ATTACHMENT 2

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
ARKANSAS NUCLEAR ONE, UNIT 1

Docket No. 50-313

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ABSTRACT

This report presents the results of the evaluation of relief requests for the inservice testing program for safety-related pumps and valves at Arkansas Nuclear One, Unit 1, of Entergy Operations.

PREFACE

This report is part of the "Review of Pump and Valve Inservice Testing Programs for Operating Reactors (III)" program conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Mechanical Engineering Branch, by EG&G Idaho, Inc., Regulatory and Technical Assistance Unit.

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CONTENTS

ABSTRACT ii

PREFACE ii

1. INTRODUCTION 1

2. PUMP RELIEF REQUEST EVALUATIONS 3

2.1 All Pumps in the IST Program 3

2.1.1 Pump Vibration Velocity Measurements 3

3. VALVE RELIEF REQUEST EVALUATIONS 5

3.1 General Valve Relief Requests 5

3.1.1 Fully Enclosed Solenoid Operated Valves 5

3.2 Decay Heat Removal System 6

3.2.1 Category A/C Valves 6

3.3 Emergency Diesel Generator 11

3.3.1 Category B Valves 11

3.4 Core Flooding System 13

3.4.1 Category C Valves 13

3.5 Emergency Feedwater System 15

3.5.1 Category C Valves 15

APPENDIX A--IST PROGRAM ANOMALIES A-1

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
ARKANSAS NUCLEAR ONE, UNIT 1

1. INTRODUCTION

This report documents a technical evaluation of ASME Section XI pump and valve inservice testing (IST) relief requests submitted by Entergy Operations for its Arkansas Nuclear One, Unit 1 (ANO-1).

Entergy Operations submitted the Arkansas Nuclear One, Unit 1, Second Ten-Year Pump and Valve Inservice Testing (IST) Program on October 20, 1988. This program is based on the ASME Code, Section XI, 1980 Edition through Winter 1981 Addenda. Entergy's response to Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," (GL 89-04), was forwarded to the NRC by letter dated October 27, 1989. Additional submittals containing new or revised relief requests, or deleting relief requests, were forwarded to the NRC by letters dated August 16, 1990, December 21, 1990, March 21, 1991, and October 9, 1991.

The relief requests were evaluated using the criteria and guidance contained in the Code of Federal Regulations 10 CFR 50.55a and GL 89-04. Relief was recommended where it was determined that the request adequately meets the appropriate criteria in these two documents.

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

Section 2 of this report presents Entergy's bases for requesting relief from the requirements for pumps followed by an evaluation and the conclusion. Section 3 presents similar information for valves.

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

The review of the Entergy justifications for exercising Category A, B, and C valves during cold shutdowns and refueling outages instead of quarterly during power operations found the justifications to be acceptable except as noted in Appendix A.

2. PUMP RELIEF REQUEST EVALUATIONS

The Entergy Operations basis for requesting relief from the Code testing requirements and the reviewer's evaluation of that request is summarized below for the identified relief requests.

2.1 All Pumps in the IST Program

2.1.1 Pump Vibration Velocity Measurements

2.1.1.1 Relief Request. In Relief Request 33, the licensee requested relief from the pump vibration amplitude measurement and allowable range requirements of Section XI, Paragraphs IWP-3100 and -4500, for all pumps in the IST program. The licensee proposed to measure and analyze vibration velocity per ASME OM-6 (1988).

2.1.1.1.1 Licensee's Basis for Requesting Relief--Due to improvements in vibration measurement and analysis techniques that have occurred since the publication of the Code of record for ANO-1 (ASME Section XI, 1980 Edition, Winter 1981 Addenda), the use of velocity is now considered to be the preferred indicator for use in determining equipment condition. In fact, more recent code revisions recognize these improved techniques and incorporated them into their requirements. ANO-1 proposes to utilize measurement of vibration velocity as opposed to displacement for pumps with rotational speeds greater than 600 RPM in order to better define pump mechanical condition.

Alternate Testing: It is proposed to conduct all phases of this activity in accordance with the requirements of the ASME approved OM-6 (1988) inservice testing standard for pumps.

NOTE: All pumps currently included in the IST Program operate at rotational speeds greater than or equal to 600 RPM. If any pump were to be added to the program with rotational speeds less than 600 RPM at a later date, then vibration displacement would be utilized to monitor the condition of that pump in accordance with OM-6.

2.1.1.1.2 Evaluation--Pump bearing degradation results in increased vibration at frequencies several times the rotational speed of the pump. These high frequency bearing noises would not produce a significant increase in pump vibration displacement measurements for pumps with rotational speeds of 600 rpm or greater and could go undetected. However, the high frequency noises would result in relatively large changes in pump vibration velocity measurements which could permit detection of bearing degradation and corrective action prior to catastrophic failure. Because of the high frequencies of the vibrations associated with the bearings of pumps with rotational speeds of 600 rpm or greater, vibration velocity measurements are generally much better than vibration displacement measurements in monitoring the mechanical condition of these pumps and detecting bearing degradation.

The advantages of measuring vibration velocity instead of displacement for monitoring the mechanical condition of pumps, with the exception of low

speed pumps, are widely acknowledged in the industry. The use of pump vibration velocity can provide a great deal of information about pump mechanical condition that could not be obtained by using vibration displacement readings. Therefore, pump vibration velocity measurements are generally superior to the Code required testing method.

Section XI does not provide allowable ranges for vibration velocities and since the relationship between displacement and velocity is frequency dependent, a mathematical conversion of the Code displacement ranges is not appropriate. ANSI/ASME OM-6 provides a set of allowable ranges for pump vibration velocity measurements that has been found to be acceptable by the NRC. The licensee indicated that they are using the ranges and limits specified in ASME OM-6 (1988). The licensee further proposed to conduct all phases of the vibration measurement activity in accordance with the requirements of OM-6 (1988) for all pumps in their IST program. Measuring pump vibration in velocity units is at least equivalent to the Code requirements and is an acceptable alternative.

