UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM RELIEF REQUESTS

GEORGIA POWER COMPANY

EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-321 AND 50-366

1.0 INTRODUCTION

The Code of Federal Regulations (10 CFR) 50.55a, requires that inservice testing (IST) of certain 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 relief has been requested and granted or proposed alternatives have been authorized by the Commission pursuant to 10 CFR 50.55a (f)(6)(i), (a)(3)(i), or (a)(3)(ii). In order to obtain authorization or relief, the licensee must demonstrate that: (1) conformance is impractical for its facility; (2) the proposed alternative provides an acceptable level of quality and safety; or (3) compliance would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Section 50.55a(f)(4)(iv) provides that inservice tests of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed, and subject to Commission approval. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provided alternatives to the Code requirements determined to be acceptable to the staff and authorized the use of the alternatives in Positions 1, 2, 6, 7, 9, and 10 provided the licensee follow the guidance delineated in the applicable position. When an alternative is proposed which is in accordance with GL 89-04 guidance and is documented in the IST program, no further evaluation is required; however, implementation of the alternative is subject to NRC inspection.

Section 50.55a authorizes the Commission to grant relief from ASME Code requirements or to approve proposed alternatives upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested or authorizing the proposed alternative as part of the licensee's IST program are contained in this Safety Evaluation (SE).

In rulemaking to 10 CFR 50.55a effective September 8, 1992 (see 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of pumps and valves shall meet the requirements set forth in ASME Operations and Maintenance Standards Part 6 (OM-6), "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10 (OM-10), "Inservice Testing of Valves in Light-Water Reactor Power Plants." Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval. Because the alternatives meet later editions of the Code, relief is not required for those inservice tests that are conducted in accordance with OM-6 and OM-10, or portions thereof, provided all related requirements are met. Whether all related requirements are met is subject to NRC inspection.

The staff transmitted a Safety Evaluation (SE) to the licensee dated December 10, 1991, which contained a Technical Evaluation Report addressing the licensee's second ten-year inservice testing (IST) program. Appendix A of this SE identified 29 anomalies in which the licensee was requested to address. A preliminary anomaly response was submitted by the licensee in a letter dated April 16, 1992.

The December 10, 1991, SE, requested that the licensee investigate the categorization of the torus suction valves in lines leading to the residual heat removal, containment spray, high pressure coolant injection, and reactor core isolation cooling systems. The staff stated that these valves should be Category A valves and leak rate tested in accordance with the requirements of ASME Section XI, Paragraph IWV-3420. The licensee responded to this request with a letter dated March 10, 1992. The licensee stated that the categorization of the torus suction valves was reviewed and concluded the valves were appropriately designated as Category B valves and provided justification for their position. This issue was closed in a letter from the NRC dated September 7, 1993.

The April 16, 1992, letter, divided the anomalies identified in the December 10, 1991, SE, into three separate tables. The licensee defined anomalies in which they were in agreement with the position of the December 10, 1991, SE, as Table 1 anomalies and committed to implement the necessary program, plan, and procedural changes to their IST program by September 16, 1992. The licensee stated that additional justification and revised relief requests would be submitted by June 1, 1992, to address anomalies listed in Table 2 of the April 16, 1991, letter. Finally, the licensee stated that the anomalies listed in Table 3 required further investigation and responses to these anomalies would be submitted by November 17, 1992.

The licensee submitted a response to the anomalies identified in Tables 1 and 2 in a letter dated June 5, 1992. Their positions to each anomaly and revised relief requests were included in this submittal. The staff sent an SE to the licensee dated April 5, 1993, which evaluated the licensee's responses. Several relief requests in the April 5, 1993, SE, were either denied or partially denied. The licensee submitted additional justification and revised relief requests in letters dated July 2, 1993, and April 4, 1994, addressing the concerns raised by the staff in the April 5, 1993, SE.

The licensee submitted its anomaly responses and revised relief requests related to the Table 3 anomalies in a letter dated November 17, 1992. This SE evaluates the Table 3 responses and revised relief requests and also evaluates the Table 2 revised relief requests from the licensee's submittals dated July 2, 1993, and April 4, 1994.

The Hatch IST Program is in its second ten-year interval which started on January 1, 1986, and extends to December 31, 1995. Their IST program was developed in accordance with the requirements of the 1980 Edition of ASME Section XI through the Winter 1981 Addenda.

2.0 EVALUATION OF RELIEF REQUESTS RELATED TO TABLE 3 ANOMALIES

2.0.1 Summary of NRC Action on Licensee's Table 3 Anomalies

Anomaly Number or Reference	Relief Request	SE Section	NRC Action
7	none	none	The licensee stated that justification to use Appendix J testing for valves that have a dual CIV/PIV function has been documented in their IST program. This documentation may be examined in a future NRC inspection or ten-year program review.
10	RR-V-39	2.10	Relief granted (f)(6)(i) with provisions.
11	RR-V-32 RR-V-40	2.1	Interim relief granted to the end of the current IST ten-year interval. (f)(6)(i)
13	RR-V-14	2.2	Approved (f)(iv)(4)
13	RR-V-17	2.3	Approved (f)(iv)(4)
14	RR-V-22	2.4	Approved (f)(iv)(4)
15	RR-V-13 RR-V-16	2.5	Approved (f)(iv)(4)
20	none	4.0	Since credit is taken for RCIC in TS when HPCI is declared inoperable, the RCIC system pump and applicable valves should be included in the licensee's IST program.

Anomaly Number or Reference	Relief Request	SE Section	NRC Action
22	RR-V-20	2.6	Relief granted (f)(6)(i) with provisions
23	RR-V-19	2.7	Alternative authorized (a)(3)(ii)
24	RR-V-41	2.8	Relief granted (f)(6)(i)
26	RR-V-31	none	Relief request withdrawn. No further NRC action required.
Section 3.2.3.1 of 12/10/91 SE/TER	RR-V-29	2.9	Relief granted (f)(6)(i) with provisions.

2.1 RELIEF REQUESTS RR-V-32 AND RR-V-40

The licensee has requested relief from the stroke time test requirements of ASME Section XI, Paragraphs IWV-3413 and IWV-3417(b), for the transverse incore probe (TIP) nitrogen purge supply valves 2C51-F3012 and 1C51-F3012. The licensee has proposed to exercise this valve quarterly without measuring stroke time and verify closure of the valve each refueling outage by performing a local leak rate test.

2.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> The safety position of this valve is CLOSED to provide containment isolation which is initiated by a LOCA signal and results in isolation of TIP purge and the TIP probes. Neither the Technical Specifications or the FSAR have specific requirements for isolation stroke time for this valve.
>
> This is a normally open, normally energized solenoid operated valve which strokes in milliseconds. The valve was not provided with remote indicating lights and its design does not provide for observation of actual stem movement (stem is fully enclosed).
>
> A simple check valve is located upstream of this solenoid valve which provides outboard containment isolation of the penetration. Nitrogen purge is at a steady flow and pressure which does not impose any harsh operating conditions on this check valve. Therefore, this upstream check valve provides additional assurance for isolation of the associated penetration.

The purge line is small (3/8") and the FSAR evaluation indicates that even in the event of a TIP dry tube failure and non-isolation of the purge line, the radioactive release would remain within the allowable limits.

Since this valve strokes in milliseconds, it is classified as a rapid acting valve per GL 89-04, Position 6. Therefore, if indicating lights or valve stem movement were observable, comparison time testing of valves with stroke times of less than or equal to 2 seconds is not required.

Industry history indicates that solenoid valves either operate properly or not at all. It has not been established that stroke time testing of solenoid valves provides data applicable for evaluation of degradation. The application of some type of electronic monitoring would be on a trial and error basis since no such equipment has been proven to provide useful test data to date. Considering the safety function of the valve (containment isolation only) and the redundancy of this function provided by a single check valve, testing to monitor degradation will not provide a significant increase in assurance that the valve is capable of performing its intended function.

2.1.2 Alternate Testing

The licensee proposes:

This valve will be exercised closed quarterly, and observation that nitrogen flow in the associated tubing has stopped will be utilized as confirmation that the valve is in the safety related closed position.

This valve is local leak rate tested (LLRT) at each refueling outage in accordance with 10 CFR 50, Appendix J. LLRT provides assurance that the valve is in the closed position and thus is capable of providing its safety function of containment isolation.

2.1.3 Evaluation

The Code requires that power operated valves which are either Category A or B be stroke time tested every three months. In addition, the Code requires corrective action to be taken for valves that exceed their limiting stroke-time value. The licensee has proposed to exercise these valves quarterly without recording stroke time. These valves are solenoid operated valves (SOVs) which neither have position indication instrumentation installed to measure stroke times nor have a visible valve stem to verify valve movement. Therefore, it is impractical for the licensee to test these valves in accordance with the Code requirements. It would be a burden to require the licensee to modify these valves to measure stroke times.

