valve LCV-112C is in the suction line to charging pumps which provide for reactor coolant makeup and seal injection flow. The reactor coolant pump seals require injection flow whenever the pumps are operating. Stroking LCV-112C closed during normal operation would require realigning the charging pump suction to an alternate supply. Available alternate supplies from the refueling water storage tank and boric acid storage tanks both contain higher concentrations of borated water which if injected, would result in a reactivity transient and eventual plant shutdown. Cold shutdown testing will provide assurance that these valves will function as required." | This valve will be full-stroke exercised at cold shutdowns. |

**Evaluation:** Valve LCV-112C is a normally open motor-operated valve at the suction of charging pumps from the volume control tank. It is also required to remain open following engineered safeguards actuation and closes during the switch over of charging pump suction to RWST.

It is impractical to full stroke exercise the VCT outlet valve, LCV-112C, quarterly because of the potential for a reactor transient due to overboration of the RCS as a result of the need to align the charging pumps' suction to the RWST or boric acid storage tanks to maintain charging flow and prevent loss of pump net positive suction head (NPSH).

The alternative provides full stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10. ¶4.2.1.2(c).

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-8 | 332, 2 inch check valve, Category C, normally closed, Emergency Boration Check Valve | 9321-F-2736-70, Flow Diagram of Chemical & Volume Control System | "System arrangement is such that valve 332 can not be exercised unless valve 333 is open to permit flow from the boric acid storage system. Aligning this flow path during power operation will result in a reactivity transient due to the introduction of highly concentrated boric acid solution from the boric acid storage system." | Valve 332 will be full stroke exercised open at cold shutdowns using primary water to the suction of the boric acid transfer pumps delivering the charging pumps for delivery to the RCS. |

**Evaluation:** Check valve 332 is located downstream of motor-operated valve 333 at the suction side of charging pumps. Its safety function is to open to facilitate emergency boration.

It is impractical to part-stroke or full-stroke open emergency boration check valve 332 quarterly because this would introduce highly concentrated boric acid solution from the boric acid tanks to the suction of the charging pumps. This, in turn, would result in the addition of excess boron to the RCS which would adversely affect plant power level and operational parameters with the potential for an undesirable plant transient and a plant trip or shutdown.

The alternative using primary water from the boric acid pumps suction provides full-stroke exercising to the open position at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-9 | 4924, 2 inch check valve, Category C, normally closed, Reactor Makeup and Emergency Boration Check Valve | 9321-F-2736-70, Flow Diagram o Chemical & Volume Control System | "System arrangement is such that this check valve can only be exercised when the emergency boration path is aligned. Aligning this path during power operation will result in a reactivity transient due to the introduction of highly concentrated boric acid solution from the boric acid storage system." | Full stroke exercised open at cold shutdowns using primary water to the suction of the boric acid transfer pump delivering to charging pumps for delivery to the RCS. |

**Evaluation:** Check valve 4924 is located in the emergency boration line to the suction of charging pumps. Its function is to open during emergency boration.

It is impractical to part-stroke or full-stroke open emergency boration check valve 4924 quarterly because this would introduce highly concentrated boric acid solution from the boric acid tanks to the suction of the charging pumps. This, in turn, would result in the addition of excess boron to the RCS which would adversely affect plant power level and operational parameters with the potential for an undesirable plant transient and a plant trip or shutdown.

The alternative using primary water from the boric acid pumps suction provides full-stroke exercising to the open position at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CVCS-10 | 212, 2 inch air-operated globe valve, Category A, normally closed, fail closed, Auxiliary Pressurizer Spray Control Valve | A208168-29, Flow Diagram of Chemical & Volume Control System | "This valve fails closed on loss of power to prevent depressurization. Normal Pressurizer Spray is provided through other piping which does not require use of this valve. During normal operation, valve 212 is closed. This valve is only opened to establish Auxiliary Pressurizer Spray. This valve closes to isolate Auxiliary Spray. If valve 212 fails to close, Auxiliary Spray may be isolated by closing MOV-205 or MOV-226 and MOV-227." | Valve 212 will be full-stroke exercised at Cold Shutdown. |

**Evaluation:** This valve is normally closed and is required to open to provide Auxiliary Pressurizer Spray. Control is from the Central Control Room. This spray path is a backup for Normal Spray from Reactor Coolant Loops 3 and 4. Valve 212 has a secondary function of acting as a relief path for the Regenerative Heat Exchanger when the RCS pressure upstream exceeds normal RCS pressure by 240 psi.

It is impractical to exercise quarterly because opening valve 212 would cause an RCS pressure transient from the spray of cooler water into the pressurizer, which in turn might cause a plant trip and may impose thermal stresses on the pressurizer spray piping. The alternative provides for full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **SAFETY INJECTION SYSTEM** | | | | |
| SIS-1 | 856B, 2 inch motor operated gate valve, Category B, locked closed,<br><br>856F, 2 inch motor operated gate valve, Category B, normally open,<br><br>Safety Injection Hot Leg Isolation Valves | A235296-22, Flow Diagram of Safety Injection System | "Valves 856B and 856F are only capable of being full-stroke exercised. Full-stroke exercising these valves quarterly during normal plant operation would be impractical in that a failure of these valves concurrent with a loss of coolant accident (LOCA) can result in a steam binding effect which would prevent adequate cooling water from reaching the core." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** These are shutoff valves in the Safety Injection lines leading to the hot legs of the Reactor Coolant System. They are normally closed and have a safety function to open approximately 24 hours after the cold leg injection has been initiated.

The valve table shows 856F to be normally open and the flow diagram shows both valves as normally open. It appears that both of these MOVs should be locked closed. Otherwise it is potentially unsafe to full-stroke these motor operated valves to the open position during normal operation because only two check valves would remain to isolate the SI system from RCS pressure (and potential for an inter-system LOCA).

On the assumption that the valve table is incorrect for valve 856F being normally open instead of locked closed the alternative provides full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c). The licensee should revise this deferral accordingly.

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-2 | 856A, 856C, 856D, 856E, 2 inch motor operated gate valves, Category B, normally locked open, Safety Injection Cold Leg Isolation Valves | A235296-22, Flow Diagram of Safety Injection System | "These valves are open or closed only valves; therefore, part-stroke exercising these valves is impractical. Full-stroke exercising these valves quarterly during normal plant operations is impractical because these valves are normally locked open and are required to be open during an emergency situation utilizing the SI system. Failure of one of these valves in the closed position would place the plant in a less conservative condition that may eventually cause plant shutdown." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** These valves are flow isolation valves in the SI lines leading to the cold legs of the Reactor Coolant System. These valves are normally locked open and have a function to close when hot leg safety injection, during the recirculation phase of Safety Injection, is required.

Technical Specifications require these SI cold leg injection valves to be locked open with power removed during normal operation but to have their mechanical stops checked quarterly to ensure compliance with the flow values assumed in the core cooling analysis. It is impractical to exercise these valves during power operation.

The alternative provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c). The valve table should be revised to show these valves as normally open.

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-3 | 842 and 843, 2 inch motor operated globe valves, Category B, locked open, SI Pumps Minimum Flow Isolation Valves | 9321-F-2735-10, Flow Diagram of Safety Injection System | "These valves are open or closed only valves; therefore, part-stroke exercising them is impractical. Full-stroke exercising the valves quarterly could compromise the Sl pump operation if the valves were in the closed position and the pumps were started. This would result in a dead head condition which would cause damage to the pumps." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** These valves are located in the mini-flow return line from the discharge of the safety injection pumps to the RWST. They are motor operated valves and are locked open during normal plant operation. They have a function to close at some time after initiation of SI.

As indicated by the licensee, full-stroke exercising of either of these valves would remove the miniflow protection of the safety injection pumps if the pumps were started while either valve was in the closed position resulting in a dead head condition which could cause damage to the pumps.

The alternative provides full-stroke exercising to the open and closed positions during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-4 | 881, 12 inch check valve, Category C, normally closed, RHR Pumps Suction Check Valve from RWST | 9321-F-2735-10, Flow Diagram of Safety Injection System | "This valve cannot be part-stroke exercised quarterly during the RHR pump mini-flow test because the test line taps in downstream of this valve. Although an 8 inch bypass line is provided around the RHR pumps for the purpose of pumping refueling water back to the RWST following refueling operations, its use during normal operations would render both RHR pumps inoperable in the LPSI mode. This line could potentially serve to permit part-stroke exercising of valve 881 during cold shutdowns when RHR pump operability is not required by Technical Specifications; however, the duration of a typical cold shutdown is such that the decay heat load is sufficiently large so as to preclude diverting any significant flow from the discharge header." | Valve 881 will be exercised open (nominally full-stroked) at refuelings using the RHR pumps to refill the primary system. |

**Evaluation:** Valve 881 is an inlet line check valve to the RHR pumps from the Refueling Water Storage Tank. The valve is normally closed and has the function of opening when the RHR pumps are used in the LPSI mode.