Section XI, Paragraph IWP-4510, requires vibration measurements to be taken on a bearing housing or its structural support, provided it is not separated from the pump by a resilient mounting. ASME OM-6 permits vibration measurements on the upper motor bearing housing for vertical line shaft pumps. This alternate location is permitted due to the inaccessibility of the pump, since it is submerged in the working fluid, and the high failure rate of permanently installed vibration sensors. A study performed by EPRI entitled "On-Line Vibration Monitoring for Submerged Vertical Shaft Pumps," EPRI NP-5704M, found that vibration measurements taken on pump motor housings may not detect pump bearing and shaft problems. Therefore, it may not be possible to monitor pump mechanical condition or detect pump degradation by measuring vibration on the upper motor bearing housing. The licensee should determine if this is the case. If so, they should investigate other testing alternatives that would permit monitoring pump mechanical condition, such as installing specially designed permanent detectors on the submerged pumps.

Based on the determination that the licensee's proposed testing is equivalent or better than the Code required testing for non-vertical line shaft pumps, relief should be granted from the Code requirements, provided the licensee verifies that the proposed testing would detect any significant mechanical degradation of vertical line shaft pumps. If it is determined that significant mechanical degradation cannot be detected, the licensee should investigate alternate testing methods. If an acceptable alternate method is found, it should be incorporated within two years. If the investigation shows that no acceptable alternatives exist, this should be documented in the program and the proposed testing continued until an alternative is found and implemented.

3. VALVE RELIEF REQUEST EVALUATIONS

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

3.1 General Valve Relief Requests

3.1.1 Fully Enclosed Solenoid Operated Valves

3.1.1.1 Relief Request. Relief Request No. 10 requests relief from the remote position indication verification requirements of Section XI, Paragraph IWV-3300, for the listed solenoid operated valves. The licensee has not proposed alternate testing for these valves.

NOTE: Relief Request No. 10 was submitted by letter dated October 20, 1988. This request was revised in the October 27, 1989 submittal by adding 10 new valves, therefore, it is evaluated below.

3.1.1.1.1 Licensee's Basis for Requesting Relief--The listed solenoid and control valves have enclosed stems, hence, their operation cannot be observed.

Alternate Testing: No alternate testing is proposed.

3.1.1.1.2 Evaluation--Most solenoid actuated valves are constructed so the moving parts (i.e., disk or plug) are not visible when the valve is assembled. Substantial valve disassembly would be required to permit observation of the moving parts and this disassembly would make the valve inoperable. Therefore, it is impractical to directly observe the position of these valves to verify that the remote valve position indication accurately reflects valve position. Significant system modifications, such as replacing these valves with ones that can be observed, would be necessary to meet this Code requirement. Performing the necessary modifications would be burdensome due to the high costs and would not significantly improve the level of safety.

The licensee has not proposed any alternate testing to meet this Code requirement. Relying on valve position indication in the conduct of plant operation where that indication is not routinely verified to be an accurate representation of valve position, is not acceptable. Therefore, relief should not be granted and the licensee should develop alternate means of determining valve position so the remote position indication can be verified accurate at least once every two years. The licensee should consider observation of system pressures or flow, or the use of diagnostic techniques to determine valve position in lieu of direct observation.

3.2 Decay Heat Removal System

3.2.1 Category A/C Valves

3.2.1.1 Relief Request. Relief Request No. 7, requests relief from the exercising requirements of Section XI, Paragraph IWV-3520, for the combined injection check valves DH-14A and DH-14B. The licensee has proposed to disassemble and manually exercise these valves on a sampling basis during refueling outages.

NOTE: Relief Request No. 7 was submitted by letter dated October 20, 1986. This request is affected by GL 89-04 Positions 2 and 4, however, it does not appear to fully comply with these positions, therefore, it is evaluated below.

3.2.1.1.1 Licensee's Basis for Requesting Relief--Flow cannot be established through these valves in normal operation because the differential pressure between the RCS (approximately 2250 psig) and the CFTs (approximately 600 psig) acts to maintain DH-14A and DH-14B closed.

Alternate Testing: These valves cannot be opened during normal operation due to the differential pressure between the RCS and CFTs. The ability of these valves to full stroke open and close will be verified either by visual inspection, flow, or external means (ultrasonics). If these valves are visually inspected then DH-14A will be inspected during even numbered outages and DH-14B will be inspected during odd numbered refueling outages.

NOTE: Relief Request No. 7 indicates that valves DH-14A and DH-14B may be verified either by flow, visual inspection, or external means (ultrasonics). However, the position summary section of the submittal dated October 27, 1989, indicates these valves will be sample disassembled and inspected during refueling outages.

3.2.1.1.2 Evaluation--It is impractical to full- or part-stroke exercise valves DH-14A and DH-14B during power operations because the only flow path through them is from the decay heat removal pumps or CFTs into the RCS. These sources do not produce sufficient head to overcome normal operating RCS pressure and cannot establish flow into the RCS. To full-stroke exercise these valves quarterly during power operations, extensive system modifications would have to be performed, such as installing full flow test loops. It would be costly and burdensome for the licensee to make such modifications. Additionally, these modifications might result in a reduction in system reliability due to failures that could divert injection flow away from the RCS.

It is impractical to full-stroke exercise these check valves during cold shutdowns by establishing full CFT flow into the RCS because there is not an adequate expansion volume. Injecting into the RCS could cause or contribute to a low-temperature overpressurization of the RCS.

Verifying maximum required accident flow through each of these valves during refueling outages, when the vessel head is removed to provide an adequate expansion volume, is not practical. It would involve a full pressure discharge of the CFTs into the RCS, which could result in damage to

reactor and core components and radioactive contamination of equipment inside containment. The licensee's proposal to disassemble and inspect these valves appears to be the only practical method available to full-stroke exercise them open and verify that they are not in a degraded condition.

Disassembly and inspection, to verify the full-stroke capability of check valves is an option only when full-stroke exercising cannot practically be performed by flow or by other positive means. The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

The minutes of the public meeting on GL 89-04 states that part-stroke exercise testing with flow should be performed after disassembly and inspection is completed but before returning the valve to service. This testing provides a degree of confidence that the disassembled valve has been re-assembled properly and that the disk moves freely.