The licensee has proposed to exercise these valves closed quarterly. The valves would be verified closed by the cessation of nitrogen flow in the system. Exercising the nitrogen purge supply SOVs in accordance with the licensee's alternate testing would insure that the valves are not bound and are capable of moving to their closed safety position. The licensee should not mechanically aid the SOV during testing and should investigate any SOV that does not stroke on the first test attempt even though the valve is stoked successfully on subsequent attempts. Further discussion on SOV testing and maintenance can be found in NUREG-1275, Volume 6, "Operating Experience Feedback Report - Solenoid Operated Valve Problems."

The licensee's proposed alternate testing is not designed to detect degradation of the TIP nitrogen purge supply SOVs. The LLRT will not provide any additional information to aid in the determination of SOV degradation other than verifying that the valve disc and seating surface have not been damaged. However, the licensee stated in their basis that some type of electronic monitoring of the SOVs would be applied, but implied that this method is experimental and would not be used to determine valve degradation. A paper in NUREG/CP-0123, "Proceedings of the Second NRC/ASME Symposium on Pump and Valve Testing" entitled *Inservice Diagnostics for Solenoid Operated Valves* describes a number of SOV monitoring methods. Two methods described using the coil impedance can be employed without installation of additional sensors or signal cables. Relief has been granted to other licensee's to use non-intrusive methods to determine SOV degradation. This testing is usually conducted on a refueling outage frequency because of the burden to set up equipment quarterly and during cold shutdowns.

The licensee has not demonstrated that the proposed alternate testing would determine valve degradation. Therefore, long term relief cannot be granted. The licensee should investigate methods to provide assurance that the SOVs are not degraded. These methods may include non-intrusive testing, SOV refurbishment, or replacement of SOVs. The proposed alternative provides reasonable assurance of operational readiness during the interim period because the valves are exercised quarterly, demonstrating that the valves are not bound. Also, monitoring the nitrogen flow in the associated tubing indicates that the valves have closed.

Because the technology to test SOVs using non-intrusive methods is still developing and the O&M committee is considering guidance for testing of SOVs, the licensee should be given an extended interim period to develop a testing program. Since the Hatch third ten-year IST program interval starts on January 1, 1996, this issue should be addressed by the licensee in its third ten-year IST Program submittal.

2.1.4 Conclusion

Interim relief is granted from the Code test method requirements for the TIP nitrogen purge supply valves pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing SOV testing in accordance with the Code requirements, and in consideration of the burden on the licensee if the Code requirements were imposed on the facility. The interim period is from the date of this SE until the end of the Hatch IST Program second ten-year interval (December 31, 1995). During the interim period the licensee should develop a method to determine SOV degradation or include the valves in an enhanced maintenance program.

2.2 RELIEF REQUEST RR-V-14

The licensee has requested relief from the test frequency requirements of ASME Section XI, Paragraph IWV-3521, for the Unit 1 residual heat removal (RHR) low pressure coolant injection (LPCI) injection check valves 1E11-F050A and 1E11-F050B. The licensee has proposed to partial flow test one check valve every cold shutdown and both valves during refueling outages as a function of shutdown cooling operations. In addition, the licensee has proposed to mechanically exercise each valve every refueling outage.

2.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> The plant and system configuration does not provide for full or partial flow exercising during normal operation. LPCI injection during normal operation is impossible because reactor pressure is significantly greater than LPCI injection pressure. Therefore full or partial exercising with flow is impossible quarterly.
>
> During operation in the cold shutdown mode, it has been determined that the subject valve for the loop in operation is only partially stroke to the open position. To fully open the valve in this mode would require the use of two RHR pumps in combination; however, net positive suction head [NPSH] requirements would not be met in this alignment.
>
> The only way to full flow exercise these valves would be to align the RHR pump suction to the suppression pool and inject to the RPV [reactor pressure vessel] at cold shutdown or refueling outage. This would result in a significant degradation of reactor coolant quality which would require and extensive amount of time to restore the Technical Specification required coolant quality. Therefore full flow exercising at cold shutdown or refueling is impractical.
>
> It is normal plant practice to utilize only one loop if RHR in shutdown cooling for any unscheduled shutdown due to the efforts involved in system alignment, flushing, pipe warm-up and swapping of loops. Requiring both loops of RHR shutdown cooling to be placed in operation during an unplanned shutdown for the sole purpose of exercising each check valve places undue hardship on operation's personnel involved with other shutdown activities and could extend shutdown duration. Therefore partial exercising each valve with RHR shutdown cooling flow during each cold shutdown is impractical.
>
> These valves are located inside the primary containment and are therefore inaccessible during normal operation or at cold shutdown unless the containment is de-inerted. The containment is never de-inerted during an unplanned shutdown unless containment entry

is absolutely necessary. Therefore mechanical exercising quarterly or at cold shutdown is impractical.

2.2.2 Alternate Testing

The licensee proposes:

The loop of RHR utilized for shutdown cooling will be alternated each shutdown. Therefore one of these valves will be partial exercised each cold shutdown and valves will be alternated for each shutdown.

During each refueling outage, both loops of RHR shutdown cooling are utilized in support of normal shutdown and fuel handling activities. Therefore each check valve will be partially exercised at each refueling outage.

Additionally, each valve will be mechanically exercised in accordance with IWV-3522(b) at each refueling outage. Partial exercising with flow at the described frequency along with mechanical exercising and leak rate testing during each refueling outage provides sufficient confirmation of valve operability.

2.2.3 Evaluation

The Code requires that the Unit 1 LPCI injection check valves be exercised to their safety position once every three months. These valves have a safety function in the open direction in the LPCI mode of RHR to allow flow into the RPV in the event of an accident. These valves cannot be exercised during power operation because reactor pressure is greater than LPCI injection pressure. Currently during cold shutdowns, one of the two check valves is partial-stroke exercised as a result of RHR operation in the shutdown cooling mode. Full-stroke exercising both check valves during shutdown cooling operations would require operation of two RHR pumps which is impractical due to NPSH limits of the pumps during shutdown cooling operations. Using the suppression pool as a source of water to full-stroke the valves during cold shutdowns would inject poor quality water into the reactor vessel and require the licensee to return the quality of the reactor coolant to a quality level specified in the Technical Specifications.

In rulemaking to 10 CFR 50.55a effective September 8, 1992 (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval, and therefore, relief is not required for those inservice tests that are conducted in accordance with OM-10 or portions thereof. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, it may be limited to full-stroke during refueling outages. Paragraph 4.3.2.4(b) provides check valve exercise requirements when a mechanical exerciser is used. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan. The licensee's proposed alternative is in accordance with paragraphs 4.3.2.4(b) and 4.3.2.2(e) of OM-10. The submission of this relief request meets the documentation requirements of paragraph 6.2(d).

2.2.4 Conclusion

Full-stroke exercise of the Unit 1 RHR LPCI check valves at a refueling outage frequency is approved pursuant to 10 CFR 50.55a(f)(4)(iv) provided that all the related requirements of OM-10 are met which include paragraphs 4.3.2.2(e), 4.3.2.4(b), and 6.2(d). Implementation of related requirements is subject to NRC inspection.

2.3 RELIEF REQUEST RR-V-17

The licensee has requested relief from the test frequency requirements of ASME Section XI, Paragraph IWV-3521, for the Unit 2 residual heat removal system (RHR) low pressure coolant injection (LPCI) injection check valves 2E11-F050A and B. The licensee has proposed to partial flow test at least one of the two check valves every cold shutdown. In addition, the licensee has proposed to either verify each valve full-stroke opens by means of local position indication or full-stroke exercise the valves by some other means on a refueling outage frequency.

2.3.1 Licensee's Basis for Requesting Relief

The licensee states:

> The plant and RHR system configuration does not provide for full or partial flow exercising during normal operation. LPCI injection during normal operation is impossible because reactor pressure is significantly greater than LPCI injection pressure. Therefore, full or partial exercising with flow is impossible quarterly.
>
> During the shutdown cooling mode of RHR operation, the normal flow rate is between 7700 and 8200 gpm. At 7700 gpm the flow velocity is approximately 14 fps [feet per second]. Valve vendor information indicates that a flow velocity of ≥10 fps is sufficient to fully open the valve disk if the valve is in good operating condition. Therefore, normal shutdown cooling flow rates are sufficient to fully open the disk of a valve in good operating condition.
>
> Valve design incorporates a two piece (outside hollow cylinder and inside solid cylinder) hinge pin because the valve was initially provided with an operator which was used to minimally exercise the valve disk. The operator is no longer utilized for disk exercising, but the two piece hinge pin allows for external visual determination of the disk position by observing the inside hinge pin position.