A review of the P&ID indicates that the only full flow path through check valve 881 is into the reactor coolant system which cannot be utilized during power operation because the RHR pumps cannot overcome RCS pressure. It is also impractical to full-stroke exercise the valve open at cold shutdowns because the test configuration (a) may not receive sufficient flow due the duration of a typical cold shutdown, or, (b) failure of the valve could result in a loss of decay heat removal.

The alternative of full-stroke exercising the valve open at refueling outages is in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-5 | 847, 8 inch check valve, Category C, normally closed, SI Pumps Suction Check Valve from RWST | 9321-F-2735-10, Flow Diagram of Safety Injection System | "The only practical means to exercise this check valve is to activate the Safety Injection pumps and flow water from the RWST to the Reactor Coolant System (RCS). Full-stroke exercising the valve quarterly while the plant is at normal operating power is impractical in that the RCS pressure is at approximately 2250 psig and this pressure locks out the check valve at the RCS/SIS interface that is downstream and in series with the subject check valve. The head available from the SI pumps is not enough to overcome the RCS pressure, thereby preventing flow. It is also impractical to exercise the valve at cold shutdowns." | Valve 847 will be part-stroke exercised quarterly during SI pump tests and will be full-stroke exercised open at refueling outages. |

**Evaluation:** Valve 847 is a check valve located at the inlet to the Safety Injection pumps from the Refueling Water Storage Tank (RWST) whose function is to open upon activation of the safety injection pumps.

It is impractical to full-stroke exercise check valve 847 to the open position quarterly because the SI pump discharge pressure cannot overcome the RCS pressure. It is also impractical to full-stroke exercise this valve at cold shutdowns because the SI pumps are deactivated when the RCS pressure goes below 1900 psig as part of the overpressure protection requirements. Part-stroke exercising to the closed position cannot be accomplished due to test connection alignments.

The alternative provides part-stroke exercising to the open position quarterly and full-stroke exercising at refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(d).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-6 | 849A, 849B, 852A, 852B, 5220, 4 inch check valves, Category C, normally closed, SI Pumps Discharge Check Valves | 9321-F-2735-10, Flow Diagram of Safety Injection System | "Full-stroke exercising these valves quarterly while the plant is at normal operating power is impractical in that the RCS pressure is at approximately 2250 psig. This pressure locks out these check valves at the RCS/SIS interface that is downstream an in series with the subject check valves. The head available from the Safety Injection pumps is not great enough to overcome the RCS pressure, thereby preventing flow. It is also impractical to exercise these valves at cold shutdowns." | Valves 849A, 849B, 852A, 852B, and 5220 will be full-stroke exercised open at refueling outages. |

**Evaluation:** These valves are check valves located at the outlet of the SI pumps. They are normally closed and have a function of opening upon actuation of the Safety Injection pumps.

It is impractical to full-stroke exercise the SI pumps discharge check valves to the open position quarterly because the SI pump discharge pressure cannot overcome the RCS pressure. It is also impractical to full-stroke exercise this valve at cold shutdowns because the SI pumps are deactivated when the RCS pressure goes below 1900 psig as part of the overpressure protection requirements. Part-stroke exercising is impractical because these valves are downstream of the miniflow test loop.

The alternative provides full-stroke exercising open at refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(e).

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-7 | 882, 12 inch motor operated gate valve, Category B, normally open, RHR Pump Suction Isolation Valve from RWST | 9321-F-2735-10, Flow Diagram of Safety Injection System | "This valve is deenergized open during normal plant operations to ensure proper operability of the RHR system follow, and an accident. Failure of this valve in the closed position during normal operations would preclude the proper operation of the system." | This valve will be full-stroke exercised at cold shutdowns. |

**Evaluation:** This valve is located in the supply line from the RWST to the RHR pumps. The valve is normally deenergized open to ensure flow to the RHR pumps for low head SI. The valve must close during recirculation from the containment sump to the RHR pumps.

It is impractical to full-stroke exercise MOV 882 quarterly because its closure would render both RHR pumps, which are used for low head SI, inoperable.

The alternative provides full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-8 | 1810, 3 inch motor operated gate valve, Category B, locked open, SI Pumps Suction Isolation Valve from RWST | 9321-F-2735-10, Flow Diagram of Safety Injection System | "This valve is required to be deenergized open during normal plant operations to ensure water flow from the RWST to the SI pumps. Because it is a single valve in this line, failure of this valve in the shut position would cause the failure of the SI system and require the plant to shutdown." | This valve will be full-stroke exercised at cold shutdowns. |

**Evaluation:** This valve is located in the water supply leading to the SI pumps from the RWST. It is normally deenergized open; however, following an accident where the SI piping is broken downstream of valves 888A and B, this valve is required to shut and valve 898 is manually opened.

It is impractical to full-stroke exercise MOV 1810 quarterly because its closure would render all three SI pumps, which are used for high head SI, inoperable.

The alternative provides full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| SIS-9 | 1802A, 1802B, 10 inch motor operated gate valves, Category B, normally closed, Containment Recirculation Pumps Discharge Isolation Valves | A235296-22, Flow Diagram of Safety Injection System | "Opening either valve during normal plant operation will cause the RWST to drain to containment. The only time the RWST is drained sufficiently to permit stroking 1802A and 1802B is at refuelings." | These valves will be full-stroke exercised at refuelings. |

**Evaluation:** These valves are redundant parallel valves on the discharge of the containment internal recirculation pumps They are normally closed and have a safety function to open when the recirculation pumps are put into service during the recirculation phase of a Loss of Coolant Accident. The recirculation pump header is provided with a normally open bypass line back to the pump to prevent dead heading the pumps. The elevation and piping arrangement from the RWST is such that with either valve 1802A or 1802B open the RWST would drain to the recirculation pump via the open bypass line with the potential for flooding the containment.

It is impractical to full-stroke exercise these valves open because they are parallel rather than series valves and opening either valve provides a flow path from the RWST to the containment sump via the open bypass line with the potential of flooding the containment. During refueling outages when the RWST level is low enough to prevent any substantial flow to the containment sump is when these valves should be exercised and stroke timed.

The alternative provides full-stroke exercising at cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(e).

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **RESIDUAL HEAT REMOVAL SYSTEM** | | | | |
| RHR-1 | 744, 12 inch motor operated valve, Category A, locked open, Auxiliary Coolant Return Header Isolation Valve | A251783-02, "F.D. Auxiliary Coolant System Residual Heat Removal Pumps" | "Full-stroke testing of the valve quarterly is impractical in that a failure of the valve in the closed position nullifies the function of the RHR pumps in the LPSI mode should an emergency occur concurrent with the valve failure. The valve cannot be exercised at cold shutdowns because closing the valve will terminate the normal RHR cooling mode (required to maintain cold shutdown). It is also impractical to part stroke exercise the valve since this valve is an open or closed only valve. In addition, Technical Specifications effectively require one RHR pump operable at all times; closing 744 makes the RHR pumps inoperable." | This valve will be full stroke exercised at refueling outages. |

**Evaluation:** Valve 744 is a non-redundant valve in the LPSI/RHR pump discharge header. It is a CIV and is normally open during plant operation. The valve also has a safety function to close following the termination of the LPSI mode of operation of the RHR system.

It is impractical to full-stroke exercise this valve closed quarterly because closure of this valve renders both trains of Low Pressure Safety Injection (LPSI) inoperable. It is impractical to full-stroke exercise this valve closed at cold shutdowns because closure would render both trains of Residual Heat Removal inoperable.

The alternative provides full-stroke exercising during refueling outages in accordance with OMa-1988, Part 10, ¶4.2.1.2(e).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RHR-2 | 741A, 12 inch check valve, Category A/C, normally closed, RHR Return Header Check Valve | 9321-F-2720-61, "F.D. Auxiliary Coolant System" | "Full-stroke testing of the valve quarterly during normal power operations is impractical because the LPSI mode of emergency cooling would have to be initiated to do so. This valve will be part-stroked quarterly using the miniflow test line for the RHR pumps and full stroked at cold shutdown during RHR operation." | This valve will be part-stroked quarterly and full-stroke exercised open at cold shutdowns, during the normal shutdown cooling mode of operation of the RHR pumps. |

**Evaluation:** Valve 741A is a check valve and functions as a containment isolation valve in the discharge line from the RHR pumps. This valve is normally closed and opens when the RHR pumps are used in the LPSI mode of emergency cooling.