When it is impractical to establish or verify sufficient flow through a check valve to full-stroke exercise it, GL 89-04 states that, if possible, the valve must be part-stroke exercised quarterly or during cold shutdowns. Decay heat removal flow is established through at least one of these valves each cold shutdown. It should not be a burden for the licensee to establish flow through both valves during decay heat removal operation. Therefore, the licensee should part-stroke exercise these valves during cold shutdowns. It may be practicable to verify by non-intrusive diagnostic technique that the valve disk fully opens when decay heat removal flow is initiated. The use of diagnostic techniques to determine that a check valve opens fully or sufficiently to pass maximum required accident flow is considered an acceptable alternative to full flow testing. The licensee should investigate the use of non-intrusive techniques to verify that these valves full-stroke open when subjected to a partial flow.

This relief request implies that valve closure will be verified by sample disassembly and inspection. However, the position summary section of the submittal dated October 27, 1989, indicates that these valves perform a pressure isolation (PIV) function and that valve leak tightness is monitored during power operations and tested during heatup from cold shutdown. The Minutes of the Public Meetings on GL 89-04 state that disassembly and inspection may be found acceptable to verify closure capability if verification by pressure or flow measurement is not practical, however, disassembly and inspection is not acceptable for demonstration of leak-tight integrity. Closure of DH-14A and DH-14B should be demonstrated by some positive means other than disassembly and inspection. This relief request should be modified to reflect the alternate closure verification used.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted with the following provisions. Valves that are disassembled in lieu of testing should have a post maintenance part-stroke

exercise performed prior to their return to service. These valves should be part-stroke exercised during cold shutdowns. The licensee should investigate the use of non-intrusive diagnostic techniques to verify that these valves full-stroke exercise open when subjected to decay heat removal flow. Additionally, these valves should be tested per GL 89-04, Position 4, to verify their PIV function.

3.2.1.2 Relief Request. In Relief Request No. 8, the licensee requests relief from the exercising requirements of Section XI, Paragraphs IWV-3521 and IWV-3522, for the decay heat removal check valves DH-13A, DH-13B, DH-17, and DH-18. The licensee has proposed to disassemble and manually exercise these valves on a sampling basis during refueling outages.

NOTE: Relief Request No. 8 requests relief from exercising the listed valves to both the open and the closed positions. Evaluating this request for both positions together would be confusing. Therefore, the evaluation has been broken up into two parts for clarity. Section 3.2.1.2 evaluates the request for testing the valves open and Section 3.2.1.3 evaluates testing them closed.

3.2.1.2.1 Licensee's Basis for Requesting Relief--These check valves are in a parallel pipe configuration. Full flow can be verified through the system but not through each set of valves. There are not any isolation valves in this parallel configuration.

Alternate Testing: Due to the differential pressure between the RCS and the discharge of the decay heat removal pumps, these valves cannot be partial stroke tested during power operations. These valves are partial stroke tested during cold shutdowns. The ability of these valves to full stroke open and close will be verified either by flow, visual inspection, or external means (ultrasonics). If these valves are visually inspected then DH-13A and DH-17 will be inspected during even numbered outages and DH-13B and DH-18 will be inspected during odd numbered refueling outages.

NOTE: This relief request indicates that the listed check valves may be verified either by flow, visual inspection, or external means (ultrasonics). However, in the position summary section of the submittal dated October 27, 1989, the licensee indicates that these valves will be sample disassembled and inspected during refueling outages in accordance with the guidelines of GL 89-04.

3.2.1.2.2 Evaluation--Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs" (GL 89-04), Position 1, states that a check valve's full-stroke open can be verified by passing the maximum required accident condition flow rate through the valve. The only full-flow test path through these valves is into the reactor vessel. It is impractical to exercise these valves quarterly during power operation because the decay heat pumps do not produce sufficient head to overcome normal operating reactor coolant system (RCS) pressure. Quarterly testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves. The necessary modifications would be burdensome for the licensee due to the cost involved and possible reduction in reliability.

It is impractical to verify maximum accident flow through each of these valves during cold shutdowns because the parallel flow paths do not have permanently installed flow instrumentation. The header flow instruments cannot be used for this purpose because there are no valves to isolate one of the parallel paths. System modifications would be required to install isolation valves or flow rate instruments to permit cold shutdown testing. It would be burdensome to require the licensee to make these modifications due to the costs involved. Portable flow rate instruments could be installed for this testing, however, installing portable instrumentation might be burdensome during cold shutdowns. The time needed to install portable instruments, perform the test, and restore the system may cause a delay in returning the plant to power. Further, there may be high radiation or other personnel hazards inside containment where this work would be performed. These valves are part-stroke exercised during cold shutdowns.

Disassembly, together with inspection, to verify the full-stroke capability of check valves is an option only where full-stroke exercising cannot practically be performed by flow or by other positive means. The NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not a test and not equivalent to the exercising produced by fluid flow. This procedure has some risk which may make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

The Minutes of the Public Meeting on GL 89-04 state that partial-stroke exercise testing with flow should be performed after valve disassembly and inspection is completed but before returning the valve to service. This post inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and the disk moves freely.

The system drawing shows flow elements installed in the parallel paths upstream of these check valves. It may be practical to use portable flow instruments to verify a full-stroke exercise of these valves. The use of valve diagnostics to determine that a check valve opens fully or sufficiently to pass maximum required accident flow during flow testing is considered an acceptable alternative to full flow testing. A non-intrusive method of testing these valves may be practical. Therefore, an interim period of one year or until the end of the next refueling outage, whichever is longer, should be provided to permit the licensee time to investigate whether portable flow instruments or valve diagnostic techniques can be used to verify that these valves fully open or open sufficiently to allow passage of maximum required accident flow during cold shutdowns or refueling outages. At the end of this interim period, the licensee should implement full-stroke testing with flow or provide the results of a study that demonstrate the impracticality of this alternative.

While valve disassembly and inspection should not be used in lieu of exercising with flow if that test method is found to be practical, a partial-stroke exercise during cold shutdowns and disassembly and inspection of two valves each refueling outage on a sampling basis in accordance with GL 89-04, Position 2, should provide reasonable assurance of valve operational readiness.

Based on the determination that compliance with the Code requirements is impractical and burdensome and considering that the proposed alternate testing should provide reasonable assurance of operational readiness during the interim period, interim relief may be granted from the exercising method and frequency requirements of the Code for a period of one year or until the end of the next refueling outage, whichever is longer. Valves that are disassembled in lieu of testing should have a post maintenance partial-stroke exercise with flow performed prior to returning them to service.