It is normal plant practice to utilize only one loop of RHR shutdown cooling for any unscheduled shutdown due to the extra efforts involved in system alignment, flushing, pipe warm-up and swapping of loops. Requiring both loops of RHR shutdown cooling to be placed in operation during an unplanned shutdown for the sole purpose of exercising each check valve, places undue hardship on operations personnel involved with other shutdown activities and could extend shutdown duration. Therefore, full flow exercising each valve at each shutdown is impractical.

2.3.2 Alternate Testing

The licensee proposes:

At least one of these check valves receives shutdown cooling flow (7700 - 8200 gpm), therefore is at least partially exercised, each cold shutdown. The loop of RHR shutdown cooling placed into service will be alternated for each unplanned shutdown. Therefore, a different valve will be fully exercised each time shut down cooling is utilized.

During each refueling outage, both loops of RHR shutdown cooling are utilized in support of normal shutdown and fuel handling activities. Therefore, each check valve will be full stroke exercised at each refueling outage.

In conjunction with the RHR shutdown cooling operation each refueling outage, external visual observation of rotation of the inside hinge pin will be utilized to confirm that the valve disk is fully open. Scribe marks, angular measurements, or some other positive means will be used to ensure that the flow actually moves the valve disk to the full open position. If visual observation does not confirm that the flow has fully exercised the valve disk, then appropriate additional actions will be taken (e.g. mechanically exercising the valve per IWV-3522(b), disassemble, exercise and visually inspect, etc.).

2.3.3 Evaluation

The Code requires that the Unit 2 LPCI injection check valves be exercised to their safety position once every three months to monitor for degradation. These valves have a safety function in the open direction in the LPCI mode of RHR to allow flow into the reactor vessel in the event of an accident. These valves cannot be exercised during power operation because reactor pressure is greater than LPCI injection pressure. Currently during cold shutdowns, one of the two check valves is partial-stroke exercised as a result of RHR operation in the shutdown cooling mode. Although the licensee states that the valve in the LPCI loop involved in shutdown cooling operations will be fully open due to the shutdown cooling flow which is less than design basis flow, credit can be taken for this operation as a full-stroke exercise if the licensee is able to verify that the disk strokes to the backstop. Verification can be performed using nonintrusive techniques or by observing the inside hinge pin. Verification is not required for each test, only initially and then on a periodic basis, such as once every six years, or following maintenance or modification that could impact the valve stroke.

In rulemaking to 10 CFR 50.55a effective September 8, 1992 (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval, and therefore, relief is not required for those inservice tests that are conducted in accordance with OM-10 or portions thereof. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, it may be limited to full-stroke during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan. The licensee's proposed alternative is in accordance with paragraphs 4.3.2.2(e) of OM-10. The submission of this relief request meets the documentation requirements of paragraph 6.2(d).

2.3.4 Conclusion

Full-stroke exercise of the Unit 2 RHR LPCI check valves at a refueling outage frequency is approved pursuant to 10 CFR 50.55a(f)(4)(iv) provided that all the related requirements of OM-10 are meet which include paragraphs 4.3.2.2(e) and 6.2(d). Implementation of related requirements is subject to NRC inspection.

2.4 RELIEF REQUEST RR-V-22

The licensee has requested relief from the exercise procedure requirements of ASME Section XI, Paragraph IWV-3412, for the residual heat removal service water (RHRSW) pressure regulator valves 1E11-F068A and B and 2E11-F068A and B. The licensee has proposed to partial exercise these valves quarterly during RHRSW pump testing and stroke time these valves open and closed every refueling outage.

2.4.1 Licensee's Basis for Requesting Relief

The licensee states:

> These valves operate as pressure control valves modulating to ensure that RHRSW pressure is always maintained greater than RHR pressure across the RHR heat exchanges. Valves are required to close in the unlikely event that accident conditions require injecting RHRSW into the reactor vessel via the RHRSW/RHR inner tie. Valve logic and operating controls prevent the valves from being fully exercised independent of valve controller response time without defeating the logic circuity. The valves cannot be opened unless the associated RHRSW pump is running. However, if the valve is fully opened with the pump operating, the pump would then run out and cause potential damage to the pump.
>
> RHRSW is required during plant shutdown for cooldown of the reactor coolant system. Attempting to defeat valve operating logic to perform an exercise test at cold shutdown could extend

the shutdown. Performing such testing at cold shutdown imposes undue requirements on operations personnel involved with other shutdown activities.

2.4.2 Alternate Testing

The licensee proposes:

Quarterly RHRSW pump testing demonstrates that the valve is operating properly to control RHRSW pressure and also ensures that the valve is capable of closure. Thus partial exercising of the valve occurs quarterly.

Each refueling outage the valve operating logic will be defeated and the valve will be exercised and stroke timed in both the open and closed directions. Comparison time testing per IWV-3417(a) will be applied to detect valve degradation.

2.4.3 Evaluation

The Code requires that these valves be exercised to their safety position once every three months to monitor for degradation. These valves are pressure regulator valves which have a safety function to close during an accident in the event that RHRSW is injected into the reactor vessel via the RHRSW/RHR inner tie line. These valves cannot be stroke timed during power operation because the valves can only be exercised closed by defeating the control logic which will interfere with the operation of the associated RHRSW pump. Testing these valves during cold shutdowns is impractical because the RHRSW system is used for cooldown of the reactor coolant system during cold shutdowns and testing may extend the cold shutdown outage.

The licensee has proposed to conduct stroke-time testing of these valves every refueling outage by defeating the valve control logic and measuring individual valve stroke time in accordance with the Code requirements. In addition, these valves are required to perform their intended function during the quarterly RHRSW pump test which results in a partial-stroke exercise of the valves.

In rulemaking to 10 CFR 50.55a effective September 8, 1992 (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval, and therefore, relief is not required for those inservice tests that are conducted in accordance with OM-10 or portions thereof. Paragraph 4.2.1.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, it may be limited to full-stroke during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of valve stroke testing be documented in the inservice test plan. The licensee's proposed alternative is in accordance with paragraphs 4.2.1.2(e) of OM-10. The submission of this relief request meets the documentation requirements of paragraph 6.2(d).

2.4.4 Conclusion

Stroke-time testing the RHRSW pressure regulator valves at a refueling outage frequency is approved pursuant to 10 CFR 50.55a(f)(4)(iv) provided that all the related requirements of OM-10 are meet which include paragraphs 4.2.1.2(e) and 6.2(d). Implementation of related requirements is subject to NRC inspection.

2.5 RELIEF REQUESTS RR-V-13 AND RR-V-16

The licensee has requested relief from the test frequency requirements of ASME Section XI, Paragraph IWV-3521, for the core spray injection check valves 1E21-F006A and B and 2E21-F006A and B. The licensee has proposed to mechanically exercise the check valves every refueling outage and also perform leak rate testing at a refueling outage frequency.

2.5.1 Licensee's Basis for Requesting Relief

The licensee states:

> The plant and system configuration does not provide for full or partial flow exercising during normal operation. Core spray injection during normal operation is impossible because reactor pressure is significantly greater than core spray injection pressure. Therefore full or partial exercising with flow is impossible quarterly.
>
> The only possible way to flow test these valves is by injecting suppression pool water into the RPV [reactor pressure vessel] or alternately aligning the core spray pump suction to the condensate storage tank (CST) and injection to the RPV. Utilizing either suction source results in significant degradation of the reactor coolant quality due to the poor quality of the suppression pool water or the poor quality of stagnant water in the piping associated with aligning the core spray pumps to the CST. A significant amount of time would be required to restore reactor coolant to the Technical Specification required quality. Therefore, exercising with flow at cold shutdown or refueling is impractical.
>
> These valves are located inside the primary containment and are therefore inaccessible during normal operation or at cold shutdown unless the containment is de-inerted. The containment in not de-inerted during an unplanned shutdown unless containment entry is necessary. Therefore mechanical exercising quarterly or at cold shutdown is impractical.

2.5.2 Alternate Testing

The licensee proposes:

> Each check valve will be mechanically exercise per IWV-3522(b) during each refueling outage. This mechanical exercising in conjunction with leak rate testing each refueling outage will provide sufficient confirmation of valve operability.

2.5.3 Evaluation

The Code requires that these valves be exercised to their safety position once every three months to monitor for degradation. These valves have a safety function to open to allow flow into the reactor vessel from the core spray pumps and to close to isolate the reactor from the lower pressure core spray system. Testing these during power operation is impractical because the reactor pressure is greater than the core spray system pressure. These valves also cannot be flow tested during cold shutdowns or refueling outages because this testing would result in the injection of poor quality water from the suppression pool or stagnant portions of the core spray system into the reactor vessel. This testing would be impractical because injection of poor quality water into the reactor vessel may cause the reactor coolant chemistry to be outside of Technical Specification limits which may delay plant startup from an outage.

The licensee has proposed to exercise these valves during refueling outages by the use of a mechanical exerciser. This testing can be conducted only during refueling outages because the valves are located inside an inerted containment. Local leak rate testing of the valves will verify the closure safety function of the valves.

