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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM AND REQUESTS FOR RELIEF

DUKE POWER COMPANY

DOCKET NOS. 50-369 AND 50-370

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a(g), requires that inservice testing (IST) of ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda, except where specific written relief has been requested by the licensee and granted by the Commission pursuant to 10 CFR 50.55(a)(3)(i), (a)(3)(ii), or (g)(6)(i). In requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety; or (3) the conformance with certain requirements of the applicable Code edition and addenda is impractical for its facility.

The Regulation, 10 CFR 50.55a(a)(3)(i), (a)(3)(ii), and (g)(6)(i), authorizes the Commission to grant relief from these requirements upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested as part of the licensee's IST Program are contained in the Safety Evaluation (SE) issued on the licensee's program.

The IST program addressed in this report covers the first ten-year inspection interval from December 1, 1981 to December 1, 1991 for Unit 1 and March 1, 1984 to March 1, 1994 for Unit 2. The licensee's IST program, Revision 14 for Unit 1 and Revision 10 for Unit 2, is described in a letter dated April 20, 1990, which supersedes all previous submittals. The program is based on the requirements of Section XI of the ASME Code, 1980 Edition.

EVALUATION

The IST program and the requests for relief from the requirements of Section XI have been reviewed by the staff with the assistance of its contractor, EG&G, Idaho, Inc. (EG&G). In addition, EG&G and staff members met with licensee representatives on August 16 and 17, 1988, in a working session to discuss questions resulting from the review. The Technical Evaluation Report (TER) provided as Attachment 1 is EG&G's evaluation of the licensee's inservice testing program and relief requests. The staff has reviewed the TER and concurs with and adopts the evaluations and conclusions contained in the TER. A summary of the pump and valve relief request determinations is presented in Table 1. The granting of relief is based upon the fulfillment of any commitments made by the licensee in its basis for each relief request and the alternative proposed testing.

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Two relief requests were partially denied (TER Sections 3.2.1 and 3.6.1) and 13 relief requests were granted with certain conditions (TER Sections 3.3.1, 3.4.1, 3.5.1, 3.7.1, 4.2.1.1, 4.2.1.2, 4.3.1.1, 4.3.1.2, 4.4.2.1, 4.5.1.1, 4.5.1.2, 4.6.1.1 and 4.7.1.1). The licensee should refer to the specific TER section for a detailed discussion of these cases. These partial denials and conditions are listed in the TER Appendix A, which also lists other IST program anomalies identified during the review.

The licensee should resolve all the items listed in Appendix A in accordance with the staff guidance therein. Program/procedural changes in cases where interim relief is not specifically granted in Table 1 should be made within six months of receipt of this SE. Item six should be actively pursued and, if alternate testing methods are developed, the affected relief requests should be revised or withdrawn.

CONCLUSION

Based on the review of the licensee's IST program relief requests, the staff concludes that the relief requests as evaluated and modified by this SE will provide reasonable assurance of the operational readiness of the pumps and valves to perform their safety related functions. The staff has determined that granting relief, pursuant to 10 CFR 50.55(a)(3)(i), (a)(3)(ii) and (g)(6)(i), 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 alternate testing being implemented, the impracticality of performing the required testing and the burden on the licensee if the requirements were imposed on the facility. The last column of Table 1 identifies the regulation under which the requested relief is granted.

During the review of the licensee's inservice testing program, the staff has identified certain misinterpretations or omissions of Code requirements. These items are summarized in the TER Appendix A. The IST program relief requests for McGuire Nuclear Station Units 1 and 2 provided by a submittal dated April 20, 1990, are acceptable for implementation provided that the items noted above are corrected promptly. New or revised relief requests contained in any subsequent revisions may not be implemented without prior approval by NRC, unless they are relief requests meeting the positions in Generic Letter 89-04, Enclosure 1.

Principal Contributor: K. Dempsey, EMEB, DET

Dated: January 16, 1991

McGUIRE NUCLEAR STATION, UNITS 1 AND 2
SER TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
I.3(A)	3.1.1	IWP-3100, Measure pump static suction pressure.	All pumps.	No measurement if the pump is already in operation.	Relief granted. (a)(3)(i)
I.3(B)	3.1.2	IWP-3100 and 3200, Measure pump vibration amplitude.	All pumps.	Measure vibration velocity in accordance with ANSI/ASME OM-6.	Relief granted. (a)(3)(i)
I.3(C)	3.1.3	IWP-3100, 3300, and 3500, Annual measurement of bearing temperature.	All pumps.	Evaluate pump bearing condition using quarterly vibration velocity measurements.	Relief granted. (a)(3)(i)
I.4(B) Unit 1 I.4(A) Unit 2	3.2.1	IWP-3300, Measure and observe all quantities in Table 3100-1.	Diesel fuel oil transfer pumps, FD-1A (2A) and 1B (2B).	Quarterly vibration velocity analysis, calculate suction pressure and flow rate.	Relief granted provided computational methods meet Code accuracy requirements, relief denied for lubricant level observation and flow rate acceptance criteria deviation. (a)(3)(i)