3.2.1.3 Relief Request. Relief Request No. 8 requests relief from the individual component leak test requirements of Section XI, Paragraph IWV-3420, for decay heat removal check valves DH-13A, DH-13B, DH-17, and DH-18. The licensee proposes to test these check valves in sets.

3.2.1.3.1 Licensee's Basis for Requesting Relief--There is not a way to leak test these valves individually.

Alternate Testing: These valves will be leak rate tested as a set and the maximum leakage through the set will be based on the maximum leakage through the most limiting valve.

3.2.1.3.2 Evaluation--Decay heat check valves DH-13A and DH-18 are located in parallel lines that connect together downstream of the valves. This parallel pair is in series with downstream check valve DH-14A. The same configuration exists for the DH-13B, DH-17, and DH-14B combination. The licensee indicated that DH-14A and DH-14B are individually leak rate tested, but the upstream check valves are tested as sets. These check valves have been identified by the licensee as Event V PIVs, however, the proposed testing does not fully comply with GL 89-04, Position 4, "Pressure Isolation Valves." This position states that the licensee should ensure that Event V PIVs are individually leak rate tested.

A review of system P&IDs indicates that test taps exist upstream and downstream of these sets of check valves. It should not be burdensome for the licensee to individually leak rate test these valves. The licensee's proposed testing does not comply with GL 89-04 and does not provide assurance that these valves are capable of performing their leak tight safety function. The licensee should develop a leak rate test procedure that individually verifies the leak tight integrity of these valves.

Immediate compliance with the Code requirements could result in an extended outage which would be a hardship due to the costs involved and may not provide a compensating increase in the level of quality and safety. An interim period is necessary to give the licensee time to determine a method and develop test procedures to individually leak rate test these valves. The licensee's proposed alternative, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim.

Based on the determination that immediate compliance with the Code would be a hardship without a compensating increase in the level of quality and safety and considering the adequacy of the proposed testing during the interim period, interim relief may be granted for one year or until the next refueling outage, whichever is longer. During the interim, the licensee should develop a method to individually leak rate test these check valves.

3.3 Emergency Diesel Generator

3.3.1 Category B Valves

3.3.1.1 Relief Request. In Relief Request No. 30 the licensee requests relief from the stroke time measurement requirements of Section XI, Paragraph IWV-3413, for the emergency diesel generator (EDG) air start valves, SV-5218, SV-5233, SV-5237, SV-5239, CV-5218, CV-5233, CV-5237, and CV-5239. The licensee has proposed to stroke time these valves indirectly by measuring the starting times of the diesel generators.

NOTE: Relief Request No. 30 requests relief for valves that perform two distinctly different functions. Evaluating this request for all of these valves together would be confusing. Therefore, the evaluation has been broken up into two parts for clarity. Section 3.3.1.1 evaluates the request for the EDG air start valves and Section 3.3.1.2 evaluates the request for the service water valves.

3.3.1.1.1 Licensee's Basis for Requesting Relief--These valves do not have independent actuation and therefore cannot be independently timed. They are interlocked with the Emergency Diesel Generator and stroked open when the EDG is started.

Alternate Testing: The EDG must be at rated voltage within 15 seconds of receiving an actuation signal. A successful start of the EDG (within 15 seconds of signal) constitutes a successful stroke test of these valves. These valves are full stroke tested quarterly.

3.3.1.1.2 Evaluation--Air start solenoid valves, SV-5218, SV-5233, SV-5237, and SV-5239 are rapid acting valves that provide actuation air signals to the diesel generator air start control valves, CV-5218, CV-5233, CV-5237, and CV-5239. These valves operate from an engine start control signal rather than a control switch and do not have remote position indication or any external means to determine valve position. Therefore, it is impractical to stroke time these valves as required by the Code. System modifications would be necessary to directly measure the stroke times of these valves. These modifications may involve replacement of the valves and would be expensive and burdensome to the licensee.

The licensee proposes to evaluate the condition of these valves by a quarterly start test of the EDG. A diesel start within 15 seconds of the start signal is said to indicate a successful stroke test of these valves. Many diesel generator air start systems are composed of two totally redundant air start trains, either of which can start the diesel within the required time. If the ANO-1 installation is totally redundant, the proposed testing may not detect a seriously degraded or failed valve. In this case, an alternate method of testing that detects valve degradation would have to be developed and implemented. One possible method is isolation of one air start train during monthly EDG tests, which would provide an indication of the condition of the valves in the other train. Alternating between the air start trains from test to test would independently verify the operability of each set of air start valves quarterly and would provide reasonable assurance of operational readiness. Other methods could involve monitoring air receiver pressure decreases or the use of non-intrusive diagnostic

techniques. Care should be taken to ensure compliance with appropriate EDG manufacturers guidelines when performing EDG testing.

However, if the air start trains are not totally redundant, all of these solenoid operated valves and air start control valves would have to operate rapidly to start the diesel within the allowed time. Therefore, significant degradation or failure of these valves to function would be indicated by increased diesel generator start times. This testing would provide a reasonable assurance of valve operability for installations with non-redundant air start trains.

Based on the determination that compliance with the Code requirements is impractical and burdensome to the licensee, and considering the proposed alternate testing, relief should be granted with the following provisions. The licensee should determine if the EDG can start in the required time with only one train of air start available. If so, some method to independently verify the operational readiness of both sets of valves should be developed and implemented within one year or by the next refueling outage, whichever is longer.

3.3.1.2 Relief Request. In Relief Request No. 30, the licensee requests relief from the stroke time measurement requirements of Section XI, Paragraph IWV-3413, for the EDG service water cooling valves, CV-3806 and CV-3807. The licensee has proposed to verify the stroke time indirectly by the starting time of the diesel generator.

3.3.1.2.1 Licensee's Basis for Requesting Relief--These valves do not have independent actuation and therefore cannot be independently timed. They are interlocked with the Emergency Diesel Generator and stroked open when the EDG is started.

Alternate Testing: The EDG must be at rated voltage within 15 seconds of receiving an actuation signal. A successful start of the EDG (within 15 seconds of signal) constitutes a successful stroke test of these valves. These valves are full stroke tested quarterly.