In rulemaking to 10 CFR 50.55a effective September 8, 1992 (See 57 *Federal Register* 34666), the 1989 edition of ASME Section XI was incorporated in 10 CFR 50.55a(b). The 1989 edition provides that the rules for IST of valves may meet the requirements set forth in OM-10. Pursuant to (f)(4)(iv), portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met, and subject to Commission approval, and therefore, relief is not required for those inservice tests that are conducted in accordance with OM-10 or portions thereof. Paragraph 4.3.2.2(e) of OM-10 states that if valve exercising is not practicable during plant operation or cold shutdowns, it may be limited to full-stroke during refueling outages. In addition, paragraph 6.2(d) of OM-10 requires that the justification for deferral of check valve exercising be documented in the inservice test plan. The licensee's proposed alternative is in accordance with paragraphs 4.3.2.2(e) of OM-10. The submission of this relief request meets the documentation requirements of paragraph 6.2(d).

2.5.4 Conclusion

Full-stroke exercising the core spray injection check valves at a refueling outage frequency is approved pursuant to 10 CFR 50.55a(f)(4)(iv) provided that all the related requirements of OM-10 are meet which include paragraphs

4.3.2.2(e) and 6.2(d). Implementation of related requirements is subject to NRC inspection.

2.6 RELIEF REQUEST RR-V-20

The licensee has requested relief from the exercise procedure requirements of ASME Section XI, Paragraph IWV-3412(b) for the isolation valves listed below which are located in the pump room cooler supply lines (service water system) for the RHR, HPCI and core spray pump rooms. The licensee has proposed to stroke time these valves by observation of valve stem movement every refueling outage. The licensee has also proposed to trend the stroke times of each valve.

1P41-F035A	1P41-F039A	2P41-F037B
1P41-F035B	1P41-F039B	2P41-F037C
1P41-F306A	1P41-F340	2P41-F037D
1P41-F036B	2P41-F035A	2P41-F039A
1P41-F037A	2P41-F035B	2P41-F039B
1P41-F037B	2P41-F036A	2P41-F339A
1P41-F037C	2P41-F036B	2P41-F339B
1P41-F037D	2P41-F037A	

2.6.1 Licensee's Basis for Requesting Relief

The licensee states:

> These valves are normally closed, fail open air operated valves which have a safety function to open and provide cooling water flow to the associated safety related equipment. System design did not provide indicating lights or direct valve control switches. Therefore, "switch-to-light" timing is not possible.
>
> The valves receive an open signal upon initiation of the associated equipment and a close signal upon termination of operation of the associated equipment. Therefore, measurement of valve stroke time can only be performed by observation of the actual valve stem movement when the associated equipment is placed in operation.
>
> These valves have allowable stroke times ranging from 5 seconds for the smallest valves to 30 seconds for the largest valves. IWV-3413(b) requires stroke times to be measured to the nearest second for stroke times of 10 seconds or less and within 10% of the specified limiting stroke time for times greater than 10 seconds. Review of past stroke time data and interviews with operations personnel directly involved with the testing indicate that the requirements of IWV-3413(b) are achievable utilizing a digital stop watch and observing actual valve stem movement from the closed to open position.

2.6.2 Alternate Testing

The licensee proposes:

> Each valve will be stroke timed by observing actual valve stem movement. Stroke time will be considered to be the time from start to stop of valve stem movement. The requirements of IWV-3417(a) will be applied to monitor valve degradation.

2.6.3 Evaluation

Relief Request RR-V-20 was granted for an interim period in NRC's SE dated December 20, 1991, requesting the licensee to investigate non-intrusive methods to measure stroke time and determine valve degradation for the equipment cooling water supply valves. The licensee has added additional information to support performing stroke time testing by observing valve stem movement.

The equipment cooling water supply valves are air-operated valves which have a safety function to open. The Code requires that stroke timing of Category B valves be measured from the initiation of the actuation cycle to the completion of the actuation cycle. The Code requirements are impractical because these valves are not equipped with any type of position indication instrumentation that would facilitate timing the valves in accordance with the Code requirements. Imposition of the Code requirements would be a burden because new valves equipped with position indication or instrumentation would have to be procured and installed.

Typically, valves with position indication are timed by an operator using a stopwatch. The operator times the valve stroke time interval based on position lights in the control room. The licensee has proposed to measure the stroke time of these valves from the time the valve stem starts to move until the stem completes full travel. Switch-to-light timing involves visual observation and therefore has the same potential inaccuracy as the licensee's proposed method. However, switch-to-light timing provides electronic verification of full valve travel. The licensee has not proposed any method to verify that the valve has traveled to its full-stroke position or, as a minimum, to a repeatable position. The licensee should develop a means to verify full-stroke travel of the valve or to mark the stroke position on the valve for repeatability, ensuring that the point is acceptable for the safety function. The proposed alternate testing, with verification of full-stroke travel, provides a reasonable assurance of operational readiness because the actual stroke time of the valve movement is being measured in a repeatable manner.

2.6.4 Conclusion

Relief to stroke time the equipment cooling water supply air-operated valves is granted pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing testing in accordance with the Code requirements, and in consideration of the burden on the licensee if the Code requirements were imposed on the facility. The relief is granted with the provision that the licensee develop some means to verify the full-stroke travel or repeatability for the valve.

2.7 RELIEF REQUEST RR-V-19

The licensee has requested relief from the test frequency requirements of ASME Section XI, Paragraph IWV-3520, for the Unit 2 high pressure coolant injection (HPCI) system room cooler outlet check valves 2P41-F024A and 2P41-F024B. The licensee has proposed to verify that the valves can pass their safety-related flow during the service water performance monitoring program flow test which is performed once per cycle just prior to each refueling outage.

2.7.1 Licensee's Basis for Requesting Relief

The licensee states:

> During quarterly testing of the HPCI pumps, the associated room coolers are placed in operation, thereby exercising these valves. However, system design does not provide for positive verification (flow instrumentation) of the flow rate through each valve. Therefore, confirmation of full flow exercising quarterly or at cold shutdown is impossible.

2.7.2 Alternate Testing

The licensee proposes:

> GPC has implemented a Plant Service Water System Performance Monitoring Program which performs periodic flow measurements at various locations throughout the system to detect potential flow or component degradation. These measurements are performed prior to each scheduled refueling outage in order that any required corrective measures can be implemented during the subsequent outage. Temporary ultrasonic flow measuring instruments are utilized to obtain the required system flow rates and the architect engineer has provided the design basis acceptance criteria for each location included in the program.
>
> The ECCS room coolers are considered important pieces of equipment and thus service water flow to and from each cooler is included in the service water performance monitoring program.
>
> The GPC Service Water Performance Monitoring Program will be utilized prior to each refueling outage to confirm that these check valves are capable of opening sufficiently to perform their safety related function. Trending of the associated flow measurements will provide data which is potentially indicative of check valve degradation.
>
> Partial exercising of each check valve is confirmed during quarterly testing of the associated ECCS room coolers. Temperature indicators are provided in the system piping which

will provide some assurance that the check valves are not stuck in the closed position.

2.7.3 Evaluation

The Code requires that check valves be exercised to the position required to fulfill their safety function every three months to monitor for degradation. The licensee has proposed to exercise the Unit 2 HPCI system room cooler outlet check valves once each cycle just prior to the refueling outage. The licensee stated that there is no installed flow instrumentation to verify flow individually through each valve; therefore, verification of accident flow through the Unit 2 HPCI system room cooler outlet check valves cannot be performed quarterly or during cold shutdowns. It would be a hardship for the licensee to install flow instrumentation when other means of verifying check valve exercising are available.

The licensee has proposed to verify that these valves pass their design flow during the service water performance monitoring program flow testing. This testing is conducted during power operation, just prior to refueling outages, by using an ultrasonic flow meter to measure and verify design flows throughout the service water system. The HPCI pump room coolers are included in this program. The licensee's proposed testing provides a reasonable assurance of operational readiness because the check valves are partial-stroke exercised quarterly during the HPCI pump IST which verifies their safety function. Design basis flow through each check valve is measured and trended on a refueling outage frequency which provides information on valve degradation. Compliance with the Code requirements would result in a hardship without a compensating increase in quality or safety because measuring flows through the check valves quarterly would not provide significantly more information to justify the testing frequency.

2.7.4 Conclusion

The proposed alternative to verify the full-stroke exercise capability of the RHR, HPCI, and CS pump room cooler outlet check valves is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the Code requirements results in a hardship or unusual difficulty without a compensating increase in the level of quality or safety.

2.8 RELIEF REQUEST RR-V-41

The licensee has requested relief from the exercise procedure requirements of ASME Section XI, Paragraph IWV-3522, for the diesel generator service water outlet check valves P41-F552A and P41-F552C. The licensee has proposed to take credit for a partial-stroke of these valves during regularly scheduled diesel generator surveillance testing which occurs monthly, semi-annually, and during refueling outages. In addition, the licensee has proposed to disassemble and inspect one valve each refueling outage.