It is impractical to full-stroke exercise this valve open quarterly because this would require full accident flow rate of the LPSI system injecting into the RCS during normal plant operation and the LPSI system pressure is insufficient to open these valves.

The alternative provides part-stroke exercising to the open position quarterly during the testing of the RHR pumps, and full-stroke exercising to the open position during cold shutdowns in accordance with OMa-1988, Part 10, 4.3.2.2(b).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RHR-3 | 743 and 1870, 3 inch motor operated globe valves, Category A, normally open, locked open, RHR Minimum Flow Isolation Valves | A251783-02, "F.D. Auxiliary Coolant System Residual Heat Removal Pumps" | "These valves are open or closed only valves; therefore, part-stroke exercising of these valves is impractical. Full-stroke exercising these valves quarterly during normal plant operation is impractical because if the valves were closed and the RHR pumps were needed to start, they would start against a dead head and possibly be damaged. Also, these valves are locked open valves and are required to be open during an accident." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** These valves are Containment Isolation Valves in the miniflow test line of the RHR pumps. These valves are motor operated and are locked open during normal plant operation. They are remote manually shut at some time (long-term) following accident initiation.

These valves are locked open during power operation. It is impractical to full-stroke exercise these valves closed quarterly because closure of these valves would disable both trains of RHR pumps by isolating the common mini-flow recirculation line to the pumps' suction header.

The alternative provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RHR-4 | 738A and 738B, 12 inch check valves, Category C, normally closed, RHR Pumps Discharge Check Valves | A251783-02, "F.D. Auxiliary Coolant System Residual Heat Removal Pumps" | "Full-stroke testing of these valves during normal operation is impractical as it would require full flow test of the RHR pumps through the SI system. This is impractical as it would require safety injection flow to the RCS which is at a higher pressure than the RHR pumps can deliver." | These valves will be part-stroke exercised quarterly during the RHR pump mini-flow test and full-stroke exercised open at cold shutdowns by momentary full flow operation of an RHR pump. |

**Evaluation:** Valves 738A and 738B are RHR pump discharge check valves. Their safety functions are to open to permit LHSI flow to reach the core.

It is impractical to full-stroke exercise these valves quarterly because this would require full flow operation of the RHR pumps. The discharge head of the RHR pumps is insufficient to overcome the normal RCS pressure during plant operation.

The alternative provides part-stroke exercising to the open position quarterly during the RHR pump tests, and full-stroke exercising to the open position during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(b).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RHR-5 | 746 and 747, 8 inch motor operated gate valves, Category B, normally closed, Low Head Safety Injection & RHR Loop Injection Isolation Valves | 9321-F-2720-61, "F.D. Auxiliary Coolant System" | "Valves 746 and 747 are only capable of being full-stroke exercised. Full-stroke exercising these valves quarterly during normal plant operations could subject the LHSI/RHR system to pressure in excess of their design pressure. It is assumed for purposes of a cycling test that one or more of the upstream check valves has failed. No positive methods are available for determining the pressure or lack thereof on the high pressure side of the valve to be cycled." | These valves will be full-stroke exercised at cold shutdowns. |

**Evaluation:** Valves 746 and 747 are motor operated valves in the LHSI/RHR lines and are downstream of the RHR heat exchangers. These are normally closed valves and receive an engineered safeguard signal to open for LHSI/RHR operation.

According to the drawing, these valves appear as normally open valves but should be normally closed. It is potentially unsafe to full-stroke exercise these valves open during normal power operation because only two downstream check valves would remain to isolate the RHR system from the RCS pressure (and the potential for an inter-system LOCA exists).

The alternative provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| RHR-6 | 730 and 731, 14 inch motor operated gate valves, Category A, normally closed, RHR & RCS Pressure Isolation Valves | 9321-F-2720-61, "F.D. Auxiliary Coolant System" | "These valves will be full-stroke exercised at cold shutdowns." | These valves will be full-stroke exercised at cold shutdowns. |
| **Evaluation:** Valves 730 and 731 are pressure isolation valves (PIVs) between the Reactor Coolant System and RHR system. They are normally closed and have a safety function to open in order to reach cold shutdown for most non- LOCA design basis events.<br><br>It appears that the licensee has erroneously described the test frequency as the justification. The justification is missing.<br><br>The licensee should revise and resubmit this deferral to include the justification for deferred testing. | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **CONTAINMENT SPRAY SYSTEM** | | | | |
| CSS-1 | 867A and B, 8 inch check valves, Category A/C, normally closed, Containment Spray Pump Discharge Check Valves | 9321-F-2735-101, "F.D. Safety Injection System" | "These valves are located downstream of the containment spray pump mini-flow test line and therefore cannot be part-stroke exercised quarterly during the mini-flow test of the containment spray pumps. These valves can be full-stroke exercised at refuelings through a disconnect that allows for operations other than containment spray." | This valve will be full-stroke exercised at refueling outages. |

**Evaluation:** Valves 867A and B are Containment Spray discharge check valves in the lines leading to the containment spray headers. They are closed during plant operation and open when the containment spray pumps are activated to supply refueling water storage tank (RWST) water/spray additive to the containment spray headers.

It is impractical to part-stroke or full-stroke exercise these valves open quarterly because these valves are downstream of the CS pumps mini-flow test recirculation line and would require spraying down the containment or installing a disconnect at power.

The licensee should revise and resubmit this deferral request, however, to discuss the impracticality of part-stroke or full-stroke exercising these valves during cold shutdowns.

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CSS-2 | 880A - 880K, 2 inch motor operated valves, Category B, normally closed, Containment Charcoal Filter Fire Protection Valves | A235296-22, "F.D. Safety Injection System" | "The only function of these valves is to open in the unlikely event that a charcoal filter high temperature occurs. During normal operation these valves are maintained in the closed position to assure that no water enters the charcoal beds which could degrade charcoal performance. The piping arrangement is such that a standing head of water can accumulate behind these valves with no means of draining this water off prior to cycling the valves. Thus, quarterly cycling could result in water entering the charcoal beds, which is unacceptable." | These valves will be full-stroke exercised at refuelings prior to charcoal filter performance testing so that, if charcoal filter degradation occurs, appropriate corrective actions can be instituted prior to return to power operation. |

**Evaluation:** Valves 880A through 880K are non-automatic motor operated valves in the line from the Containment Spray header to the charcoal filter fire protection nozzles of the Fan Cooler Units. These valves are closed during plant operation and are required to open in the unlikely event of a high temperature condition in a filter unit during a design basis event.

It is impractical to full-stroke exercise these valves to the open position quarterly because opening these valves could cause water to enter the charcoal filter beds. However, the licensee has not provided justification for not exercising these valves during cold shutdowns.

The licensee should revise and resubmit this deferral to discuss the impracticality of full-stroke exercising these valves open during cold shutdowns.

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **COMPONENT COOLING WATER SYSTEM** | | | | |
| CCW-1 | FCV-625, 3 inch motor operated gate valve Category A, normally open, Reactor Coolant Pumps Thermal Barrier Return<br><br>797, 784, 6 inch motor operated gate valves, Category A, normally open, Reactor Coolant Pumps Supply and Motor Bearing Cooler Return CIVs | A227781-44, "F.D. Auxiliary Coolant System" | "These valves are open or closed only valves; therefore, part-stroke testing of these valves is impractical. Also, full-stroke exercising these valves quarterly while the plant is at normal operating power is impractical because this would isolate cooling water to the RC pumps." | These valves will be full-stroke exercised at cold shutdowns provided the RC pumps are secured. If one or more RC pumps are not secured at cold shutdowns, the associated valves will be tested at intervals no greater than refuelings. |

**Evaluation:** Valves 797, 784, and FCV-625 are all containment isolation valves in the Component Cooling System that supplies cooling water to the Reactor Coolant Pumps bearing oil coolers and thermal barriers. Valve 797 is a CIV and allows cooling water to flow to the bearing oil coolers and thermal barriers. Valve 784 is a CIV in the return leg from the RC pump motor bearing cooler. Valve FCV-625 is a CIV in the return leg from the thermal barriers. All these valves are normally open during plant operation and have an emergency function to close upon receipt of a containment isolation signal.

It is impractical to full-stroke exercise these valves open or closed quarterly because this would interrupt CCW flow to the RCP thermal barriers or motor bearing oil coolers, thereby creating the potential for damage to the RCPs.