3.3.1.2.2 Evaluation--Valves CV-3806 and CV-3807 open to provide service water flow to the EDG jacket heat exchangers to cool the EDGs. These valves receive a signal to open on an EDG start. However, severe degradation or failure of these valves would not affect the EDG start times. Therefore, the proposed test does not adequately assess valve condition and does not provide a reasonable assurance of operational readiness.

The licensee indicated that these valves stroke simultaneously on a command signal and cannot be independently stroke timed. However, system drawings (M-210) show that handswitches and position indication lights are available. It should be practical for the licensee to stroke time these valves independently to meet the requirements of the Code.

Based on the determination that the licensee has not adequately demonstrated that compliance with the Code requirements is impractical or a hardship, and that the proposed testing does not provide reasonable assurance of operational readiness, relief should not be granted as requested. If compliance with the Code requirements is determined to be impractical, the licensee should propose a test that adequately monitors valve degradation.

3.4 Core Flooding System

3.4.1 Category C Valves

3.4.1.1 Relief Request. Relief Request No. 6, requests relief from the exercising requirements of Section XI, Paragraph IWV-3520, for the core flood tank (CFT) injection check valves CF-1A and CF-1B. The licensee has proposed to disassemble and manually exercise these valves on a sampling basis during refueling outages.

NOTE: Relief Request No. 6 was submitted by letter dated October 20, 1988. This request is affected by GL 89-04 Positions 2 and 4, however, it does not appear to fully comply with these positions, therefore, it is evaluated below.

3.4.1.1.1 Licensee's Basis for Requesting Relief--Flow cannot be established through these valves in normal operation because the differential pressure between the RCS (approximately 2250 psig) and the CFTs (approximately 600 psig) acts to maintain check valves DH-14A and DH-14B closed. These check valves are in series with CF-1A and CF-1B respectively, therefore preventing flow through CF-1A and CF-1B from CFTs.

Alternate Testing: These valves cannot be opened during normal operations due to the differential pressure between the RCS and CFTs. The ability of these valves to full stroke open and close will be verified either by visual inspection, flow, or external means (ultrasonics). If these valves are visually inspected then CF-1A will be inspected during even numbered outages and CF-1B will be inspected during odd numbered refueling outages.

NOTE: This relief request indicates that the listed check valves may be verified either by flow, visual inspection, or external means (ultrasonics). However, the position summary section of the submittal dated October 27, 1989, indicates that these valves will be sample disassembled and inspected during refueling outages.

3.4.1.1.2 Evaluation--It is impractical to full- or part-stroke exercise valves CF-1A and CF-1B during power operations because the only flow path through them is from the CFTs into the RCS. The CFTs are at a pressure below normal operating RCS pressure and cannot establish flow into the RCS. To full-stroke exercise these valves quarterly during power operations, extensive system modifications would have to be performed, such as installing full flow test loops. It would be costly and burdensome for the licensee to make such modifications. Additionally, these modifications might result in a reduction in system reliability due to failures that could divert injection flow away from the RCS.

It is impractical to full-stroke exercise these check valves during cold shutdowns by establishing full CFT flow into the RCS because there is not an adequate expansion volume. Injecting into the RCS could cause or contribute to a low-temperature overpressurization of the RCS.

Verifying maximum required accident flow through each of these valves during refueling outages, when the vessel head is removed to provide an adequate expansion volume, is not practical. It would involve discharging the CFTs into the RCS, which could result in damage to reactor and core components and radioactive contamination of equipment inside containment. The licensee's proposal to disassemble and inspect these valves may be the only practical method available to full-stroke exercise them open and verify that they are not in a degraded condition.

Disassembly and inspection, to verify the full-stroke capability of check valves is an option only when full-stroke exercising cannot practically be performed by flow or by other positive means. The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

The minutes of the public meeting on GL 89-04 states that part-stroke exercise testing with flow should be performed after disassembly and inspection is completed but before returning the valve to service. This testing provides a degree of confidence that the disassembled valve has been re-assembled properly and that the disk moves freely.

The licensee has not demonstrated the impracticality or hardship of part-stroke exercising these valves during cold shutdowns. It may be practical to part-stroke them by lowering RCS pressure slightly below CFT pressure and monitoring for a decrease in CFT level or pressure prior to closing the CFT isolation valves during plant shutdown. The licensee should part-stroke exercise these valves during cold shutdowns or document the reasons this testing is impractical. It may be practicable to perform a reduced pressure discharge of the CFTs during refueling outages and verifying by non-intrusive diagnostic technique that the valve disk fully opens with the initial surge. The use of diagnostic techniques to determine that a check valve opens fully or sufficiently to pass maximum required accident flow is considered an acceptable alternative to full flow testing. The licensee should investigate whether non-intrusive techniques can be used to verify that these valves full-stroke open when subjected to a partial flow.

This relief request implies that valve closure will be verified by sample disassembly and inspection. However, the position summary section of the submittal dated October 27, 1989, indicates that these valves perform a pressure isolation (PIV) function and that valve leak tightness is demonstrated by monitoring CFT pressure and level during power operation. The Minutes of the Public Meetings on GL 89-04 state that disassembly and inspection may be found acceptable to verify closure capability if verification by pressure or flow measurement is not practical, however, disassembly and inspection is not acceptable for demonstration of leak-tight integrity. Closure of CF-1A or CF-1B should be demonstrated by some positive means other than disassembly and inspection. This relief request should be modified to reflect the alternate closure verification employed.

Based on the determination that compliance with the Code requirements is impracticable and burdensome, and considering the proposed alternate testing, relief should be granted with the following provisions. Valves that are disassembled in lieu of testing should have a post maintenance part-stroke exercise performed prior to their return to service. These valves should be part-stroke exercised during cold shutdowns or the justification for not doing so documented in the IST program. The licensee should investigate the use of non-intrusive diagnostic techniques to verify that these valves full-stroke exercise open when subjected to flow from a reduced pressure CFT discharge during refueling outages.

3.5 Emergency Feedwater System

3.5.1 Category C Valves

3.5.1.1 Relief Request. Relief Request No. 22, requests relief from the closed exercising requirements of Section XI, Paragraph IWV-3520, for the check valves in the main steam supply to the emergency feedwater turbine, MS-271 and MS-272. The licensee proposes to disassemble and inspect these valves on a sampling basis during refueling outages to verify valve closure.