2.8.1 <u>Licensee's Basis for Requesting Relief</u>

The licensee states:

> These normally open check valves are located in the cooling water discharge lines from diesel generators 1A and 1C. There are no system design provisions to verify forward flow operability by flow rate measurement.
>
> Each diesel generator is operated for a minimum of one hour at 1710 - 2000 kw (approx. 60 percent of continuous rate load) during testing once each month. Partial forward flow operability is verified during this test by monitoring diesel generator oil and jacket cooling water temperature. If sufficient cooling water flow was not provided to the diesel generator, elevated oil and jacket cooling water temperatures would be evident.
>
> Additionally, each diesel generator is operated for a minimum of one hour at 2250 - 2400 kw (Approx. 80 percent of continuous rated load) semi-annually. Partial flow operability is verified during this test by monitoring diesel generator oil and jacket cooling water temperatures.
>
> Additionally, at each refueling outage (at least once per 18 months) each diesel generator is operated for a minimum of 24 hours. During the first two hours of this test, the diesel is loaded to ≥ 3000 kw (approx. 105 percent of continuous rated load) and during the remaining 22 hours of this test, the diesel is loaded to 2775 - 2825 kw (approx. 90 percent of continuous rated load). Diesel generator oil and jacket cooling water temperatures are monitored during this test to ensure that sufficient cooling water is provided.
>
> Acceptable operation of the diesel generators during the monthly and semi-annual tests verifies that the valves are not stuck in the closed position. Acceptable operation of the diesel generators during each refueling outage test verifies that the check valves have opened sufficiently to perform their design function. The diesel generator oil and jacket cooling water temperatures are tended to ensure no significant changes occur from test to test.
>
> The Architect Engineer (AE) performed an evaluation of these valves associated with INPO SOER 86-03 in 1987. This evaluation considered valve type, operating conditions and environment, and past valve maintenance history. The AE recommended periodic disassembly and inspection of the valve internals with at least one of the two valves being inspected every third refueling outage. The AE also recommended that the frequency of inspection be adjusted depending on inspection results.

2.8.2 Alternate Testing

The licensee proposes:

> Existing monthly and semi-annual diesel surveillance testing will be utilized to prove at least partial check valve exercising and the existing refueling outage frequency test confirms that the valves will open sufficiently to perform their design safety function.
>
> In addition, one valve will be disassembled, manually exercised and visually inspected every refueling outage on a rotating frequency. This disassembly frequency should be adequate to detect any valve degradation in sufficient time to take corrective action and prevent the valve from being unable to perform its safety function. Inspection results will be reviewed, and the disassembly frequency will be adjusted if warranted.
>
> The valves are flanged into the system piping and are completely removed when disassembled and inspected. The valve is visually inspected and manually full-stroke exercised prior to being reinstalled in the pipe line. The valve disassembly is performed prior to the 24-hour diesel surveillance test, thus the safety function of the valve is confirmed after reassembly by monitoring diesel generator cooling during testing. This diesel testing confirms at least partial valve exercising after reinstallation in the system.
>
> Existing diesel generator surveillance testing in conjunction with the periodic disassembly and inspection should confirm the capability of the valves to perform their intended safety function and should identify any degradation concerns prior to the valves becoming inoperable.

2.8.3 Evaluation

The Code requires that the diesel generator service water outlet check valves be exercised to the position required to fulfill their safety function once every three months unless such operation is not practical during plant operation. These valves have a safety function to open to allow cooling water flow to the diesel generators. It is impractical to measure flow rate because there is no installed flow instrumentation. It would be a burden for the licensee to install flow instrumentation if other means existed to verify that the check valves performed their safety function.

The licensee has proposed to verify flow through the check valves during monthly and semi-annual diesel generator testing. During the diesel generator testing, oil and jacket cooling water temperatures are monitored to ensure that adequate cooling flow is established. This provides an indication that the check valves are performing their safety function. In addition, the licensee has proposed to disassemble and inspect one of the two valves each refueling outage. Therefore, the proposed alternate testing provides a reasonable assurance of operational readiness which includes the combination of flow testing and disassembly and inspection.

2.8.4 Conclusion

Relief from the Code requirements for the diesel generator cooling water discharge line check valves is granted pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing testing in accordance with the Code requirements, and in consideration of the burden on the licensee if the Code requirements were imposed on the facility.

2.9 RELIEF REQUEST RR-V-29

The licensee has requested relief from the stroke time frequency and method requirements of ASME Section XI, Paragraphs IWV-3411 and IWV-3413, for the main steam safety and relief valves listed below. The licensee has proposed to monitor valve degradation by a combination of exercise testing and maintenance activities.

1B21-F013A	1B21-F013B	1B21-F013C	1B21-F013D	1B21-F013E
1B21-F013F	1B21-F013G	1B21-F013H	1B21-F013J	1B21-F013K
1B21-F013L	2B21-F013A	2B21-F013B	2B21-F013C	2B21-F013D
2B21-F013E	2B21-F013F	2B21-F013G	2B21-F013H	2B21-F013K
2B21-F013L	2B21-F013M			

2.9.1 Licensee's Basis for Requesting Relief

The licensee states:

> Failure of these valves to close while being stroke tested during power operation would cause a loss of the primary reactor coolant. These valves cannot be exercised at pressure below 100 psig and the position of the main stage of this 2 stage relief valve can only be determined by indirect means.

2.9.2 Alternate Testing

The licensee proposes:

> For Unit 1, once during the operating cycle at a reactor pressure greater than 100 psig, each relief valve shall be manually opened until thermocouples downstream of the valve indicate steam flow.
>
> For Unit 2, at least once per 18 months, when the reactor steam dome pressure is greater than 100 psig, these valves shall be manually opened and observed to ensure that either;
>
> 1. The control valve or bypass position responds accordingly, or
>
> 2. There is a corresponding change in measured steam flow.

Additionally for both units, all pilot operating assemblies and at least one valve body are removed and sent to an independent testing laboratory each refueling outage. These components are inspected and tested to determine their operating condition. Each pilot assembly is repaired/adjusted to ensure its operability prior to reinstallation. Therefore, due to the maintenance, testing and adjustments performed each refueling outage, additional testing methods which might detect valve degradation are unwarranted.

2.9.3 Evaluation

Relief from the test frequency requirements of IWV-3411 was granted in the December 10, 1991, SE, for the main steam safety and relief valves. In the evaluation, it was noted that the licensee did not request relief from Code requirements to measure the stroke times of these power-operated valves. The licensee has revised Relief Request RR-V-29 in their submittal dated November 17, 1992, to include a request for relief from the power-operated valve stroke-time testing requirements for the main steam safety and relief valves.

Each main steam safety and relief valve consists of a main stage and a pilot stage. The body of the main stage contains the main steam inlet and discharge ports. The main disc is seated in the discharge port and is attached to the main piston. The pilot stage or "topworks" is a separate component. The bonnet of the pilot stage is flanged to the main stage body over the main piston. The pilot stage functions to vent the area over the main piston when the inlet pressure reaches the setpoint pressure. Venting this volume actuates the piston and unseats the disc, thereby allowing steam to flow through the main stage discharge port. The pilot valves are totally enclosed with no visible moving parts. There are no position indication devices installed on either the pilot or main stage valves.

As discussed in the December 10, 1991, SE, stroke timing the main steam safety and relief valves by normal means is impractical because their typically fast stroke times could yield results with a high degree of uncertainty due to the variations in the response times of the individuals performing the testing. In addition, variations in steam pressure and other system variables which may not be precisely duplicated from test to test could produce variations in valve stroke times that may mask changes in valve condition. It would be a burden for the licensee to install instrumentation to facilitate stroke timing the valves because the results may not accurately reflect the valve condition.

The licensee has proposed to exercise the valves on a reduced frequency. In addition, the licensee has included in their relief request an inspection plan for the main steam safety and relief valves which includes removing all the pilot valves on both units and inspecting and testing them every refueling outage. Finally, the licensee stated that one main stage from each unit's main steam safety and relief valves is removed every refueling outage and inspected and tested. Although the licensee did not specify the types of inspection and testing activities to be performed, these generally include bench setpoint testing of the pilot valve, inspection of the pilot valve internals, and replacement of any worn elastomeric components on the pilot valves. The main stage valves are usually inspected and bench tested in the same manner. Exercise testing of the main steam safety valves should be performed once the valves are reinstalled during startup from the refueling outage. The proposed testing provides reasonable assurance of operational readiness because the inspection and maintenance activities monitor the valves for degradation. Exercising the valves during startup would confirm that they have been properly reinstalled.

Additionally, the licensee may consider the categorization of these valves in light of ongoing actions of the O&M Committee (reference Paragraph 4.3.4 of draft NUREG 1482).