McGUIRE NUCLEAR STATION, UNITS 1 AND 2
SER TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
I.4(C) Unit 1 I.4(B) Unit 2	3.3.1	IWP-3100, Measure pump flowrate and differential pressure.	Safety injection pumps, NI-1A (2A) and 1B (2B).	Measure vibration velocity and verify Tech. Spec. limits on pump operability quarterly, perform Code required testing during refueling outages.	Relief granted provided at least differential pressure and vibration are measured and trended each quarter. (a)(3)(i)
I.4(D) Unit 1 I.4(C) Unit 2	3.4.1	IWP-3100, Measure pump flow rate and differential pressure.	Residual heat removal pumps, ND-1A (2A) and 1B (2B).	Measure vibration velocity and verify Tech. Spec. limits on pump operability quarterly, perform Code required testing during refueling outages.	Relief granted provided at least differential pressure and vibration are measured and trended each quarter and Code required testing is performed at full or substantial flow during cold shutdowns. (a)(3)(i)
I.4(E) Unit 1 I.4(D) Unit 2	3.5.1	IWP-3100, Measure pump flow rate and differential pressure.	Centrifugal charging pumps, NV-1A (2A) and 1B (2B).	Measure vibration velocity and verify Tech. Spec. limits on pump operability quarterly, perform Code required testing during refueling outages.	Relief granted provided at least differential pressure and vibration are measured and trended each quarter. (a)(3)(i)

McGUIRE NUCLEAR STATION, UNITS 1 AND 2
SER TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
I.4(F) Unit 1 I.4(E) Unit 2	3.6.1	IWP-3100, Pump testing method.	Diesel generator room sump pumps, WN-1A2 (2A2), 1A3 (2A3), 1B2 (2B2), and 1B3 (2B3).	Calculate the quantities of Table 3100-2 which cannot be directly measured until system modifications can be made to enable the Code required testing.	Interim relief granted for one year or until the next refueling outages, whichever is greater. (a)(3)(ii) Relief denied for lubricant level observation requirement.
I.4(G) Unit 1 I.4(F) Unit 2	3.7.1	IWP-3100, Pump testing method.	Standby makeup pump, NV-1 and 2.	Verify that pump flow rate is greater than or equal to 26 gpm when discharge pressure is greater than or equal to 2485 psig.	Relief granted provided licensee performs testing as outlined in the evaluation. (a)(3)(i)
GR-1	4.1.1.1	IWV-3417(a), Trending valve stroke times.	All valves that normally stroke in 2 seconds or less.	Initiate corrective action if the maximum value of full-stroke time (2 seconds) is exceeded.	Relief granted. (a)(3)(i)
GR-2	4.1.2.1	IWV-3427(b) Trending leakrates of containment isolation valves.	All containment isolation valves.	Apply the requirements of IWV-3426 and 3427(a), waive the trending requirements of IWV-3427(b).	Relief granted. (a)(3)(i)

McGUIRE NUCLEAR STATION, UNITS 1 AND 2
SER TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Numerous relief requests	4.1.3.1	IWV-3521, Exercise quarterly.	Containment isolation check valves located inside containment.	Verify closure capability by performing Appendix J leak rate testing during refueling outages.	Relief granted. (a)(3)(ii)
RR-CA1	4.2.1.1	IWV-3521, Exercise quarterly.	Nuclear service water to auxiliary feedwater header check valves, 1(2)CA-165 and 166.	Disassemble and full-stroke exercise on a sampling basis during refueling outages.	Interim relief granted for one year or until the next refueling outage, whichever is greater. (g)(6)(i)
RR-CA2	4.2.1.2	IWV-3521, Exercise quarterly.	Auxiliary feedwater pump suction check valves from the service water system, 1(2)CA-8, 10, and 12.	Disassemble and inspect the valves on a sampling basis during refueling outages to verify their closure capability.	Relief granted provided the licensee part-stroke exercises the valves to the open position with flow after reassembly. (g)(6)(i)
RR-NI4	4.3.1.1	IWV-3521, Exercise quarterly.	Cold leg accumulator discharge check valves to reactor coolant system, 1(2)NI-59, 70, 81, and 93.	Part-stroke exercise during cold shutdowns, but not more frequently than once every nine months, manually exercise during refueling outages using sample disassembly.	Relief granted provided licensee performs a partial flow test of the disassembled valves before they are returned to service. (g)(6)(i)