NOTE: Relief Request No. 22 is affected by GL 89-04 Position 2. However, since disassembly is to verify valve closure, this relief request is not approved by the Generic Letter and is evaluated below.

3.4.1.1.1 Licensee's Basis for Requesting Relief--There is no closing force other than gravity on these valves. Hence the closed position cannot be verified on these valves during power operations or during cold shutdowns. The open position is verified during power operation by the normal speed of the emergency feedwater turbine.

Alternate Testing: MS-271 will be disassembled and inspected while in the closed position during even numbered refueling outages. MS-272 will be disassembled and inspected while in the closed position during odd numbered refueling outages.

3.5.1.1.2 Evaluation--It is impractical to exercise valves MS-271 and MS-272 to the closed position during power operations because of the system configuration. There are no test taps installed between these valves and the upstream isolation valves. Verifying valve closure would involve isolating the steam supply to the emergency feedwater turbine, thereby, removing that subsystem from service. These valves cannot be full-stroke exercised quarterly unless extensive system modifications are made which permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved.

It is impractical to exercise these check valves closed during cold shutdowns or refueling outages because the only conventional means to verify reverse flow closure is to leak test the valves. The system does not have the necessary test connections to leak test these valves. The licensee's proposal to disassemble and inspect these valves may be the only practical method available to exercise them closed and verify that they are not in a degraded condition.

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The NRC considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

The minutes of the public meeting on GL 89-04 states that part-stroke exercise testing with flow should be performed after disassembly and inspection is completed but before returning the valve to service. This testing provides a degree of confidence that the disassembled valve has been re-assembled properly and that the disk moves freely.

The licensee should investigate methods of verifying the reverse flow closure capability of these valves other than disassembly and inspection. It may be practical, at least each refueling outage, to verify by non-intrusive diagnostic technique that the valve disks travel to their closed seats when the upstream isolation valves are closed. The use of diagnostic techniques to determine check valve position is considered an acceptable alternative to testing with pressure or flow. The licensee should use a non-intrusive technique to verify that these valves close when subjected to reverse differential pressure if this testing is found to be practicable.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the proposed alternate testing, relief should be granted with the following provisions. Valves that are disassembled in lieu of testing should have a post maintenance part-stroke exercise performed prior to their return to service. The licensee should investigate the use of non-intrusive diagnostic techniques to verify these valves in the closed position when subjected to reverse differential pressure.

APPENDIX A

IST PROGRAM ANOMALIES

APPENDIX A
IST PROGRAM ANOMALIES

During the review of the licensee's submittals, inconsistencies and omissions were noted among the relief requests that are part of the licensee's Generic Letter 89-04 (GL 89-04) submittal and Second Ten Year Resubmittal, dated October 20, 1988. These issues are summarized below.

1. The specific Code requirements from which relief is requested should be identified in all relief requests. This should include reference to the Code paragraph number.

2. Valve Relief Requests RR-6, -7, -8, -14, -16, -17, -19, -20, -23, and -25 are check valves which cannot practically be full-stroke exercised open with system flow per GL 89-04, Position 1. The licensee proposes to full-stroke exercise these valves by sample disassembly, inspection, and a manual exercise per GL 89-04, Position 2. Disassembly and inspection, to verify the full-stroke open capability of check valves is an option only where exercising cannot be practically performed by flow or by other positive means. The NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the exercising produced by fluid flow. This procedure has some risk which may make its routine use as a substitute for testing undesirable. Check valve disassembly is a valuable maintenance tool that can provide a great deal of information about a valve's internal condition. It should be performed under the maintenance program at a frequency commensurate with the valve type and service.

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

   If the licensee's investigation reveals that full-stroke exercising with flow is not feasible, then disassembly and inspection may be used as an alternative. The licensee must perform this procedure in accordance with GL 89-04 and should ascertain proper reassembly by performing a partial-stroke exercise test prior to returning a valve to service.

3. It appears that valve Relief Requests RR-16, -19, -20, -23, and -25 request relief to use disassembly and inspection to verify both the open and the closed capabilities of the listed valves. GL 89-04 approves upon submittal relief requests proposing disassembly and inspection in lieu of full-stroke exercising valves open, when it is impractical to full-stroke exercise the valves open with flow. The Minutes of the Public Meetings on GL 89-04, state that the use of disassembly and inspection to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. However, the minutes further state, that for this use, the submission and approval of a relief request before implementation is required. The licensee has not provided justification in these relief requests addressing the impracticality of testing the listed valves closed. Therefore, these relief requests could not be approved for

closure verification and are assumed to apply only to open verification. The licensee should clarify if credit is being taken for disassembly to verify closure capability of the listed valves. If so, they should resubmit these relief requests, including the necessary justifications, for review and approval.

4. The position summary section of the licensee's submittal dated October 27, 198' indicates that valves CF-1A and CF-1B perform a pressure isolation (PIV) function. These valves are listed as Category C in the IST program, however, GL 89-04 requires PIVs to be listed in the IST program as Category A or A/C. The licensee indicated that the leak tightness of these valves is demonstrated by monitoring CFT pressure and level during power operation. This proposed test may not verify the leak tight integrity of these valves since if down stream check valves DH-14A and DH-14B are leak tight, there may not be an increase in CFT level or pressure even if CF-1A or CF-1B were not closed. These PIVs should be individually leak rate tested to verify their leak tight integrity.

5. The position summary section of the licensee's submittal dated October 27, 1989, indicates that valves DH-14A and DH-14B perform a pressure isolation (PIV) function. These valves are listed as Category C in Relief Request No. 7, however, GL 89-04 requires PIVs to be listed in the IST program as Category A or A/C. The licensee indicated that the leak tightness of these valves is monitored during power operations and tested during heatup from cold shutdown. This proposed test may not permit accurate quantification of the leakage rate of these valves since there are at least thr stream paths for leakage and leakage through any of the check valves in those paths would offset leakage through DH-14A and DH-14B. These PIVs should be individually leak rate tested to verify their leak tight integrity.