The alternative provides full-stroke exercising during those cold shutdowns when the RC pumps are secured or during refueling outages in accordance with OMa-1988, Part 10, ¶4.2.1.2(d) and (e).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CCW-2 | 822A and 822B, 12 inch motor operated gate valves, normally closed, RHR Heat Exchanger Component Cooling Outlet Isolation Valves | 9321-F-2720-61, "F.D. Auxiliary Coolant System" | "Full-stroke testing of these valves during normal plant operation may divert flow from the component cooling system via the 12" return. This could result in reduced cooling flow to the RC pump coolers and thermal barriers which could create a potential for overheating and damage to the RC pumps." | These valves will be full-stroke exercised at cold shutdowns provided the RC pumps are secured. If one or more RC pumps are not secured at cold shutdowns, the associated valves will be tested at intervals no greater than refuelings. |

**Evaluation:** Valves 822A and 822B are flow isolation valves in the component cooling system on the return leg from the residual heat exchangers. The valves are normally closed and have an emergency function to open and allow the flow of component cooling water to the RHR heat exchangers.

It is impractical to full-stroke exercise these valves open quarterly because these valves are 12 in. diameter and therefore flow through these valves could reduce flow of CCW to the RCP coolers and thermal barriers, thereby creating the potential for damage to the RCPs.

The alternative provides full-stroke exercising during those cold shutdowns when the RC pumps are secured or during refueling outages in accordance with OMa-1988, Part 10, ¶4.2.1.2(d) and (e).

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| CCW-3 | 769, 786, and 789, 6 inch motor operated gate valves, Category B, normally open, Reactor Coolant Pumps: Cooling Water Supply; Motor Bearing Cooler Return; and, Thermal Barrier Return | A227781-44, "F.D. Auxiliary Coolant System" | "Full-stroke testing of these valves quarterly during normal plant operation would cause a loss of cooling vater to the RC pumps bearing oil coolers or the thermal barriers or both and would damage the RC pumps. Part-stroke testing is also impractical because these are open or closed only valves." | These valves will be full-stroke exercised at cold shutdowns provided the RC pumps are secured. If one or more RC pumps are not secured at cold shutdowns, the associated valves will be tested at intervals no greater than refuelings. |

**Evaluation:** These valves are isolation valves in the component cooling system that supplies valves to the RC pumps bearing out coolers and thermal barriers. Valve 769 is in the supply header leading to the RC pumps. Valve 786 is in the return header leading from the RC pump bearing oil coolers. Valve 789 is in the return header leading from the RC pumps thermal barriers. These valves are open or closed only valves and are normally open valves.

It is impractical to full-stroke exercise these valves open quarterly because closure of these valves isolates flow of CCW to the RCP coolers and thermal barriers, thereby creating the potential for damage to the RCPs.

The alternative provides full-stroke exercising during those cold shutdowns when the RC pumps are secured or during refueling outages in accordance with OMa-1988, Part 10, ¶4.2.1.2(d) and (e).

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **SERVICE WATER SYSTEM** | | | | |
| SW-1 | FCV-1111 and FCV-1112, 16 inch manual butterfly valves, Category B, variably opened or closed, Conventional Plant Equipment Service Water Supply | 9321-F-2722-75, "F.D. Service Water System - Nuclear Steam Supply Plant Sheet 1 of 2" | "Either one of these valves is open during normal plant operation and the other closed. The open valve is closed at some time following an accident condition. Full or part-stroke exercising the open valve during normal plant operation is impractical because doing so would reduce or secure flow to plant equipment requiring this cooling water. This could cause damage to this plant equipment." | These valves will be full-stroke exercised at those cold shutdowns when the conventional plant equipment is not in use. In addition, these valves may be stroked during plant operation during those infrequent instances when it becomes necessary to realign service water system headers. |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** These valves are manual flow isolation valves in the normal service water supply to the conventional plant equipment. Either one of these valves is open during plant operation. The open valve is required to close during an accident condition to limit SW flow to essential components.<br><br>It is impractical to part-stroke or full-stroke exercise these valves closed quarterly because this would require realignment of the SW system supply header during plant operation, which could cause damage to conventional plant equipment.<br><br>The alternative provides full-stroke exercising to the closed position during those cold shutdowns when the conventional plant equipment is not in use in accordance with OMa-1988, Part 10, ¶4.2.1.2(c) and full-stroke exercising to the closed position during all refueling outages in accordance with ¶4.2.1.2(e). | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **AUXILIARY FEEDWATER SYSTEM** | | | | |
| AFW-1 | BFD-79, 79-1, 79-2, 79-3 4 inch check valves, Category C, normally closed, Common Turbine & Motor-Driven AFW Pump Header Check Valves | 9321-F-2019-77, "F.D. Boiler Feedwater" | "Exercising these check valves quarterly during normal operation is impractical since the auxiliary feedwater pumps must be activated to flow ambient temperature water from the CST to the SG which can result in thermal shocking of the SG tube sheet.<br><br>Full-stroke exercising at cold shutdown is impractical because the high flow rates required for full-stroke exercising make it difficult to control water levels in the SG. Excessively high water levels in the SG can result in water in the steamlines, and can lead to turbine damage when power operations are resumed." | These valves will be part-stroke exercised at cold shutdowns during operation of the auxiliary feedwater pumps and full-stroke exercised open at refuelings in conjunction with the full flow test of the auxiliary feedwater pumps. |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** These valves are normally closed check valves in the auxiliary feedwater lines at the interface of the main feedwater line. Their emergency function is to open when the auxiliary feedpumps are activated to supply emergency feedwater from the Condensate Storage Tank (CST). These valves are downstream of the AFW pumps' recirculation test lines.<br><br>It is impractical to part-stroke or full-stroke exercise these valves to the open position quarterly because this would require flow of ambient temperature water from the CST to the steam generators (SGs). This could result in thermal shocking of the SG nozzles and tube sheets. It is impractical to full-stroke exercise these valves to the open position during cold shutdowns because the high flow rates required for full-stroke exercising render it difficult to control water levels in the SGs, thereby possibly causing water to enter the steam lines which could damage the plant turbine when power operations are resumed.<br><br>The alternative provides part-stroke exercising to the open position during cold shutdowns when the AFW pumps are operating and full-stroke exercising to the open position during refueling outages in conjunction with full flow testing of the AFW pumps in accordance with OMa-1988, Part 10, ¶4.3.2.2(d). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| AFW-2 | BFD-31, 4 inch check valve, Category C, normally closed, Turbine Driven AFW Pump Discharge Check Valve<br><br>BFD-47, 47-1, 47-2, 47-3, 3 inch check valves, Category C, normally closed, Turbine Driven AFW Header Check Valves | 9321-F-2019-77, "F.D. Boiler Feedwater" | "Exercising these check valves quarterly during normal operation is impractical since the auxiliary feedwater pumps must be activated to flow ambient temperature water from the CST to the SG which can result in thermal shocking of the SG tube sheet.<br><br>Full-stroke exercising at cold shutdown is impractical because the high flow rates required for full-stroke exercising make it difficult to control water levels in the SG. Excessively high water levels in the SG can result in water in the streamlines, and can lead to turbine damage when power operations are resumed.<br><br>Full or part-stroke exercising of these valves at cold shutdowns is impractical because there is no steam present to run the turbine driven AFW pumps." | These valves will be full-stroke exercised open at refuelings in conjunction with the full flow test of the turbine driven auxiliary feedwater pump. |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** Valve BFD-31 is an Auxiliary Feedwater (AFW) pump (turbine driven) discharge check valve. The BFD-47 series valves are in the AFW supply lines from the turbine driven pump and are redundant isolation valves in series with BFD-79 series valves. The valves are normally closed and have an emergency function to open when the turbine driven AFW pump is activated to provide condensate storage tank water to the steam generators.<br><br>It is impractical to part-stroke or full-stroke exercise these valves to the open position quarterly because this would require flow of ambient temperature water from the CST to the steam generators (SGs). This could result in thermal shocking of the SG nozzles and tube sheets. It is impractical to full-stroke exercise these valves to the open position during cold shutdowns because the high flow rates required for full-stroke exercising render it difficult to control water levels in the SGs, thereby possibly causing water to enter the steam lines which could damage the plant turbine when power operations are resumed.<br><br>It is impractical to part-stroke or full-stroke exercise these valves to the open position during cold shutdowns because steam is not available from the SGs to drive the turbine-driven AFW pump.<br><br>The alternative provides full-stroke exercising to the open position during refueling outages in conjunction with full flow testing of the AFW pumps in accordance with OMa-1988, Part 10, ¶4.3.2.2(e). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| AFW-3 | BFD-39, BFD-34, 4 inch check valves, Category C, normally closed, Motor-Driven AFW Pump Discharge Check Valves<br><br>BFD-37, BFD-35, BFD-42, BFD-40, 4 inch check valves, Category C, normally closed, Motor-Driven AFW Pump Header Check Valves | 9321-F-2019-77, "F.D. Boiler Feedwater" | "These check valves are normally closed and have an emergency function to open when the AFW pumps (motor driven) are activated to provide condensate storage tank water to the steam generator. BFD 39 and BFD 34 are downstream of the AFW pump test recirculation lines thus precluding any exercising during monthly pump tests.<br><br>Part-stroke testing at cold shutdowns and full-stroke exercising at refueling outages is justified based upon the reasons given for the BFD 79 series valves." | Part-stroke exercise the valves open at cold shutdowns during operation of the auxiliary feedwater pumps. Full-stroke exercise the valves open during refueling outages in conjunction with full flow test of the auxiliary feedwater pumps. |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** BFD 39 and BFD 34 are auxiliary feedwater pumps (motor driven) discharge check valves. BFD 35, 37, 40, and 42 are check valves in the auxiliary feedwater supply lines leading from the motor driven auxiliary feedwater pumps and act as redundant isolation valves in series with check valves BFD 79, 79-1, 79-2, and 79-3. All of these valves are downstream of the AFW pumps' recirculation test lines.<br><br>It is impractical to part-stroke or full-stroke exercise these valves to the open position quarterly because this would require flow of ambient temperature water from the CST to the steam generators (SGs). This could result in thermal shocking of the SG nozzles and tube sheets. It is impractical to full-stroke exercise these valves to the open position during cold shutdowns because the high flow rates required for full-stroke exercising render it difficult to control water levels in the SGs, thereby possibly causing water to enter the steam lines which could damage the plant turbine when power operations are resumed.<br><br>The alternative provides part-stroke exercising to the open position during cold shutdowns when the AFW pumps are operating and full-stroke exercising to the open position during refueling outages in conjunction with full flow testing of the AFW pumps in accordance with OMa-1988, Part 10, ¶4.3.2.2(d). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| AFW-4 | CT-26 and CT-32, 6 inch check valves, Category C, normally closed,<br><br>CT-29, 8 inch check valve, Category C, normally closed,<br><br>AFW Pumps Suction Check Valves | 9321-F-2018-94, "F.D. Condensate & Boiler Feed Pump Suction" | See below. | The three check valves will be part-stroke exercised during quarterly AFW pump testing and full-stroke exercised open during the full-flow pump test at refuelings. In addition, these valves are part-stroked at cold shutdowns as part of the normal AFW system operation. |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|