2.9.4 <u>Conclusion</u>

Relief from the Code stroke time measurement requirements for the main steam safety and relief valves is granted pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing testing in accordance with the Code requirements, and in consideration of the burden on the licensee if the Code requirements were imposed on the facility. The relief is granted with the provision that exercising of the main steam safety valves be conducted during the initial startup after refueling outage to ensure that the valves have been properly reassembled. In addition, the licensee should update this relief request to include the inspection and testing activities to be performed on the pilot and main stage valves.

2.10 <u>RELIEF REQUEST RR-V-39</u>

The licensee has requested relief from the stroke time measurement requirements of ASME Section XI, Paragraph IWV-3413, for the scram discharge volume vent and drain valves (2)C11-F010A, -F011B, -F035A, -F035B, -F011, and -F037. The licensee has proposed to measure the response times of these valves as a group in accordance with the TS requirements.

2.10.1 <u>Licensee's Basis for Requesting Relief</u>

The licensee states:

> A limiting value of stroke time cannot be specified for the scram discharge volume vent and drain valves and they cannot be individually stroked and timed. In order to prevent water hammer induced damage to the system during a full CRD [control rod drive] scram, plant TS require that system valve operation is adjusted so that the outboard vent and drain valves (F035A&B, F037) fully close at least five seconds after each respective inboard vent and drain valve (F010A&B) during a full core scram. All valves must be fully closed in less than 45 seconds for Unit 1 and 60 seconds for Unit 2. Also, the system is adjusted so that the inboard vent and drain valves (F010A&B) start to open at least five seconds after each respective outboard vent and drain valve (F035A&B, F037) upon reset of a full core scram. The valves are not equipped with individual valve control and cannot be individually stroke timed. Because of the adjustable nature of the valve

control, individual valve stroke timing would not provide any meaningful information for monitoring valve degradation.

2.10.1.1 Additional Information Provided by Licensee

The licensee states in their anomaly response from November 17, 1992, submittal:

> GPC has investigated the possibility of measuring individual stroke times and concluded this method would represent an unnecessary hardship, given the design of the scram discharge volume vent and drain valves. The subject valves are not equipped with individual valve control switches and are controlled by a single test switch, and the test circuit uses an alternate vent path which directly affects the valves' operating time. Consequently, the opening time during normal operation testing is not representative of the actual opening time. Also, full stroke time testing during normal operation would require disabling the reactor protection system scram signal to the subject valves. The installation of electrical jumpers and opening links in an energized control circuit results in the potential of a reactor scram.

2.10.2 Alternate Testing

The licensee proposes to exercise the valves quarterly and verify that the total valve sequence response time is less than the TS requirement.

2.10.3 Evaluation

The Code requires that the limiting stroke time for power operated valves be specified by the licensee and measured within limits based on the full-stroke time of the valves. The six scram discharge volume vent and drain valves in each of the Hatch units are not designed to be individually actuated. The valves are required by TS to be closed within 45 seconds for Unit 1 and 60 seconds for Unit 2 upon receipt of a scram signal. The valves are currently tested quarterly by cycling the valves to ensure they meet the TS requirements. The testing that is currently performed is essentially a design basis test of the valve combination. Requiring these valves to be stroke timed individually is impractical and a burden on the licensee because of the extensive modifications that would be required to the system to individually stroke the valves. In addition, jumpering the control circuit during plant operation to test these valves individually would be impractical because of the potential for a reactor scram.

The licensee has proposed to use the TS required limiting time for closure for the scram discharge volume vent and drain valves as the limiting stroke time and to verify that all valves as a group fall below this value. This relief request was granted on only an interim basis in the December 10, 1991, SE, because the licensee's alternate method of testing did not provide a means to detect valve degradation. TS Section 3.3.I requires that if the scram discharge vent and drain valves are not operable, then an orderly shutdown shall be initiated and the reactor shall be placed in hot shutdown within 12 hours. TS Section 4.3.I.2.b.1 states that the scram discharge volume vent and drain valves are required to close within 45 seconds after receipt of a signal for the control rods to scram. If this specification is not met, then all the scram discharge volume vent and drain valves should be declared inoperable. The proposed testing, with the provision that all the valves are declared inoperable when their combined stroke time exceeds the maximum time given in TS Section 4.3.I.2.b.1, provides a reasonable assurance of operational readiness because the timing will provide an indication of when one of the valves in the group has degraded above the TS requirements.

2.10.4 Conclusion

Relief is granted pursuant to 10 CFR 50.55a(f)(6)(i) based on the impracticality of performing testing in accordance with the Code requirements, and in consideration of the burden on the licensee if the Code requirements were imposed on the facility. The relief is granted with the provision that all the scram discharge volume vent and drain valves in the tested group are declared inoperable when their combined stroke time exceeds the maximum time given in TS Section 4.3.I.2.b.1.

3.0 EVALUATION OF RELIEF REQUESTS RELATED TO OUTSTANDING TABLE 2 ANOMALIES

3.0.1 Summary of NRC Action on Licensee's Outstanding Table 2 Anomalies

Anomaly Number	Relief Request	SE Section	NRC Action
1	RR-P-6	3.1	Alternative authorized for vertical line shaft pumps (a)(3)(ii) Alternative authorized for standby liquid control pumps (a)(3)(ii)
4	RR-P-7	3.4	Alternative authorized (a)(3)(i)
8	RR-V-4	3.2	Alternative authorized (a)(3)(ii)

3.0.2 Use of OM-6 Code

In Section 2.0.1 of the April 5, 1993, SE, it was noted that the licensee had referenced the OM Code for their pump testing. In the licensee's submittal of April 4, 1994, Relief Requests RR-P-6 and RR-P-7 both contain the reference. As stated previously, the NRC has approved the use of ANSI/ASME OMa-1988, Part 6 (OM-6), "Inservice Testing of Pumps in Light-Water Reactor Power Plants," for performance of inservice testing of pumps. Although the Code referenced by the licensee contains essentially the same requirements as OM-6, the reference is incorrect and results in the licensee's pump program referencing a Code that is not yet approved by the NRC. The licensee should change all references to the OM Code in their IST program to OM-6 to avoid confusion.

3.1 RELIEF REQUEST RR-P-6

The licensee is requesting to conduct inservice testing for the pumps listed below in accordance with ASME OM Code-1990 in lieu of ASME Section XI, Subsection IWP. The licensee is also requesting relief from specific sections of the OM-1990 Code involving vibration testing.

Standby Liquid Control (SBLC)	Core Spray (CS)
Residual Heat Removal Service Water (RHRSW)	Residual Heat Removal (RHR)
High Pressure Coolant Injection (HPCI)	Plant Service Water (PSW)
Reactor Core Isolation Cooling (RCIC)	

3.1.1 Licensee's Basis for Requesting Relief

The licensee States:

> It has been recognized within the industry that the OM Code requirements for pump IST are more suitable that those of ASME IWP.

3.1.2 Alternate Testing

The licensee proposes:

> The testing requirements of the OM Code 1990, Section ISTB will be utilized for pump IST for those pumps required to be tested by ASME Section XI except as identified [below].
>
> Vibration Points
>
> In lieu of the requirements of ISTB 4.6.4, vibration measurements will be taken as outlined below.
>
> a. On centrifugal pumps measurements will be taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions. These measurements shall be taken on each accessible pump bearing housing. Measurements shall also be taken in the axial direction on each accessible pump thrust bearing housing. If no pump bearing housings are accessible due to pump design or physical interference, then the measurements will be taken at the accessible location that gives the best indication of lateral/axial pump vibration. This location is either on the pump casing, the motor bearing casing, or the motor casing.
>
> b. On vertical line shaft pumps, measurements will be taken in three orthogonal directions, one of which is in the axial direction in the area of the upper pump bearing housing

(pump to motor mounting flange). This is the closest accessible location to a pump bearing housing and should provide readings which are at least as representative of pump mechanical condition as those required by the OM Code which are to be taken on the top of the pump motor.

The OM Code required vibration measurements on the upper motor-bearing housing are impractical because of the following reasons.

1. Plant design did not include permanent scaffolding or ladders which provide access to the top of the motors for the subject pumps. (All but standby plant service water pump)

2. Physical layout of the pumps and interference with adjacent components does not allow for the installation of temporary scaffolding or ladders which are adequately safe for routine use. (All but standby plant service water pump)

3. There is a relatively thin cover plate bolted to the top-center of each motor which prevents measurements in line with the motor bearing. Measurement on the edge of the motor housing would be influenced by eccentricity and may not be representative of actual axial vibration.

4. Special tools (extension rod) for placing the vibration transducers are not practical because placement would be sufficiently accurate for trending data.