6. Valve Relief Requests RR-6, -7, -8, -14, -16, -20, -23, and -25 indicate that the listed check valves may be verified to operate either by flow, visual inspection, or external means (ultrasonics). In the position summary section of their submittal dated October 27, 1989, the licensee indicates that these valves will be sample disassembled and inspected during refueling outages in accordance with the guidelines of GL 89-04. The licensee's program documentation should consistently identify the intended alternate testing and should be specific as to the test method that is to be employed. If methods other than disassembly are practical, they should be used to test these valves. If this is the case, relief is not approved to use disassembly in lieu of testing.

7. In Relief Request 27, the licensee requests relief from the Code testing requirements for flow rate, bearing temperature, vibration, and inlet pressure for the service water pumps. The licensee proposes comparing differential pressure and flow rate measurements to pump curves and using expanded allowable upper ranges for pump flow. The licensee is permitted by IWP-3210 to expand the Code allowable ranges for pump testing. However, these ranges may only be relaxed if the Code specified ranges cannot be met. Significant variations in flow rate and differential pressure may indicate a problem with the test method or instrumentation and should be investigated and resolved since these problems could allow a seriously degraded pump to remain in service.

IWP requires that pump flow rate and differential pressure be evaluated against reference values to monitor pump condition and allow detection of hydraulic degradation. For pumps where it is impractical to test at a reference value of flow rate or differential pressure, testing in the "as found" condition and comparing values to an established reference "curve" may be an acceptable alternative. Pump curves represent an infinite set of reference points of flow rate and differential pressure. Establishing a reference "curve" for a pump when it is known to operating acceptably, and basing the acceptance criteria on this curve, can permit evaluation of pump condition and detection of degradation, though not in accordance with IWP. There is, however, a higher degree of uncertainty associated with using a curve to assess operational readiness. Therefore, the development of the reference "curve" should be as accurate as possible. Additionally, when using reference "curves," it may be more difficult to identify instrument drift or to trend changes in component condition.

Because varying the flow rate of the service water pumps is impractical during normal plant operating conditions due to the impact on the service water system and the cooled equipment, the use of a reference curve is an acceptable alternative to the requirements of IWP if the following elements are incorporated into the inservice testing program and procedures for developing and implementing the curve(s):

a. Curves are developed, or manufacturer supplied curves validated, when the pumps are known to be operating acceptably.

b. The reference points used to develop or validate the curves are measured using instruments at least as accurate as required by the Code.

c. Curves are based on an adequate number of reference points, with a minimum of five.

d. Points are beyond the "flat" portion (low flow rates) of the curve in a range which includes or is as close as practicable to design basis flow rates.

e. Acceptance criteria based on the curves does not conflict with Technical Specification or Facility Safety Analysis Report operability criteria, for flow rate and differential pressure, for the affected pumps.

f. If vibration levels vary significantly over the range of pump conditions, a method for assigning appropriate vibration acceptance criteria should be developed for regions of the pump curve.

g. When the reference curve may have been affected by repair, replacement, or routine service, a new reference curve shall be determined or the previous curve revalidated by an inservice test.

IWP-4300 requires measurement of pump bearing temperatures for centrifugal pump bearings outside of the main flow path. Since the

service water pump bearings are in the flow path, the bearing temperatures need not be measured. Therefore, relief is not necessary from the bearing temper ture measurement requirements for these pumps and this relief request should be modified to delete the bearing temperature measurement portions of the request.

Re ief Request No. 33 states that all phases of the pump vibration measurement activity will be conducted in accordan with the requirements of ASME OM-6 (19 8). ASME OM-6 spec ally addresses vibration measurements for vertical line shaft pumps, therefore, the portions of Relief Request No. 27 that deal with vibration measurements are superceded by Relief Request No. 33 and should be deleted. Relief Request No. 33 is evaluate n Section 2.1.1 of this TER.

8. Relief Request No. 28 was submitted by lette ted October 20, 1988, and has not been revised by subsequent subm This request is not affected by any of the positions delineated ttachment 1 of GL 89-04 and is, therefore, approved by GL 9-04. Relief Request No. 28 requests relief from the pump testing requirements of the Code for the diesel fuel oil transfer pumps. The licensee proposes to operationally test the pumps as part of the Emergency Diesel Generator (EDG) funct nal test and to perform a full flow test during refueling outages. The emergency diesel fuel oil transfer pumps are centrifugal pumps. The licensee's proposal does not provide an adequate means to monitor for hydraulic or mechanical degradation of these pumps. Pump flow rate is not evaluated with differential pressure to monitor pump hydraulic condition. The proposal to verify pump flow rate equal to or greater than 10 gpm at refueling outages demonstrates that the pumps are capable at that time of meeting their system functional requirements, but does not adequately demonstrate pump operational readiness. Also, neither pump vibration or bearing temperature is being measured to monitor for mechanical degradation.

The Code requires vibration and bearing temperature measurements to monitor pump mechanical condition and detect degradation so a degraded mp can be repaired or replaced before it fails catastrophically. Likewise, pump flow rate and differential pressure measurements are evaluated together to monitor pump hydraulic condition and detect degradation so corrective action can be taken on a pump whose continued capa to perform its safety function is questionable. Therefore, test methods that provide an indication of mechanical and hydraul c degradation should be developed and implemented. The licensee should respond to this staff concern within 90 days.

The determination of pump flow rate by measuring the rate of day tank level/volume change can provide measurements that can be evaluated with differential pressure measurements to evaluate pump hydraulic condition. These determinations can be acceptable if the day tank level instruments are sufficiently accurate to yield flow rate results as accurate as would be measured by instruments meeting the Code accuracy and range requirements. Likewise, inlet pressures can be calculated from the height of the column fuel oil above the suction of the pump. These calculations should p ide acceptable inlet pressure determinations if the fuel oil storage tank level instruments are sufficiently accurate to meet the above criteria.

9. RR-8 requests relief from the Code exercising requirements for decay heat removal check valves DH-13A, DH-13B, DH-17, and DH-18. The licensee proposes to verify a full-stroke exercise open by disassembly and inspection on a sampling basis during refueling outages (see Section 3.2.1.2 of this report), and verify leak tight closure by leak testing the valves in pairs (see Section 3.2.1.3 of this report).