McGUIRE NUCLEAR STATION, UNITS 1 AND 2
SER TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
RR-NI6	4.3.1.2	IWV-3521, Exercise quarterly.	Cold leg accumulator and safety injection combined discharge check valves, 1(2)NI-60, 71, 82, and 94	Part-stroke exercise during cold shutdowns, but not more frequently than once every nine months, manually exercise during refueling outages using sample disassembly.	Relief granted provided licensee performs a partial flow test of the disassembled valves before they are returned to service. (g)(6)(i)
RR-NF2	4.4.1.1	10CFR50 Appendix J.	Ice condenser glycol supply and return containment isolation valves, 1(2)NF-228A, 233B, and 234A.	Leak rate test glycol line containment isolation valves without draining glycol.	Not Applicable to ASME Section XI requirements.
RR-NF1	4.4.2.1	10CFR50 Appendix J, IWV-3521, Exercise quarterly.	Ice condenser glycol supply line containment isolation check valve, 1(2)NF-229.	Verify closure capability by Appendix J leak test at a refueling outage frequency, perform test without draining glycol.	Relief Granted from Code exercising frequency requirements only. (a)(3)(ii)
RR-NS1	4.5.1.1	IWV-3521, Exercise quarterly.	Containment spray header check valves, 1(2)NS-13, 16, 30, 33, 41, and 46.	Part-stroke exercise during cold shutdowns, but not more frequently than once every nine months, manually exercise during refueling outages using sample disassembly.	Relief granted provided licensee part-stroke exercises all valves during cold shutdowns and refueling outages, and the disassembled valves before they are returned to service. (g)(6)(i)

McGUIRE NUCLEAR STATION, UNITS 1 AND 2
SER TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
RR-NS2	4.5.1.2	IWV-3521, Exercise quarterly.	Containment spray pump suction check valves from the refueling water storage tank, 1(2)NS-4 and 21.	Part-stroke exercise quarterly, manually exercise during refueling outages using sample disassembly.	Relief granted provided licensee performs a partial flow test of the disassembled valves before they are returned to service. (g)(6)(i)
RR-NV4	4.6.1.1	IWV-3521, Exercise quarterly.	Centrifugal charging pump suction check valves from the boric acid tank, 1NV-411 and 413.	Part-stroke exercise during cold shutdowns, but not more frequently than once every nine months, disassemble and manually exercise during refueling outages.	Relief granted provided licensee part-stroke exercises all valves during cold shutdowns and refueling outages, and the disassembled valves before they are returned to service. (g)(6)(i)
RR-RN1	4.7.1.1	IWV-3521, Exercise quarterly.	Service water makeup to the spent fuel pool check valves, 1(2)RN-113 and 214.	Part-stroke exercise quarterly, manually exercise during refueling outages using sample disassembly.	Relief granted provided licensee performs a partial flow test of the disassembled valves before they are returned to service. (g)(6)(i)

EGG-NTA-8418
Revision 1

TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
McGUIRE NUCLEAR STATION
UNITS 1 & 2

Docket Nos. 50-369 & 50-370

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ABSTRACT

This EG&G Idaho, Inc., report presents the results of our evaluation of the McGuire Nuclear Station Inservice Testing Program for pumps and valves whose function is safety-related.

PREFACE

This report is supplied as part of the "Review of Pump and Valve Inservice Testing Programs for Operating Plants (III)" Program being 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.

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
McGUIRE NUCLEAR STATION, UNITS 1 AND 2

1. INTRODUCTION

Contained herein is a technical evaluation of the pump and valve inservice testing (IST) program submitted by Duke Power Company for its McGuire Nuclear Station, Units 1 and 2.

The working session with Duke Power Company representatives was conducted on August 16 and 17, 1988. The licensee's pump and valve IST programs, Revisions 14 and 10 dated April 20, 1990, for Units 1 and 2 respectively, were reviewed to verify compliance of proposed tests for pumps and valves whose function is safety-related with the requirements of the ASME Boiler and Pressure Vessel Code (the Code), Section XI, 1980 Edition. Any IST program revisions subsequent to those noted above are not addressed in this technical evaluation report (TER). Program changes involving additional or revised relief requests should be submitted to the NRC under separate cover in order to receive prompt attention, but should not be implemented prior to review and approval by the NRC. Other IST program revisions should follow the guidance of Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs."

In its IST program, Duke Power Company has requested relief from the ASME Code testing requirements for specific pumps and valves and these requests have been evaluated individually to determine if the criteria in 10 CFR 50.55a for granting relief has indeed been met. This review was performed utilizing the acceptance criteria of the Standard Review Plan, Section 3.9.6, the Draft Regulatory Guide and Value/Impact Statement titled "Identification of Valves for Inclusion in Inservice Testing Programs", and Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The IST Program testing requirements apply only to component testing (i.e., pumps and valves) and are not intended to provide the basis to change the licensee's current Technical Specifications for system test requirements.

Section 2 of this report presents the scope of this review.

Section 3 of this report presents the Duke Power Company bases for requesting relief from the Section XI requirements for the McGuire Nuclear Station pump testing program, and the EG&G reviewer's evaluations and conclusions regarding these requests. Similar information is presented in Section 4 for the valve testing program.

Category A, B, and C valves which are exercised at cold shutdown and refueling outages and meet the requirements of the ASME Code, Section XI, are addressed in Appendix A.

A listing of P&IDs and Figures used for this review is contained in Appendix B.

Justifications for exercising Category A, B, and C valves during cold shutdowns and refueling outages, instead of quarterly during power operation, were reviewed and found acceptable except as noted in Appendix A.