**Licensee's Justification:** "These valves are part-stroke exercised during start-up and shutdown of the reactor and are therefore part-stroke exercised during cold shutdown. In addition, these valves are part-stroke exercised during quarterly auxiliary feedwater pump testing.

Full flow testing of the auxiliary feedwater pump is conducted during refuelings. The pump suction check valves must necessarily be full-stroke exercised during this test. Full stroke exercising these auxiliary feedwater pump suction check valves requires that the associated auxiliary feedwater pump be operating. Operating these pumps during normal operation would interfere with automatic steam generator level control, likely causing a plant trip. The auxiliary feedwater pumps normally operate during start-up and shutdown; however, the pump flow rate (and hence the degree to which the suction check valves are exercised) is largely dependent on the conditions associated with the particular heatup or cooldown (e.g., the required heatup/cooldown rate and the particular auxiliary feedwater pumps that are operating).

In practice, during a typical heatup or cooldown auxiliary feedwater flow will be sufficient to full stroke exercise the suction check valves; however, this cannot be guaranteed for all heatup and cooldowns. Accordingly, credit is taken for only part-stroke exercising these valves at cold shutdowns. In addition to part-stroke exercising these valves during heatup/cooldown and full stroke exercising at refuelings, these valves are part-stroked quarterly during the auxiliary feedwater pump miniflow test. Flow rate through the suction check valves during the pump mini-flow tests is limited to a part-stroke exercise due to the size of the mini-flow test recirculation line. We believe the exercise program that these valves are subject to between refuelings provides adequate assurance that these valves will function as required.

In addition, NRC IE Bulletin 79-13 identified the potential for feedwater line cracking as a result of injecting relatively cold auxiliary feedwater (40 degrees to 60 degrees F) into relatively hot main feedwater piping (426 degrees F). Full flow testing these valves at anytime other than refuelings is contrary to these successfully implemented practices intended to minimize the potential for thermal shock to the feedwater piping and steam generators."

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **Evaluation:** These valves are check valves in the suction lines of each of the auxiliary feedwater pumps. These suction lines connect to the main header leading from the condensate storage tank. Their function is to open when the auxiliary feed pumps operate during normal start-up and shutdown of the plant or following an accident requiring the use of the auxiliary feedwater system.<br><br>It is impractical to full-stroke exercise these valves quarterly because this would require full flow operation of the AFW pumps. This in turn would require injection of ambient temperature water into the feedwater lines and steam generators, thereby subjecting the feedwater lines and steam generators to thermal shock.<br><br>Although during a typical heatup or cooldown, auxiliary feedwater flow will be sufficient to full stroke exercise the suction check valves, this cannot be guaranteed for all heatup and cooldowns. Therefore, it is impractical to full-stroke exercise these valves open during every cold shutdown.<br><br>The alternative provides part-stroke exercising to the open position quarterly and at cold shutdowns during the quarterly and cold shutdown testing of the AFW pumps and full-stroke exercising to the open and closed positions during refueling outages in accordance with OMa-1988, Part 10, ¶4.3.2.2(b) and (d). | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **HYDROGEN RECOMBINER SYSTEM** | | | | |
| HR-1 | 1878, 1 inch check valve, Category C, normally closed,<br><br>1880A, 1880B, 1879A, 1879B, 3/4 inch check valves, Category C, normally closed,<br><br>Hydrogen Recombiner Gas Supply Check Valves | 9321-F-2727-30, "F.D. Hydrogen Recombiner System" | "These valves are located inside containment. The capability of these valves to function is normally checked by proper operation of the recombiner. It is impractical to test these valves during normal operations because they are inside containment and the recombiner is not tested during plant operation." | These valves will be exercised open during cold shutdown. |

**Evaluation:** These valves are check valves in the Oxygen Line and the lines leading to the nozzles of the two hydrogen recombiners. These valves have a safety function to open when the system is placed into operation.

It is impractical to part-stroke or full-stroke exercise these valves open quarterly because the valves are located inside containment and testing requires operation of the Hydrogen Recombiners. The recombiners are not tested during plant operation.

The alternative provides full-stroke exercising to the open position during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.3.2.2(c).

However, the licensee should review the specified test frequency of this justification in conjunction with the comments in the evaluation regarding HR-2 below.

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| HR-2 | 1881C, 1881A, 1881D, 3/4 inch check valves, Category C, normally closed, Oxygen, Hydrogen, Nitrogen, Supply Check Valves | 9321-F-2727-30, "F.D. Hydrogen Recombiner System" | "As in the previous Justification, these lines are brought into service only during operation of the hydrogen recombiner. This test is conducted during refuelings and proper operation (i.e., pressures) ensures the functioning of these check valves." | These valves will be exercised open during cold shutdown. |

**Evaluation:** These valves are check valves in the lines leading from the oxygen, hydrogen and nitrogen supply lines, respectively. The oxygen and hydrogen are necessary for proper recombiner operation. The nitrogen is used to test the system flow, paths and to purge the system after use. These valves must open when the system is in operation. The valves are located outside containment.

In the previous justification, HR-1, the licensee states that the related valves are tested during cold shutdowns implying that the Hydrogen Recombiners are tested during cold shutdowns. However, in this justification, the licensee states that these valves also must be tested during operation of the Hydrogen Recombiners, but that the valves are tested during cold shutdowns while the recombiners are tested at refueling outages.

The licensee should revise and resubmit this justification to clarify the test frequency of these valves in view of the conflicting information regarding the test frequency of the Hydrogen Recombiners.

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **MAIN STEAM SYSTEM** | | | | |
| MS-1 | MS-1-21, 22, 23, 24, 28 inch fail closed stop check valves, Category B/C, normally open, Main Steam Non-Return Stop Check Valves | 9321-F-2017-61, "F.D. Main Steam" | "These MSIV's cannot be full-stroke or part-stroke exercised quarterly because to do so would cause a reactor trip. The reactor trip would be caused by the turbine tripping off line. The turbine trip is caused by a Valve Position Change Signal. The Technical Specifications require these valves be full-stroke tested and timed to their safe position during refuelings." | These valves will be full-stroke exercised and timed at cold shutdowns. |

**Evaluation:** These are the Main Steam Isolation Valves (MSIVs). These valves are stop check valves with the pneumatic operators holding the valve disks out of the main steam flow path.