5. The standby plant service water pump is accessible, but the motor has a cooling fan mounted at the top which is attached to the rotating shaft. The fan is protected by a relatively thin cover plate which prevents access to the motor housing for vibration measurements. Removing the cover does not provide for transducer placement since the rotating fan would still be in the way.

Research within the industry revealed that vibration monitoring of vertical line shaft pumps has been of limited benefit for detecting mechanical degradation due to problems inherent with pump design. The OM Code imposes more stringent hydraulic acceptance criteria on these pumps than for centrifugal or positive displacement pumps. This more stringent hydraulic acceptance criteria would place more emphasis on detection through hydraulic test data than through mechanical test data.

Therefore, application of the OM hydraulic testing criteria along with radial and axial vibration monitoring in the area of the top pump bearing housing should provide adequate data for assessing the condition of the subject pumps and for monitoring degradation.

c. On reciprocating pumps, a measurement will be taken on the bearing housing of the crankshaft, approximately perpendicular to both the crankshaft and the line of the plunger travel (As required by the OM Code).

Vibration Acceptance Criteria

In lieu of the requirements of TABLE ISTB 5.2-2a, ranges for vibration acceptance criteria for smooth running pumps will be as outlined below.

Small absolute changes in vibration for smooth running pumps (e.g. ≤.075 in./sec.) would potentially result in Alert and Required Action Ranges being declared for exceeding the 2.5Vr or 6Vr limits even though the pump is operating satisfactorily.

The Alert Range for smooth running pumps will be > 0.19 to 0.45 in./sec. and the Required Action Range starts at any value above 0.45 in./sec.

Frequency Response Range of Vibration Instrument

The OM Code (ISTB 4.6.1(f))requires a frequency response range of one-third pump operating speed to at least 1000 Hertz. The standby liquid control (SBLC) operate at 370 RPM (6.2 HZ), therefore, the instrument frequency response range of the Plant Hatch IST Program instrumentation does not satisfy the Code requirement.

In lieu of the requirements of ISTB 4.6.1(f), the vibration measuring instrument frequency response range utilized for the SBLC pumps will be as described below.

1. An I.R.D. Model 810 with accuracy of ±5% full scale over a frequency response range of 5.8 - 2,000 HZ for displacement measurements and 5.8 - 10,000 HZ for velocity measurements is utilized for IST.

2. The I.R.D. Model 810 lower frequency response limits result from high-pass filters which eliminate low-frequency elements associated with the input signal from the integration process. These filters prevent low frequency electronic noise from distorting vibration readings thus any actual vibration occurring at low frequencies is filtered out.

3. The SBLC pumps are Union Pump Company reciprocating pumps. The subject pumps utilize roller bearings instead of sleeve bearings. Sleeve bearings can exhibit vibration at subsynchronous frequencies when a condition of oil whirl is present. However, oil whirl does not occur in roller or ball bearings. Roller and ball bearing degradation symptoms typically occur at 1X [one times] shaft rotational frequency and greater. Therefore, vibration measurements at frequencies less than shaft speed would not provide meaningful data relative to degradation of the pump bearings.

4. The SBLC pumps are standby pumps only. They are only operated during Technical Specification Surveillance and Inservice Testing which results in very little run time. In the unlikely event that the system is required to perform its safety function, the pump run time would only be from 19 to 74 minutes to exhaust the volume of the sodium pentaborate storage tank.

5. In addition to the IST vibration monitoring program, these pumps are included in the site maintenance department vibration program. This program has the capability to perform spectral analysis with equipment which would satisfy the frequency response range requirement of the OM Code. The maintenance vibration monitoring is not performed at a frequency equivalent to that required for IST, but based on the infrequent operation of these pumps, the likelihood that a vibration problem would go undetected by both programs is minimal. The maintenance vibration program will also be utilized to analyze any IST vibration data which placed the pumps in the alert or action ranges. The need for any corrective actions would be based on evaluation of IST and maintenance testing program data.

6. Based on the pump bearing design, the combination of vibration monitoring implemented and the limited operation time, it seems unlikely that a vibration problem not detectable by the equipment being utilized would prevent these pumps from fulfilling their design safety function.

Use of the existing vibration monitoring equipment which is calibrated to at least ±5% full scale over a frequency response range of 5.8 - 2000 HZ (SBLC pump nominal shaft speed = 6.2 HZ) should provide sufficient data for monitoring the mechanical condition of the SBLC pumps. This equipment will provide accurate vibration measurements over the frequency range in which typical roller bearing vibration problems occur. This monitoring program should meet the intent of the Code and will relieve the utility and expense involved with procurement, calibration, training, and administrative control of new testing equipment which seems unjustified for assessing the mechanical condition of the subjoct pumps.

3.1.3 Evaluation

The licensee was granted relief to use testing requirements that complied with the requirements of OM-6 in the December 10, 1991, SE. The SE stated that the licensee could incorporate the requirements of OM-6 provided that they also adopted any related requirements. The licensee revised Relief Request RR-P-6 in their submittal dated June 5, 1992, to use OM-6 except as identified in their relief request. The NRC transmitted an SE in a letter dated April 5, 1993, which evaluated a number of relief requests and anomaly responses including Relief Request RR-P-6. The section of Relief Request RR-P-6 related to vibration testing of vertical line shaft pumps was denied. In addition, the section pertaining to the frequency response range of vibration instrumentation was granted on an interim basis for a period of one year. The licensee submitted revisions to Relief Request RR-P-6 in letters dated July 2, 1993, and April 4, 1994. These letters provided additional justification for not performing vibration testing of the vertical line shaft and standby liquid control pumps in accordance with the Code. Relief from the OM-6 vibration requirements for smooth running pumps was granted in the December 10, 1993, SE.

3.1.3.1 Vibration Testing of Vertical Line Shaft Pumps

The OM-6 Code requires that vibration measurements for vertical line shaft pumps be taken on the upper motor bearing housing in three orthogonal directions, one of which is axial. The licensee stated that because of plant design, access to the upper motor bearing housing of the RHRSW and PSW, and the Unit 1 RHR and CS pumps, is not practical. The licensee has also requested relief for the SDSW pump because of a cooling fan that is mounted to the top of the pump prevents access to the motor bearing.

Vibration measurements of vertical line shaft pump bearings cannot be measured directly without the installation of permanent instrumentation because the pumps are submerged in the fluid and are not accessible during pump operation. In the ASME Section XI Code, no differentiation in the Code requirements was made between centrifugal and vertical line shaft pumps. OM-6 established a separate category for acceptable hydraulic performance of vertical line shaft pumps which was more conservative than that of centrifugal pumps. In addition, OM-6 also recognized that vertical line shaft pump bearings were not readily accessible and specified that vibration measurements to meet the Code were required to be taken in three orthogonal directions, one of which is axial, on the upper motor bearing housing of these pumps.

A report published by the Electric Power Research Institute (EPRI NP-5704M, "Submerged Vertical Shaft Pumps Diagnostics") investigated vibration measurement techniques of vertical line shaft pumps. This study, in part, evaluated the effectiveness of vibration transducers mounted at various locations along a vertical line shaft pump, including the area of the pump to motor mounting flange and permanently mounted submerged sensors in the vicinity of the pump bearings. The submerged sensors located near the pump bearings were superior in detecting pump degradation, however, they had high failure rates. The external sensors mounted near the motor did not detect pump degradation as early as the submerged sensors but were able to detect some high vibration peaks. In addition, the study also emphasized the value of obtaining performance data to evaluate pump degradation in conjunction with the vibration data.

The licensee has proposed to take the three required Code vibration measurements of the RHRSW, PSW, and SDSW, and the Unit 1 RHR and CS pumps, on the flange where the motor is mounted to the pump. The referenced EPRI study confirms that some information about the mechanical condition of the pump can be obtained from vibration sensors mounted in the vicinity of the pump to motor mounting flange. However, these sensors were not as effective as permanent sensors mounted near the pump bearings which are not required by the Code. It would be a hardship for the licensee to construct permanent access to the upper motor bearing housing or modify the pumps to measure vibration from the upper motor bearing housing because this would not provide any additional useful information as that obtained from the area of the pump to motor mounting flange. The proposed testing provides a reasonable assurance of operational readiness because the licensee will be taking vibration measurements in three orthogonal directions, as required by the Code, and collecting all the pump performance data required by the Code to assess the condition of the pump.

3.1.3.2 Frequency Response Range of Vibration Instrumentation

The OM-6 Code requires that the frequency response range for vibration instrumentation shall be from one third pump rotational speed (2.1 Hz for the standby liquid control pumps at Hatch) to 1000 Hz. The licensee has proposed to measure pump vibration using an instrument with a response from 5.8 Hz to 10,000 Hz.