Inconsistencies and omissions in the licensee's IST program noted during the course of this review are listed in Appendix A. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

2. SCOPE

The EG&G Idaho review of the McGuire Nuclear Station Inservice testing (IST) program for pumps and valves began in April, 1987. The program initially examined was Revisions 10 and 6, for Units 1 and 2 respectively, dated May 6, 1988, which identified the licensee's proposed testing of safety-related pumps and valves in the plant systems listed in Appendix B.

The licensee's proposed IST program was reviewed by locating and highlighting the components on the appropriate system P&IDs and determining their function in the system. The licensee's proposed testing was then evaluated to determine if it was in compliance with the ASME Code, Section XI, requirements. During the course of this review, questions and comments were made pertaining to unclear or potential problem areas in the licensee's IST program. These were transmitted to the licensee in the form of a request for additional information (RAI) which served as the agenda for the working meeting between the licensee, the NRC, and the EG&G reviewers.

Each pump and valve relief request was individually evaluated to determine if the licensee had clearly demonstrated that compliance with the Code requirements is impractical or presents a hardship without a compensating increase in safety for the identified system components, and to determine if the proposed alternate testing would provide a reasonable indication of component operability. Where the licensee's technical basis or alternate testing was insufficient, the licensee was requested to clarify the relief request. The system P&ID was also examined to determine whether the instrumentation necessary to make the identified measurements is available. If, based on the unavailability of adequate instrumentation, or the reviewer's experience and knowledge, it was determined that it may not be possible or practical to make the measurements identified in the licensee's IST program, a question or comment was generated requesting clarification.

For pumps, it was verified that each of the seven inservice test quantities of Table IWP-3100-1 were being measured or observed. For those test quantities that were not being measured or observed quarterly in

accordance with the Code, it was verified that a request for relief from the Code requirements had been submitted. If the testing was not being performed in accordance with the Code and a relief request had not been submitted, the licensee was requested to explain the inconsistency in the RAI.

The review of the proposed testing of valves verified that all appropriate ASME Code testing for each individual valve is performed as required. The proposed testing was evaluated to determine if all valves that were judged to be active Category A, B, and/or C, (other than safety and relief valves) are exercised quarterly in accordance with IWV-3410 or 3520. If any active safety-related valve is not full-stroke exercised quarterly as required, then the licensee's justification for the deviation, either in the form of a cold shutdown justification or a relief request, was examined to determine its accuracy and adequacy. The proposed alternate testing was also evaluated to determine its compliance with the Code requirements.

Safety-related safety valves and relief valves, excluding those that perform only a thermal relief function, were confirmed to be included in the IST program and are tested in accordance with IWV-3510.

For valves with remote position indication, the reviewer confirmed that the valve remote position indication is verified in accordance with IWV-3300. The reviewer verified that the licensee had assigned limiting values of full-stroke times for all power operated valves in the IST program as required by IWV-3413. For valves having a fail-safe actuator, the reviewer confirmed that the valve's fail-safe actuator are being tested in accordance with IWV-3415.

Each check valve was evaluated to determine if the proposed testing would verify its ability to perform its safety function(s). Extensive system knowledge and experience with other similar facilities is used to determine whether the proposed tests would full-stroke exercise the check valve disks open or verify their reverse flow closure capability. If there was any doubt about the adequacy of the identified testing, questions were included in the RAI.

Further evaluation was performed on all valves in the program to determine that the identified testing could practically and safely be conducted as described. If the licensee's ability to perform the testing was in doubt, a question was formulated to alert the licensee to the suspected problem.

Once all of the components in the licensee's IST program had been identified on the P&IDs and evaluated as described above, the P&IDs were examined closely, by at least two trained and experienced reviewers, to identify any additional pumps or valves that may perform a safety function. The licensee was asked to reconcile any components that were identified by this process which were not included in the IST program. Also, the list of systems included in the licensee's program was compared to a system list in the Draft Regulatory Guide and Value/Impact Statement titled, "Identification of Valves for Inclusion in Inservice Testing Programs." Systems that appear in the Draft Regulatory Guide list but not in the licensee's program were evaluated, and if appropriate, questions were added to the RAI.

Additionally, if the reviewers suspected a cific or a general aspect of the licensee's IST program, questions were uded in the RAI to clarify those areas of doubt. Some questions were included to allow the reviewers to make conclusive statements in the RAI.

The review was completed and the RAI was transmitted to the licensee. These questions were later used as the agenda for the working meeting with the licensee on August 16 and 17, 1988. At the meeting, each question and comment was discussed in detail and resolved as follows:

a. The licensee agreed to make the necessary IST Program corrections or changes to satisfy the concerns of the NRC and their reviewers.

b. The licensee provided additional information or clarification about their IST Program that satisfied the concerns of the NRC and their reviewers, and no program change is required.

c. The item remained open for the licensee to further investigate and propose a solution to the NRC.

d. The item remained open for further investigation by the NRC.

e. The item remained open for further investigation and discussion by both the NRC and the licensee.