It is impractical to either part-stroke or full-stroke exercise these valves closed quarterly because any change in valve position would generate a Valve Position Change Signal, which in turn causes a turbine trip and a reactor trip.

The alternative provides full-stroke exercising during cold shutdowns in accordance with OMa-1988, Part 10, ¶4.2.1.2(c) and 4.3.2.2(c).

**Table 4.1 Indian Point Unit No. 2**
**Justification of Deferrals**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| MS-2 | PCV-1133, 6 inch air-operated gate valve, Category B, normally open, fail closed, Priming Ejector Steam Supply PCV | A227780-27, "Main Steam" | "Exercising this valve during normal operations is impractical because it would require securing the priming injectors during the test or disrupting steam flow should the valve fail to reopen. Due to the function of the valve (i.e., pressure regulation) it is part-stroked at indeterminate times during normal operation." | This valve will be full-stroke exercised and timed at cold shutdowns. |
| **Evaluation:** This valve is a pressure control valve in the main steam line leading to the priming injectors. This valve has an emergency function to close on high radiation.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **FEEDWATER SYSTEM** | | | | |
| FW-1 | FCV-417L, 427L, 437L, 447L, 6 inch air-operated gate valves, Category B, normally closed, fail closed | 9321-F-2019-77, "F.D. Boiler Feedwater" | "These valves are normally closed during normal plant operations. They are used during initial start-up of the secondary steam generating system. Exercising these valves quarterly is impractical because the increased flow caused by the opening of the valve would cause a feedwater flow/steam generator level mismatch and cause an unnecessary oscillation in the flow control network and steam generator water level and potential plant trip." | These valves will be full-stroke exercised at cold shutdowns or prior to startup following cold shutdowns. |
| **Evaluation:** These are normally closed valves which are main feedwater regulating valves in the feedwater regulator bypass lines (low flow control path) and are used during startup conditions. The valves are required to fail closed.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |
| FW-2 | FCV-417, 427, 437, 447, 18 inch air-operated gate valves, Category B, normally open, fail closed | 9321-F-2019-77, "F.D. Boiler Feedwater" | "Exercising these valves quarterly is impractical during power operation in that it would shut off the feedwater to the steam generator, which would result in a reactor trip condition." | These valves will be full-stroke exercised at cold shutdowns or prior to startup following cold shutdowns. |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **Evaluation:** These valves are the main feedwater regulators which are open during power operations to control the main feedwater supply to the steam generators. The valves are required to fail closed.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| FW-3 | BDF-2-21 and BFD-2-22, 20 inch motor operated gate valves, Category B, normally open, fail-as-is | 9321-F-2019-77, "F.D. Boiler Feedwater" | "Exercising these valves quarterly is impractical during power operation as it would shut off the feedwater to steam generators and trip the plant." | These valves will be full-stroke exercised at cold shutdowns. |
| **Evaluation:** These are motor operated valves in the boiler feedwater pump discharge lines. They are open during power operations to supply feedwater to steam generators.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **HEATING VENTILATING & AIR CONDITIONING SYSTEM** | | | | |
| HVAC-1 | FCV-1170, 1171, 1172, 1173, 36 inch air-operated butterfly valves, Category A, normally closed, fail closed, Containment Purge Supply & Exhaust Isolation Valves | 9321-F-4022-36, "F.D. Ventilation System - Containment, Primary Auxiliary Building, Fuel Storage Building" | "These valves are normally closed during power operation and have a safety function to close; therefore, they are generally considered passive valves. An administrative goal has been established to limit the amount of time these valves may be open during plant operation. As such, exercising will be accomplished at cold shutdown." | These valves will be full-stroke exercised at cold shutdowns. |
| **Evaluation:** These valves are containment isolation valves in the containment purge system.<br><br>These are non-ASME Code Class Valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **ISOLATION VALVE SEAL WATER SYSTEM** | | | | |
| IVSW-1 | 1500-1543, 1545-1550, 5602, 1406, 3/8 in., Cat. C, normally closed check valves<br><br>1456, 3/4 in., Cat. C, normally open check valve | 9321-F-2746-30, "F.D. Isolation Valve Seal Water System" | "These valves form a boundary between the IVSW system and the process lines served by the IVSW system. The test connections installed to permit flow testing these check valves are located between their respective check valve and the process lines being served. With the process line in service flow verification of these valves is precluded by the process fluid effluxing through the test connection. As such, these valves can only be exercised at refuelings.<br><br>In addition, the Isolation Valve Seal Water System serves a containment isolation function. As such, it is appropriately tested at a frequency consistent with leak testing of the associated CIVs, on a refueling basis, consistent with 10CFR50 Appendix J, Type C requirements." | Exercised at refuelings. |
| **Evaluation:** These valves are check valves in the lines leading to the various CIVs. Their function is to open following a containment isolation signal to provide a pressurized water or nitrogen seal between the containment isolation valves.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **WELD CHANNEL PRESSURIZATION SYSTEM** | | | | |
| WCPS-1 | SOV-1277 and SOV-1278, 1 in., Cat. B, normally open, fail closed, solenoid-operated gate valves | 9321-F-2726-49, "F.D. Penetration and Liner Weld Joint Channel Pressurization System" | "These valves operate from the same circuit as the Containment Isolation valves listed above (i.e. FCV-1170 thru FCV-1173). The Containment Isolation valves are stroked at cold shutdown frequency in accordance with their CSHD justification (see HVAC-1) because of the administrative goal established to limit the amount of time the Containment Isolation valves are open during plant operation." | These valves will be tested at cold shutdown. |
| **Evaluation:** These solenoid valves are normally open, allowing WCPS air to pressurize the piping between FCV-1170, 1171 and FCV-1172, 1173, respectively. When the isolation valves open (FCV-1170 through 1173), the solenoids reposition to stop WCPS air and to vent the air from between the isolation valves.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| WCPS-2 | SOV-1334 thru SOV-1345, 1 in. Cat. B, normally closed, fail open, solenoid-operated gate valves<br><br>SOV-1434 thru SOV-1439, 1 in., Cat. B, normally open, fail closed, solenoid-operated gate valves | 9321-F-2726-49, "F.D. Penetration and Liner Weld Joint Channel Pressurization System" | "These valves are actuated by a Containment Phase 'A' isolation signal. Although these valves can be manually actuated, manual actuation would not demonstrate actuation by the Containment Phase 'A' Isolation signal. Therefore, performance of the safety function requirement would not be demonstrated in a meaningful way." | These valves will be tested at cold shutdown. |
| **Evaluation:** These solenoid valves operate to pressurize the containment personnel airlocks' differential pressure instrumentation lines with WCPS air on receipt of a Containment Isolation Phase "A" signal. Valves SOV- 1340 through 1345 are normally closed. These valves open to pressurize the instrument lines. The licensee states that valves SOV-1334 through 1339 and SOV-1434 through 1439 are normally open. These valves close to maintain line pressure.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

**Table 4.1 (Cont'd)**

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| WCPS-3 | 85C, 85D, 95C, 95D, 1 in. Cat. A/C, normally closed, spring loaded check valves | UFSAR Fig. 5.2-27, Rev. 3, "Containment Isolation System Penetration Schematics" | "There are no positive means available for exercising these valves. Proper operation may be deduced when making periodic entries to containment. In addition, the Appendix J tests for leak rate serve to verify the operability of these valves." | These valves will be tested at cold shutdowns. |
| **Evaluation:** These check valves function as CIVs for the airlocks.<br><br>These are non-ASME Code Class Valves and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **INSTRUMENT AIR SYSTEM** | | | | |
| IA-1 | PCV-1228, 2 in., Cat. A, normally open, fail closed, air-operated globe valve | 9321-F-2036-55, "F.D. Instrument Air Control Bldg., Conventional Plant, Etc." | "This valve is an open or close only valve so that part stroke exercising is impractical. Full-stroke exercising the valve quarterly during power operations or at cold shutdowns is also impractical because it shuts off the operating air supply to the valves inside containment that may be required to function during both power and cold shutdown operations." | This valve will be full-stroke exercised at refueling outages. |
| **Evaluation:** PCV-1228 is a CIV in the Instrument Air System. This valve is normally open during power operation.<br><br>This is a non-ASME Code Class valve and no evaluation is required. | | | | |

Table 4.1 (Cont'd)

| Item No. | Valve Identification | Drawing No. | Licensee's Justification for Deferred Testing | Proposed Alternate Testing |
|---|---|---|---|---|
| **NON-ASME VALVES** | | | | |
| **NITROGEN SYSTEM** | | | | |
| N2-1 | 4107 and 4108, 3/4 in., Cat. C, normally closed check valves | A235306-05, "F.D. Nitrogen to Nuclear Equipment" | "These valves are in containment and not accessible during reactor operation. Testing requires manual valve isolation and nitrogen line venting inside containment." | These valves will be tested at cold shutdown. |
| **Evaluation:** These check valves open to allow pressurization of Nitrogen Accumulators which are used for operation of the PORV's. These check valves close in the event of upstream line break to maintain accumulator pressure.<br><br>These are non-ASME Code Class valves and no evaluation is required. | | | | |

## 5.0 IST PROGRAM RECOMMENDED ACTION ITEMS

Inconsistencies, omissions, and required licensee actions identified during the review of the licensee's third interval Inservice Testing Program are summarized below. The licensee should resolve these items in accordance with the evaluations presented in this report.