System P&IDs show flow elements installed upstream of these check valves. It may be practical to use portable flow instruments to verify a full-stroke exercise of these valves. Also, a non-intrusive method of testing these valves may be practical. Therefore, an interim period of one year or until the end of the next refueling outage, whichever is longer, should be provided to permit the licensee time to investigate whether portable flow instruments or valve diagnostic techniques can be used to verify that these valves fully open or open sufficiently to allow passage of maximum required accident flow during cold shutdowns or refueling outages. At the end of this interim period, the licensee should implement full-stroke testing with flow or provide the results of a study that demonstrate the impracticality of this alternative.

These check valves have been identified by the licensee as Event V PIVs, however, the proposed testing does not fully comply with GL 89-04, Position 4. This position states that the licensee should ensure that Event V PIVs are individually leak rate tested. A review of the system P&IDs indicates that several test taps exist upstream and downstream of the respective sets of check valves. It should not be burdensome for the licensee to individually leak rate test these valves. The licensee's proposed testing does not comply with GL 89-04 and does not provide assurance that these valves are capable of performing their leak tight safety function. The licensee should develop a leak rate test procedure that individually verifies the leak tight integrity of these valves. An interim period is necessary to give the licensee time to determine a method and develop test procedures to individually leak rate test these valves.

10. RR-30 requests relief from the Code requirements to measure the stroke times of the EDG air start valves (see Section 3.3.1.1 of this report). The licensee proposed to verify the stroke times indirectly by verifying the starting times of the diesel generators are 15 seconds or less. Many diesel generator air start systems are composed of two totally redundant air start trains, either of which can start the diesel within the required time. If the ANO-1 installation is totally redundant, the proposed testing may not detect a seriously degraded or failed valve. In this case, an alternate method of testing that detects valve degradation would have to be developed and implemented.

11. RR-30 requests relief from the Code requirement to measure the stroke times of EDG service water cooling valves, CV-3806 and CV-3807 (see Section 3.3.1.2 of this report). The licensee proposed to verify the stroke time indirectly by observing the starting time of the diesel generators. The diesel starting times would not be affected by degradation or failure of these valves, therefore, the proposed test would not detect valve degradation. Since the licensee has not shown the Code requirements to be impractical and the proposed testing does not provide reasonable assurance of valve operational readiness, relief

should not be granted as requested. The licensee should test these valves to the Code requirements or, if this is shown to be impractical, develop and implement a test that monitors for valve degradation.

12. RR-24 requests relief from the stroke time measurement requirements for service water isolation valve SW-72, which is indicated to be a manual valve. IWV-3413 requires measurement of stroke times for power operated valves. This requirement does not appear to apply to this manual valve. Therefore, the licensee should examine this relief request and either modify it or delete it as appropriate.

13. RR-33 requests relief from the pump vibration amplitude measurement and allowable range requirements for all pumps in the IST program (see Section 2.1.1.1 of this report). The licensee proposed to measure and analyze vibration velocity per ASME OM-6 (1988). Relief should be granted as requested provided the licensee verifies that the proposed testing would detect any significant mechanical degradation of vertical line shaft pumps. If it is determined that significant mechanical degradation cannot be detected, the licensee should investigate alternate testing methods. If an acceptable alternate method is found, it should be incorporated within two years. If the investigation shows that no acceptable alternatives exist, this should be documented in the program and the proposed testing continued until an alternative is found and implemented.

14. RR-10 requests relief from the remote position indication verification requirements of Section XI, but the licensee has not proposed alternate testing for these valves. This request was submitted by letter dated October 20, 1988, however, it was revised in the October 27, 1989, submittal by adding 10 new valves, therefore, it is evaluated in Section 3.1.1.1 of this TER. Relying on valve position indication in the conduct of plant operation where that indication is not routinely verified to be an accurate representation of valve position, is not acceptable. Therefore, relief should not be granted and the licensee should develop alternate means of determining valve position so the remote position indication can be verified accurate at least once every two years. The licensee should consider observation of system pressures or flow, or the use of diagnostic techniques to determine valve position in lieu of direct observation.

15. RR-6 requests relief from the exercising requirements of Section XI for the core flood tank (CFT) injection check valves CF-1A and CF-1B (see Section 3.4.1.1 of this report). The licensee has proposed to disassemble and manually exercise these valves on a sampling basis during refueling outages. The licensee has not demonstrated the impracticality or hardship of part-stroke exercising these valves during cold shutdowns. Therefore, the licensee should part-stroke exercise these valves during cold shutdowns or document the reasons this testing is impractical. It may be practicable to perform a reduced pressure discharge of the CFTs during refueling outages and verifying by non-intrusive techniques that the valve disk fully opens. The licensee should investigate whether non-intrusive techniques can be used to verify that these valves full-stroke open when subjected to a partial flow.

This relief request implies that valve closure will be verified by sample disassembly and inspection. However, the position summary section of the submittal dated October 27, 1989, indicates that these valves perform a pressure isolation (PIV) function and that valve leak tightness is demonstrated by monitoring CFT pressure and level during power operation. The Minutes of the Public Meetings on GL 89-04 state that disassembly and inspection may be found acceptable to verify closure capability if verification by pressure or flow measurement is not practical, however, disassembly and inspection is not acceptable for demonstration of leak-tight integrity. Closure of CF-1A or CF-1B should be demonstrated by some positive means other than disassembly and inspection. This relief request should be modified to reflect the alternate closure verification employed.

16. RR-22 requests relief from the closed exercising requirements of Section XI for the check valves in the main steam supply to the emergency feedwater turbine, MS-271 and MS-272. The licensee proposes to disassemble and inspect these valves on a sampling basis during refueling outages to verify valve closure. RR-22 is affected by GL 89-04, Position 2. However, since disassembly is to verify valve closure, this relief request is not approved by the Generic Letter and is evaluated in Section 3.5.1.1 of this report. The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The licensee should investigate methods of verifying the reverse flow closure capability of these valves other than disassembly and inspection. It may be practical, at least each refueling outage, to verify by non-intrusive diagnostic technique that the valve disks travel to their closed seats when the upstream isolation valves are closed. The licensee should use a non-intrusive technique to verify that these valves close when subjected to reverse differential pressure if this testing is found to be practical.