Revised IST programs, Revisions 11 and 7 (for Units 1 and 2 respectively) dated October 31, 1988, Revisions 12 and 8 dated April 19, 1989, Revisions 13 and 9 dated December 14, 1989, and Revisions 14 and 10 dated April 20, 1990 were received and compared to the previous submittals to identify any changes. The changes were evaluated to determine whether they were acceptable, if not, they were added to the items that remained open from the meeting.

This TER is based on information contained in the submittals and on information obtained in the meetings which took place during the review process.

3. PUMP TESTING PROGRAM

The McGuire Nuclear Station, Units 1 and 2, IST Program submitted by Duke Power Company was examined to verify that all pumps that are included in the program are subjected to the periodic tests required by the ASME Code, Section XI, except for those pumps identified below for which specific relief from testing has been requested and as summarized in Appendix C. Each Duke Power Company basis for requesting relief from the pump testing requirements and the reviewer's evaluation of that request are summarized below.

3.1 All Pumps in the IST Program

3.1.1 Static Measurement of Suction Pressure

3.1.1.1 Relief Request. The licensee has requested relief from the requirement of Section XI, Table IWP-3100-1, that static suction pressure be measured prior to pump startup. The licensee has proposed that this measurement not be required if the pump is already in operation.

3.1.1.1.1 Licensee's Basis for Relief--This measurement ensures adequate NPSH is available. Occasionally, pumps may be in service supporting normal plant operation. In these cases, NPSH requirements have already been verified and it is not required to shut down an operation pump to measure static suction pressure.

For pumps operating at the time of the test, static suction pressure (Pi) will not be measured.

3.1.1.1.2 Evaluation--Stopping a running pump to ensure that suction pressure is adequate would not be meaningful since insufficient pump suction pressure would cause pump cavitation which would be readily apparent. The values of differential pressure, flow, and vibration would likely be outside the allowable ranges of Table IWP-3100-2, and pump damage caused by cavitation would be evident during pump testing. Therefore, the licensee's proposed alternative, to verify adequate net positive suction

head prior to pump startup, is a reasonable alternative to the Code requirements.

Based on the determination that the licensee's proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

3.1.2 Pump Vibration Measurements

3.1.2.1 Relief Request. The licensee has requested relief from the vibration amplitude measurement requirements of Section XI, Paragraphs IWP-3100 and 3200. The licensee has proposed that vibration velocity be used to evaluate the mechanical condition of the pumps in accordance with the requirements and limits of ANSI/ASME OM-6.

3.1.2.1.1 Licensee's Basis for Relief--Industry experience has shown that pump bearing degradation results in increased bearing noise at frequencies 5 to 100 times the rotational frequency of the pump. The measurement of vibration amplitude in mils is adequate for measuring unbalance, misalignment, and other low frequency modes; however, this measurement does not provide early warning of bearing degradation since the magnitude of the higher frequency vibration is 10 to 1,000 times lower than normal pump movement. Considering the high frequency vibration associated with pump bearings, vibration velocity measurements provide a better indication of the mechanical condition of the pump than displacement measurements. Recognizing this fact, Table 6100-1 of ANSI/ASME OM-6 establishes velocity limits for pumps operating at a speed of $\geq$600 rpm.

In lieu of measuring overall amplitude in units of displacement (mils), pump vibration velocity measurements will be used to evaluate pump mechanical condition and to detect bearing degradation. The pump vibration measurements will be performed in accordance with all vibration requirements of Draft 11 of ANSI/ASME OM-6, including the allowable ranges and limits specified by Table 6100-1 of this document. The range and accuracy requirements for vibration instrumentation specified by Section 4600 of OM-6 will be used in lieu of the range and accuracy requirements of IWP-4100.

3.1.2.1.2 Evaluation--The measurement of vibration velocity provides an indication of pump mechanical condition which is superior to that provided by the measurement of vibration amplitude.

ANSI/ASME OM-6 provides the requirements, allowable limits, and the range and accuracy requirements for measurement of vibration velocity.

Based on the determination that the measurement of vibration velocity, instead of vibration amplitude, would provide an acceptable level of quality and safety, relief may be granted as requested.

3.1.3 Bearing Temperature Measurement

3.1.3.1 Relief Request. The licensee has requested relief from the bearing temperature measurement requirements of Section XI, Paragraphs IWP-3100, 3300, and 3500 for all pumps in the IST program. The licensee has proposed evaluating pump bearing condition using quarterly vibration velocity measurements.

3.1.3.1.1 Licensee's Basis for Relief--The yearly measurement of bearing temperature for pumps does not provide any meaningful information. Several factors such as the temperature of the working fluid, the ambient temperature, and the size of the bearing housing will mask any bearing condition change short of a catastrophic failure. Obtaining these measurements requires a minimum of one-half hour of pump operation to achieve stable bearing temperatures. The small probability of detecting bearing failure by temperature measurement does not justify the additional pump operating time required to make the measurement.

The quarterly pump bearing vibration signatures obtained in accordance with all requirements of Draft 11 of ANSI/ASME OM-6, will be used to evaluate pump mechanical condition and to detect bearing degradation. The velocity signatures provide a better indication of bearing performance since these measurements are not substantially affected by outside influences.