5.1 There are a number of containment isolation valves included in the IST Program that are identified as not ASME Code Class. The licensee should review the Code classifications of these valves, as portions of the primary containment are generally considered Code Class 2. (Ref. ANSI/ANS 51.1) Refer to Relief Requests numbers 3 & 6, and Justification of Deferrals for HVAC-1 & IA-1.

5.2 The IST Program does not include the safety functions nor the test directions of the valves. Additionally, the justifications do not clearly identify which test direction(s) the licensee is deferring. Some valves have safety functions in both the closed and open positions. The deferrals (e.g., RCS-2, -3, -4, -6, -7, CVCS-6, etc.) were evaluated based on the information supplied in the justification. In general, the basis only discusses the impracticality of full-stroke exercising the check valves open. Without a basis for deferring the verification of valve closure, it is assumed that this exercising will be performed quarterly for valves with safety functions in both directions. As discussed in Draft NUREG-1482, Appendix A, Question Group 24, a demonstration of a full-stroke open before verification of closure capability is not required. If exercising the valve closed is also impractical to perform quarterly, the licensee must revise the deferral. In any case, the IST Program should be revised to clearly indicate the intended test direction(s) for each valve.

5.3 Neither the relief requests, nor the deferrals, nor the IST Program Tables indicate the component coordinates on the P&IDs. It would be desirable to add coordinates to the P&ID column of the IST Program Tables for ease in locating the valves on the drawings.

5.4 Many of the relief requests pertain to non-ASME Code Class components, however the individual relief requests do not state this. The only way to ascertain this information is to note whether the letters "NA", i.e., Not Applicable, are indicated in the Quality Group column in the Valve Table. (The licensee did provide a letter (Ref. 2) identifying which requests did not require evaluation.) In any future revisions to the Program, such relief requests should clearly indicate that the components in question are not ASME Code Class components and that they are being submitted for information only.

5.5 The review performed for this TER did not include verification that all pumps and valves within the scope of 10 CFR 50.55a and Section XI are contained in the IST Program, and did not ensure that all applicable testing requirements have been identified. The scope of the IST Program, however, was reviewed for several selected important systems. The pumps and valves for the Safety Injection, Containment Spray, Residual Heat Removal, Recirculation, and related portions of the Component Cooling Water and Chemical and Volume Control Systems were reviewed against the requirements of Section XI and the regulations. The review results showed compliance with the Code, except for the items identified below. The licensee should review these items and make changes to the IST Program, where appropriate. Additionally, the licensee should verify that there are not similar omissions with the IST Program for other systems.

5.5.1 The Code requires testing of all relief valves installed in systems that perform a required function to achieve or maintain safe shutdown conditions or that mitigate an accident. Several relief valves are not in the IST Program:

* On Flow Diagram 9321-F-2735-101 (at coordinates E2), relief valve 1815 on the Containment Spray Additive Tank.

* On Flow Diagram A235296-22 (at coordinates D1), control valves 839 B, D, F, H are in the Program but associated relief valve 855 and check valves 858 A and B are not in the Program. Also, relief valves 892 A through D on the Accumulator Tanks are not in the Program.

* On Flow Diagram 9321-F-2720-61 (at coordinates H4), relief valve 821 H for the Reactor Vessel Cooling Support Blocks.

5.5.2 On 9321-F-2735 (at coordinates H3), 3/4 inch control valve 1813 on a line leading from the Containment Spray pumps to the Refueling Water Storage Tank is not in the program.

5.5.3 On A235296-22 (at coordinates D2 and H3), normally open MOV 1805 from the Containment Sump to the Recirculation Pumps and check valve 1818 on the Recirculation Pumps recirculation line to the Containment Sump are not in the program.

5.5.4 On A251783-02 (at coordinates D1), locked closed, motor operated valve 883 on the recirculation line from the RHR pumps' discharge to the RHR pumps' suction is not in the program.

5.5.5 On 9321-F-2720-61 (at coordinates F4), 2 inch check valves 829A and 829B are not in the program are upstream of relief valve 1836 which is in the program.

5.6 In Pump Relief Request No. 1 (TER 2.1.1) the licensee proposed to perform a full-flow pump test at refueling outages. OMa-1988, Part 6, ¶4.5 allows the establishment of an additional set of reference values which can be for the full flow test, and, therefore relief is not required.

5.7 For Pump Relief Request No. 2 (TER 2.2.1) it is recommended that the licensee consider the use of a pump curve, that is, the use of variable reference values for flow rate and differential pressure during pump testing, as discussed in Section 5.2 of Draft NUREG-1482. Alternatively, the licensee could utilize a new set of reference values as described in OMa-1988, Part 6, ¶4.5 to test the pumps at a flow rate that, e.g., maintains constant pressurizer level, which may require manual control of normal makeup. (That is the approach Commonwealth Edison uses for its Zion Station centrifugal charging pumps.) In using this approach consideration needs to be given to the allowable variance from reference points as discussed in Draft NUREG-1482, Section 5.3. Should either of these methods or some other acceptable method be decided upon, the acceptance criteria given in Tables 3a and 3b must be met which includes discharge pressure.

Also, the licensee did not discuss in any detail why the vibration acceptance criteria should be increased, nor provide the reference flow rates.

5.8 In Valve Relief Request No. 2 (TER 3.1.1) relief for exercising and stroke timing block valves 535 and 536 quarterly when maintained in the closed position for 90 days or greater was denied. Should a block valve be closed due to associated excessive seat leakage in its series PORV the block valve becomes part of the reactor coolant pressure boundary and then opening that block, valve will likely invoke the technical specification limiting condition for operation for identified leakage and perhaps cause further degradation to the PORV. Should the block valve have been closed because of a stuck open series PORV, opening that block valve may cause a small LOCA. In the modified standard technical specifications (enclosed with GL 90-06) the block valves are exempt from the surveillance requirements to cycle the valves when they have been closed to comply with ACTION requirements. The licensee's alternative testing of exercising and stroke timing the block valves quarterly when maintained in a closed position for durations of 90 days or greater, and exercising and stroke timing these block valves at a cold shutdown frequency when maintained in the open position for durations less than 90 days is not consistent with the STS nor the logic for not testing the block valves during operation when they are closed. Full-stroke exercising and timing quarterly when the block valves are open (and PORVs are not leaking), and exercising and stroke timing at a cold shutdown frequency when the block valves have been closed (to prevent PORV leakage) is consistent with the NRC staff position.

However, it is possible that the licensee considered that the requirements of the Low-Temperature Over-Pressurization Protection System took precedence in determining the block valve alternate testing. It is the staff's position that the reactor coolant pressure boundary integrity takes priority over the capability of the PORV to mitigate an overpressure event.

5.9 In Valve Relief Requests No. 5, No. 26, No. 27, No. 28, and No. 29, (TERs 3.2.1, 3.6.1, 3.7.1, 3.8.1, and 3.9.1) all relating to air-operated control valves in which the licensee requested relief from measuring stroke time, interim relief was recommended for a period of one year or until the next refueling outage, whichever is longer. It is not acceptable for the long term to not have an objective means to monitor valve condition and detect degradation. Stroke time measurements are required for monitoring changes which could be indicative of degrading conditions in a power operated valve. Although the proposed alternative provides a level of assurance of the operational readiness of these valves for an interim period, long term relief cannot be recommended because the alternative has no means of monitoring for degrading conditions in the operation of the valves. In the interim period, the licensee should develop a means to obtain meaningful stroke times or to otherwise monitor for degrading conditions of these valves. Draft NUREG-1482, Section 4.2.9, recommends that the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify stroke times of the valves.