These pumps are positive displacement pumps with rolling element bearings. The licensee has consulted with the pump manufacturer and stated that because of the bearing design, evidence of bearing degradation occurs at frequencies of one times pump running speed and above. The licensee also stated that they have a maintenance vibration monitoring program separate from the IST program which uses spectral analysis for vibration testing of the pumps. This testing is not conducted at the IST frequency but does provide additional assessment of pump degradation. Requiring the licensee to procure new instrumentation to meet the Code requirements would be a hardship because the current instrumentation should allow an adequate assessment of pump operational readiness for this pump design.

3.1.4 Conclusion

The proposed alternative to the Code vibration sensor location requirements for the referenced vertical line shaft pumps and the proposed alternative to the Code vibration frequency response range requirements for the SBLC pumps are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.2 RELIEF REQUEST RR-V-4

The licensee has requested relief from the corrective action requirements of ASME Section XI, Paragraphs IWV-3417(b) and IWV-3523 for all valves in the licensee's IST program exercised during cold shutdown and refueling outages. The licensee has proposed to use the Technical Specifications for valves specifically listed to determine if mode changes can be made without corrective action. For valves not in the Technical Specifications, the licensee has proposed to assure that corrective action is performed prior to entering a mode of operation in which the components are required to be operable.

3.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> The Technical Specifications provide the requirements and plant conditions necessary for plant startup.

3.2.2 Alternate Testing

The licensee proposes:

> The Technical Specifications shall be utilized to determine the component operability requirements for plant startup. However, assurance will be made that any required corrective actions are completed and the affected components are returned to the operable condition prior to entering a mode of operation when the components are required to be operable.

3.2.3 Evaluation

Paragraphs IWV-3417(b) and IWV-3523 require corrective action for inoperative valves prior to start-up. These requirements help to ensure prompt action is taken to repair or replace degraded components. The licensee's relief request addresses two issues; 1) component operational readiness, and 2) plant start-up requirements. The licensee proposes to comply with the Hatch Technical Specifications for declaring component and system inoperability and determining plant start-up requirements. In addition, for components not specifically listed in the Technical Specifications, the licensee stated in their July 2, 1993, submittal that components in the IST program that require corrective action will be repaired prior to entering a mode of operation for which the component is required to be operable in accordance with the requirements of the Technical Specifications. This will be done in lieu of the requirements of IWV-3417(b) and IWV-3523.

The NRC has reviewed and approved the Hatch Technical Specifications for plant operation. The station Technical Specifications specify the components and systems needed to allow continued safe operation and to change plant operational modes.

Regarding start-up, the Code requirement to repair or replace each component prior to start-up cannot be applied practically in all cases. In many instances, start-up or mode change would be allowed by Technical Specifications even with a component or related system or subsystem inoperative. To require the licensee to perform the Code corrective action before start-up could likely cause a significant delay in the return to power which would impose a hardship on the licensee that is not compensated by an increase in the level of quality and safety. The licensee's proposal to follow Technical Specification start-up criteria provides a reasonable level of plant operational quality and safety.

3.2.4 Conclusion

The proposed alternative to the Code requirements is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the Code requirements results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.3 RELIEF REQUEST RR-V-43

The licensee has requested relief from the valve leak rate test requirements of ASME Section XI, Paragraphs IWV-3421 and IWV-3422, for the transverse incore probe (TIP) system outboard isolation explosively actuated shear valves, 1C51-Shear A through D and 2C51-Shear A through D. The licensee has proposed to allow the manufacturer to leak test a sample lot of valves prior to delivery.

3.3.1 Licensee's Basis for Requesting Relief

The licensee states:

> These valves are explosive actuated shear valves. The shear valve isolates the TIP tubing by shearing the tube and TIP drive cable, and by jamming the sheared ends of the tubing into a teflon coating on the shear valve disc. Thus the shear valves cannot be local leak rate tested without destroying the drive tube.

3.3.2 Alternate Testing

The licensee proposes:

> Each lot of shear valves is sample leakage tested by the manufacturer prior to delivery. This sample leak rate testing satisfies the requirements of the Plant Hatch 10 CFR 50, Appendix J leak rate program.

3.3.3 Evaluation

The staff evaluated this relief request in the April 5, 1993, SE, and stated that these valves should be categorized as Category D valves and therefore leak testing would not be required to meet IST. The licensee submitted a revised relief request in their letter dated July 2, 1992, which classified these valves as Category AD, and requested relief from the Code leak rate testing requirements.

Each TIP drive mechanism has a shear valve located between the mechanism and a ball valve in the guide tube to provide outboard isolation of the guide tube in the event that containment isolation is required. When the TIP is beyond the ball valve, which is normally used to provide outboard isolation, and power to the TIP system has failed, the shear valve is actuated manually from the control room. This action actuates the shear valve detonation squib which shears the guide tube and drive cable and isolates the guide tube.

Valves which are classified as Category A are required to be leak tested in accordance with the Code requirements. Upon actuation, the subject valves shear the guide tube in order to achieve containment isolation. Requiring the licensee to actuate the shear valves to conduct leak rate testing would be a hardship on the licensee that is not compensated by an increase in the level of safety because the shear valve would have to be replaced and the associated guide tube and drive cable repaired.

The licensee has proposed to use the manufacturer's leak rate testing to satisfy the Code requirements. The licensee stated that the sample leak rate testing performed by the manufacturer satisfies the Hatch 10 CFR 50, Appendix J leak rate program. The proposed testing provides a reasonable assurance of operational readiness because the manufacturer's testing is conducted on each shear valve and this testing meets the requirements of Appendix J. The leak testing requirements of Appendix J provide an adequate assessment of leaktightness for containment isolation valves.

3.3.4 Conclusion

The proposed alternative to the Code leak rate testing requirements for the shear valves is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the Code requirements results in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.4 RELIEF REQUEST RR-P-7

The licensee has requested relief from the Code full-scale range requirements of ANSI/ASME OMa-1988, Part 6 (OM-6), for flow instrumentation in the residual heat removal (RHR) system. The licensee has proposed to use the installed instrumentation.

(Note: The evaluation of Relief Request RR-P-7 is only a portion of the original relief request that pertains to the flow instruments in the RHR system which was granted on an interim basis in the SE dated April 5, 1993. Evaluations of the remaining instrumentation included in the original relief request are contained in Section 2.3.3 of the April 5, 1993, SE.)

3.4.1 Licensee's Basis for Requesting Relief

The RHR flow indicators (1(2)E11-FI-R603A(B)) installed in the RHR system do not meet the instrument range requirements of OM-6. However, the existing instrumentation exceeds the Code accuracy requirements such that the actual maximum variance is less than the Code allowable variance.

Unit	Flow Inst. Accuracy %	Flow Inst. Range gpm	Total Loop Accuracy %	Code Allowed Accuracy %	Code Allowed Range gpm	Code Allowed Variance gpm	Actual Maximum Variance gpm
1	1.5	0 - 25000	1.7	2	0 - 23100	462	425
2	1	0 - 25000	1.3	2	0 - 23550	471	325

3.4.2 Alternate Testing

The licensee has proposed to use the installed instrumentation.

3.4.3 Evaluation

The four flow indicators in the Unit 1 and 2 RHR systems, 1(2)E11-FI-R603A(B), exceed the full-scale range requirements of OM-6, Section 4.6.1.2(a). The Unit 1 and 2 indicators are calibrated to an accuracy of ±1.5% and ±1% of full scale respectively. This results in the actual variance having a value less than the maximum variance allowed by the Code. The installed instrumentation provides an acceptable level of quality and safety because the variance in the actual test results is more conservative than that allowed by the Code.

3.4.4 Conclusion

The proposed alternative to the Code instrument range requirements is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety.

4.0 INCLUSION OF RCIC SYSTEM COMPONENTS IN THE LICENSEE'S IST PROGRAM

The licensee, in response to anomaly 20 in their November 17, 1992, letter, stated that the RCIC system should not be included in their IST program because the system is not included in any accident analysis. However, the licensee's TS allow credit to be taken for the RCIC system if the high pressure coolant injection (HPCI) system is inoperable. Specifically, TS Section 3.5.D.2 states that if the HPCI system is inoperable, then the reactor may remain in operation for a period not to exceed 14 days provided that the following systems are operable: automatic depressurization, core spray, residual heat removal/low pressure coolant injection mode, and RCIC. Therefore, because of the TS requirement for RCIC to be operable to allow for continued plant operation if the HPCI system is inoperable, the RCIC system should be in the licensee's IST program.

5.0 CONCLUSION

The staff concludes that the relief requests as evaluated and modified by this SE will provide reasonable assurance of the operational readiness of the valves to perform their safety-related functions. The licensee has six months to implement program and procedural changes for the relief requests that were granted on a provisional basis. The staff has determined that granting relief pursuant to 10 CFR 50.55a(f)(6)(i) and authorizing alternatives pursuant to 10 CFR 50.55a(a)(3)(i) and 10 CFR 50.55a(a)(3)(ii) is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest. In making this determination, the staff has considered the impracticality of performing the required testing and the burden on the licensee if the requirements were imposed.

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