3.1.3.1.2 Evaluation--For pumps which are not equipped with bearing temperature instrumentation, the required measurements must be taken on the bearing housing or major modifications must be made to install instrumentation. There are several factors that would affect the temperature measured at the bearing housing which could mask a change in the bearing condition (short of catastrophic failure) such as the temperature of the working fluid, ambient room temperature, and lubricant temperature.

The use of pump vibration velocity can provide a great deal of information about pump mechanical condition that could not be obtained using vibration displacement readings or by measuring the temperature of the bearing housing. Pump bearing degradation results in increased bearing noise at frequencies 10 to 100 times the rotational speed of the pump. These high frequency bearing noises would result in relatively large changes in pump vibration velocity measurements, whereas vibration displacement and bearing housing temperature measurements may not change significantly. A program utilizing pump vibration velocity measurements can provide better information about pump bearing condition than a single annual bearing temperature measurement and would, therefore, provide an acceptable level of quality and safety.

Based on the determination that the licensee's proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

3.2 Diesel Fuel Oil Transfer Pumps

3.2.1 Testing of Positive Displacement Pumps

3.2.1.1 Relief Request. The licensee has requested relief from the measurement requirements of Section XI, Paragraph IWP-3300, for the diesel fuel oil transfer pumps, FD-1A (2A) and 1B (2B). The licensee has proposed that the condition of these pumps be determined by quarterly vibration testing and verification that the pumps perform their design function during monthly diesel generator testing. Additionally, the licensee has proposed that pump suction pressure and flowrate be calculated instead of directly measuring them.

3.2.1.1.1 Licensee's Basis for Requesting Relief--Section XI does not provide appropriate provisions for testing positive displacement pumps.

The fuel oil transfer pumps are internal gear positive displacement pumps. The performance curve for these pumps is relatively flat. Capacity of these pumps is independent of discharge pressure when operating properly and operating below the cracking pressure of the pump internal relief valve. Discharge pressure will be measured for information purposes, but will not be compared to any acceptance criteria. The pumps will be tested by measuring the level rise in the fuel oil day tank and converting this to a flow rate. Pump testing is between the level setpoints of the fuel oil day tank and this gives a run time of approximately 60-75 seconds. The flow rate will be compared to acceptance criteria established in accordance with Table IWP-3100-2 except the acceptable range has been widened and the high alert range increased to allow for level instrument fluctuations.

Acceptable Range:	0.94 to 1.07 Qr
Low Alert Range:	0.90 to 0.94 Qr
High Alert Range:	1.07 to 1.10 Qr
Low Required Action Range:	<0.90 Qr
High Required Action Range:	>1.10 Qr

These pumps are designed to produce a flow rate of 22 gpm. The system design flow rate requirement for the pumps is 11 gpm. This difference provides a comfortable margin in the event a reference value is falsely established that would allow approximately 12% pump degradation before requiring any action in accordance with IWP.

The diesel generator fuel oil storage tank is monitored to maintain level as required by the McGuire Technical Specifications. This level ensures adequate NPSH and no suction gauge is required.

No lubrication level verification is required for this pump. Lubrication is maintained under our routine preventative maintenance program.

The mechanical condition of the subject pumps will be determined from vibration data to be gathered quarterly. No bearing temperature instrumentation is installed. OM-6 will not require bearing temperature measurements.

In addition, monthly diesel generator starting and loading (as required by McGuire Technical Specifications) will assess the hydraulic condition of the subject auxiliary pumps and demonstrates the capability of the individual components to perform their design function.

3.2.1.1.2 Evaluation--These diesel fuel oil transfer pumps are positive displacement type pumps. The capacity of positive displacement pumps is independent of the discharge pressure in the design operating range when the pumps are in good operating condition. Pump degradation may result in the loss of capacity at higher pressures, however, these pumps supply fuel oil to a non-pressurized tank and the pressure developed at the discharge of the pump is due only to system resistance. Since the differential pressure across the pump is independent of pump performance, the measurement of pump differential pressure is not meaningful.

The measurement of pump suction pressure is required by the Code primarily to ensure adequate net positive suction head. The minimum level requirement for the diesel generator fuel oil storage tank identified in the McGuire Technical Specifications will assure that the fuel oil transfer pumps will have adequate suction head. Therefore, as long as this minimum level is maintained, measurement of suction pressure should not be necessary.

Flow rate instrumentation is not installed in the discharge line for these pumps. The licensee's proposal, to compute the flow rate based on the rate of increase in the day tank level, is a reasonable alternative to the Code requirements and is acceptable provided the licensee's method of flow rate computation meets the accuracy requirements of IWP-4110. The licensee has proposed raising and expanding the high alert and required action ranges of Table IWP-3100-2 to allow for level instrument fluctuations. The licensee's justification is that the pumps have a design flowrate which is

100% above the system requirements, thereby providing sufficient margin to compensate for undetected degradation if the flowrate reference value were falsely established at too low a value. The purpose of Section XI testing is to detect degradation which could affect the future operability of the tested components. Even if the component design is 100% greater than the system requirements, a significant decrease in performance may still be indicative of impending failure.