5.10 In Valve Relief Requests Nos. 11 through 22 and 24, the proposed alternative testing is check valve disassembly and inspection as per Generic Letter 89-04, Position 2. Request Nos. 11 through 18 and No. 24 involve ASME Code Class valves. No information is provided in the IST Program and in the relief requests to ensure that the licensee is properly adhering to the conditions detailed in Position 2 regarding the size of the sample and the types of valves to be included in the sample. The licensee should ensure that the sample size complies with the criteria in GL 89-04. Also, the NRC staff position is that licensees should discuss the impracticality of using nonintrusive testing techniques as a preferred alternative to disassembly and inspection.

5.11 In Valve Relief Request No. 13, for the Safety Injection System Internal Recirculation Pump Outlet check valves, 886A and 886B, it appears that the valves have a safety function to close to prevent reverse flow of one pump if only the opposite pump is started. The licensee should revise the relief request to discuss both the open and closed positions of the valves.

5.12 In Valve Relief Request No. 18, for the AFW City Water Supply check valves to the AFW pumps' suction lines, CT-25, CT-28, and CT-31, it appears that the valves have a safety function to close to prevent diversion of flow through, when normal AFW supply flow is provided from the Condensate Storage Tank. The licensee should revise the relief request to discuss both the open and closed positions of the valves.

5.13 In Valve Relief Request No. 24, for Nuclear Service Water Check Valves to Radiation Monitors SWN-963, 964, 965, 966, 981, 982, 983, 954, and 945, the valves are normally open and have a safety function both to open and to close. The licensee's alternative testing is to perform disassembly and inspection per Generic Letter 89-04, Position 2. The licensee's stated basis is simply: "There are no positive means to verify that the disk moves promptly away from the seat when flow through the valve is initiated." It appears that the disassembly and inspection applies only to the open position. The licensee should revise the relief request to discuss both the open and closed positions of the valves.

5.14 Deferrals RCS-5 and RCS-6 dealing with the isolation and check valves in the normal and alternate charging lines was previously discussed in section 4.0 of this TER. The reason given for deferral relates to "fatigue which may result in exceeding the fatigue usage factor design limits". No explanation is given for the type of fatigue; whether this fatigue applies specifically to these valves or to the piping or both. Con Edison received relief for these valves in the November 20, 1991 SER (Ref. 14) but this is not referenced in the deferral justification. These deferrals have been accepted but should be revised in future submittals.

5.15 In deferral SIS-1 the Valve Table shows MOV 856F as normally open. It should be locked closed. The P&ID shows both SIS hot leg isolation valves, MOVs 856B & 856F as normally open. It appears that both the Valve Table and the P&ID need to be corrected. In deferral SIS-2 the Valve Table shows MOVs 856A, 856C, 856D, and 856E as normally open but should show them as locked open and the P&ID should indicate they are locked open. In deferral RHR-5 the P&ID shows MOVs 746 and 747 as normally open but they should be normally closed.

5.16 For both of the containment spray deferrals, CSS-1 and CSS-2, the licensee did not discuss the impracticality of full-stroke exercising these valves open during cold shutdowns.

5.17 For deferrals HR-1 and HR-2 it is not clear why testing frequencies are different. In HR-1 the hydrogen recombiner gas supply check valves are being full-stroke exercised at cold shutdowns, while in HR-2, the Oxygen, Hydrogen, and Nitrogen supply check valves are being exercised during refueling outages. Also, in HR-2, a refueling outage frequency is called for in the justification but the proposed alternate test is during cold shutdowns. The licensee needs to clarify the test frequency.

5.18 For deferral RHR-6, the licensee's justification for deferred testing was missing. The licensee should revise and resubmit this deferral to include the justification for deferred testing.

## 6.0 REFERENCES


1. Third Ten-Year Inservice Testing (IST) Program; Revision 0, Indian Point Unit 2, S.B. Bram, Consolidated Edison Co. of New York, Inc., to USNRC, December 30, 1993.

2. Con Edison Letter to U.S. NRC from S.B. Bram "Third Ten-Year IST Program; Clarification of Scope of NRC Evaluation," March 9, 1994.

3. ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection, 1989 Edition.

4. ASME/ANSI OMa-1988, Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants".

5. ASME/ANSI OMa-1988, Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants".

6. Title 10, Code of Federal Regulations, Section 50.55a, Codes and Standards.

7. Standard Review Plan, NUREG-0800, Section 3.9.6, Inservice Testing of Pumps and Valves, Rev. 2, July 1992.

8. NRC Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs", April 3, 1989.

9. Minutes of the Public Meetings on Generic Letter 89-04, October 25, 1989.

10. Supplement to the Minutes of the Public Meetings on Generic Letter 89-04, September 26, 1991.

11. Draft NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants", P. Campbell, November 1993.

12. NRC Safety Evaluation, Indian Point Unit 2, IST Program Plan, November 20, 1987.

13. Generic Letter 90-06, "Resolution of Generic Issue 70, Power-Operated Relief and Block Valve Reliability, and Generic Issue 94, Additional Low-Temperature Overpressure Protection for Light-Water Reactors", June 25, 1990.

14. NRC Safety Evaluation, Indian Point 2, IST Program Plan, November 20, 1991.

15. Final Safety Analysis Report (FSAR) for Indian Point Unit No. 2, Supplement 15, Dec. 31, 1987

16. NRC SER for Remote Reactor Head Vent, Varga (NRC) to O'Toole (Con Edison), September 9, 1983.

17. Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Non-Conforming Conditions on Operability"' November 7, 1991.

18. Technical Evaluation Report, Zion Generating Station IST Program, March 16, 1994.

19. Technical Specifications, Indian Point Unit 2.

## Appendix A Indian Point Nuclear Power Plant
## Unit 2 - List of Reference Drawings

| Flow Diagram Dwg. No.-Rev. No. | Flow Diagram Title |
|---|---|
| A208168-29 | Chemical & Volume Control System |
| A208368-20 | Screen Wash System & Bearing Cooling for Circ. & S.W. Pumps |
| A208479-11 | Containment Bldg. Post Accident Containment Air Sampling System |
| A208879-10 | Post Accident Containment Venting System |
| A209762-32 | Service Water System-Nuclear Steam Supply Plant Sh. 2 of 2 |
| A227780-27 | Main Steam |
| A227781-44 | Auxiliary Coolant System |
| C235117-02 | Radiation Monitors R-46, R-49 and R-53 |
| B235122-02 | Radiation Monitors R-39, R-40, R-47 and R-48 |
| A235296-22 | Safety Injection System |
| A235306-05 | Nitrogen to Nuclear Equipment |
| A251783-02 | Auxiliary Coolant System Residual Heat Removal Pumps |
| 9321-F-2017-61 | Main Steam |
| 9321-F-2018-94 | Condensate & Boiler Feed Pump Suction |
| 9321-F-2019-77 | Boiler Feedwater |
| 9321-F-2025-39 | Condenser Air Removal and Waterbox Priming |
| 9321-F-2027-35 | Auxiliary Steam Supply and Condensate Return System |
| 9321-H-2029-35 | Starting Air to Diesel Generators |
| 9321-F-2030-31 | Fuel Oil to Diesel Generators |
| 9321-F-2035-30 | Station Air |
| 9321-F-2036-55 | Instrument Air Control Bldg. Conventional Plant, Etc. |
| 9321-F-2719-87 | Waste Disposal System |
| 9321-F-2720-61 | Auxiliary Coolant System |
| 9321-F-2722-75 | Service Water System Nuclear Steam Supply Plant Sheet 1 of 2 |
| 9321-F-2723-46 | Nitrogen to Nuclear Equipment |

## Appendix A Indian Point Nuclear Power Plant
## Unit 2 - List of Reference Drawings (Cont'd)

| Flow Diagram Dwg. No.-Rev. No. | Flow Diagram Title |
|---|---|
| 9321-F-2726-49 | Penetration and Liner Weld Joint Channel Pressurization System |
| 9321-F-2727-30 | Hydrogen Recombiner System |
| 9321-F-2729-48 | Steam Generator Blowdown & Blowdown Sample System |
| 9321-F-2735-101 | Safety Injection System |
| 9321-F-2736-70 | Chemical & Volume Control System |
| 9321-F-2738-72 | Reactor Coolant System |
| 9321-F-2745-39 | Sampling System |
| 9321-F-2746-30 | Isolation Valve Seal Water System |
| 9321-F-4022-36 | Ventilation System-Containment, Primary Auxiliary Bldg. Fuel Stg. Bldg. |
| 9321-F-7045-16 | Radiation Monitoring Installation Details Instrumentation |
| FSAR Figure 5.2-27 | Containment Isolation System Penetration Schematics |