Lubricant level should be observed for all pumps in the IST program where provisions exist. If provisions exist and the licensee determines that performing this testing is impractical, then the licensee should demonstrate the impracticality of the Code required testing in their basis for relief. For pumps where no provision exists for the measurement or observation of lubricant level or pressure (such as pumps with permanently lubricated sealed bearings or where bearing lubricant is the fluid pumped), this requirement is not applicable.

The measurement of pump vibration velocity and bearing temperatures has already been discussed in sections 3.1.2 and 3.1.3 of this report. The diesel fuel oil transfer pumps are tested monthly in accordance with the McGuire Technical Specifications. This is in excess of the Code required frequency and further ensures the operability of these pumps.

Based on the determination that the proposed alternatives would provide an acceptable level of quality and safety, relief may be granted as requested for the measurement of inlet and differential pressure. Relief may also be granted to compute flow rate based on the rate of change of day tank level provided this method meets the accuracy requirements of IWP-4110. However, since the licensee has not demonstrated that the proposed acceptance criteria for flow rate measurement would provide reasonable assurance of operational readiness, relief for deviation from the flowrate acceptance criteria of Table 3100-2 should not be granted. Also, since the licensee has not demonstrated the impracticality of the lubricant level observation or the equivalence of their preventative maintenance program to the Code requirements, relief from this Code requirement should not be granted.

3.3 Safety Injection Pumps

3.3.1 Testing procedure

3.3.1.1 Relief Request. The licensee has requested relief from the testing procedure requirements of Section XI, Paragraph IWP-3100, for the safety injection pumps, NI-1A (2A) and 1B (2B). The licensee has proposed taking vibration velocity measurements and verifying the Technical Specification limits on pump operability are met each quarter, and performing the Code required pump testing each refueling outage.

3.3.1.1.1 Licensee's Basis for Relief--When testing these pumps on line, the only flow path available is through the miniflow to the fueling water storage tank (FWST). Flow is limited by an orifice in the miniflow line, which yields a test point back on the head curve. As stated in Generic Letter 89-04, minimum flow lines are not designed for pump testing purposes. The test point for monitoring pump performance for degradation should be in a more stable region on the pump performance curve. Also, the amount of time the pump is run at miniflow should be minimized.

The safety injection pumps will be tested according to the following program, which is consistent with Generic Letter 89-04:

Quarterly
The safety injection pumps will be tested quarterly to verify Technical Specification limits on pump operability are met. Velocity vibration measurements will also be taken. The main thrust of this test will be to verify pump operability.

Refueling Outage
During each refueling outage, a Code pump test, including velocity vibration measurements, will be performed at a test point in the stable region of the performance curve.

Implementation
The new testing program (quarterly and refueling) will be in place by the 1990 Unit 2 refueling outage and the 1991 Unit 1 refueling outage.

3.3.1.1.2 Evaluation--The only flow path available for testing of the safety injection pumps, quarterly and during cold shutdowns, is through the minimum flow recirculation lines. The injection lines to the reactor coolant system cannot be used for quarterly pump testing since the safety injection pumps do not develop enough head to overcome reactor coolant system pressure. Using the injection lines for pump testing during cold shutdowns could result in a low-temperature overpressurization of the reactor coolant system.

While flow instruments are installed in the McGuire minimum flow recirculation lines for the safety injection pumps, flow rate is limited by an orifice in these lines and neither the flow or the differential pressure can be varied. Pump testing using minimum flow recirculation lines, through which the flow rates are significantly below pump design flow, may result in pump operation in the flat portion of the pump curve where flow rate measurement will not provide meaningful data. In these cases, the NRC staff has determined that performing the Code required pump testing under full or substantial flow conditions, using a fully instrumented flow path, at a reduced frequency (e.g. - cold shutdowns or refueling outages) is an acceptable alternative to the Code requirements provided quarterly testing is also performed in which at least pump differential pressure and vibration are measured and trended as required by IWP-6000.

The licensee has not stated precisely what testing, other than vibration velocity measurements, will be performed to verify pump operability each quarter. However, quarterly testing as discussed above combined with the Code required testing under full or substantial flow conditions during refueling outages should provide an acceptable level of quality and safety and relief may be granted on the condition that the licensee's testing incorporates these provisions.

3.4 Residual Heat Removal Pumps

3.4.1 Testing Procedure

3.4.1.1 Relief Request. The licensee has requested relief from the testing procedure requirements of Section XI, Paragraph IWP-3100, for the

residual heat removal pumps ND-1A (2A) and 1B (2B). The licensee has proposed taking vibration velocity measurements and verifying the Technical Specification limits on pump operability are met each quarter, and performing the Code required pump testing each refueling outage.

3.4.1.1.1 Licensee's Basis for Relief--When testing these pumps on line, the only flow path available is through the miniflow line. Flow is limited by the miniflow control valve in the line, which yields a test point back on the head curve. As stated in Generic Letter 89-04, minimum flow lines are not designed for pump testing purposes. The test point for monitoring pump performance for degradation should be in a more stable region on the pump performance curve. Also, the amount of time the pump is run at miniflow should be minimized.

The residual heat removal pumps will be tested according to the following program, which is consistent with Generic Letter 89-04:

Quarterly

The residual heat removal pumps will be tested quarterly to verify Technical Specification limits on pump operability are met. Velocity vibration measurements will also be taken. The main thrust of this test will be to verify pump operability.

Refueling Outage

During each refueling outage, a Code pump test, including velocity vibration measurements, will be performed at a test point in the stable region of the performance curve.

Implementation

The new testing program (quarterly and refueling) will be in place by the 1990 Unit 2 refueling outage and the 1991 Unit 1 refueling outage.

3.4.1.1.2 Evaluation--The only flow path available for quarterly testing of the safety injection pumps is through the minimum flow recirculation lines. The injection lines to the reactor coolant system cannot be used for quarterly pump testing since the residual heat removal

pumps do not develop enough head to overcome reactor coolant system pressure.

While flow instruments are installed in the McGuire minimum flow recirculation flow path for the residual heat removal pumps, flow rate is limited by the minimum flow control valve and the size of the recirculation lines. Pump testing using minimum flow recirculation lines, through which the flow rates are significantly below pump design flow, may result in pump operation in the flat portion of the pump performance curve where flow rate measurement will not provide meaningful data. In these cases, the NRC staff has determined that performing the Code required pump testing under full or substantial flow conditions, using a fully instrumented flow path, at a reduced frequency (e.g. - cold shutdowns or refueling outages) is an acceptable alternative to the Code requirements provided quarterly testing is also performed in which at least pump differential pressure and vibration are measured and trended as required by IWP-6000.

The licensee has not stated precisely what testing, other than vibration velocity measurements, will be performed to verify pump operability each quarter. Further, the residual heat removal pumps are routinely used for decay heat removal via the instrumented injection lines to the reactor coolant system during cold shutdowns. However, the licensee has not provided a justification which demonstrates why this flow path cannot be used for pump testing during cold shutdowns. Quarterly testing as discussed above, combined with the Code required testing under full or substantial flow conditions during cold shutdowns should provide an acceptable level of quality and safety and relief may be granted on the condition that the licensee's testing incorporates these provisions.

3.5 Centrifugal Charging Pumps

3.5.1 Measurement of Flow

3.5.1.1 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWP-3100, for pumps NV-1A (2A) and 1B (2B), that both flow rate and differential pressure be measured and compared

to a reference value. The licensee has proposed taking vibration velocity measurements and verifying the Technical Specification limits on pump operability are met each quarter, and performing the Code required pump testing each refueling outage.

3.5.1.1.1 Licensee's Basis for Relief--When testing these pumps on line, the only flow path available is through a combination of the normal charging and the miniflow to the volume control tank (VCT). The miniflow is not instrumented for flow. Flow through the line is assumed to be at the flow rate corresponding to the orifice design conditions. Also, the combination flow paths yield a test point back on the head curve. The best test point back for monitoring pump performance for degradation should be in a more stable region on the pump performance curve.

The centrifugal charging pumps will be tested according to the following program, which is consistent with Generic Letter 89-04:

Quarterly

The centrifugal charging pumps will be tested quarterly to verify Technical Specification limits on pump operability are met. Velocity vibration measurements will also be taken. The main thrust of this test will be to verify pump operability.

Refueling Outage

During each refueling outage, a Code pump test, including velocity vibration measurements, will be performed at a test point in the stable region of the performance curve.

Implementation

The new testing program (quarterly and refueling) will be in place by the 1990 Unit 2 refueling outage and the 1991 Unit 1 refueling outage.

3.5.1.1.2 Evaluation--These pumps are tested using both the normal charging flow path and the minimum flow recirculation lines. The minimum flow recirculation li are no nstrumented for flow rate measur ent. Isolating the c fugal arging pump minimum flow

recirculation lines during quarterly pump testing could cause pump damage during low pump flow conditions. Therefore, the total pump flow cannot be measured during quarterly pump testing with the current system configuration. The total centrifugal charging pump flow rates during normal operation are substantially less than pump design flow, which results in pump operation near the flat portion of the pump performance curve where flow rate measurement may not provide meaningful data. Achieving full or substantial pump flow during cold shutdowns could result in a low temperature overpressurization of the reactor coolant system.

In cases such as this, where flow can only be established through flow paths where the flow rate cannot be determined precisely and flow rates during quarterly testing are substantially below pump design flow, the NRC staff has determined that performing the Code required pump testing under full or substantial flow conditions, using a fully instrumented flow path, at a reduced frequency (e.g. - cold shutdowns or refueling outages) is an acceptable alternative to the Code requirements. However, quarterly testing should also be performed in which at least pump differential pressure and vibration are measured and trended as required by IWP-6000.

The licensee has not stated precisely what testing, other than vibration velocity measurements, will be performed to verify pump operability each quarter. However, quarterly testing as discussed above combined with the Code required testing under full or substantial flow conditions during refueling outages should provide an acceptable level of quality and safety and relief may be granted on the condition that the licensee's testing incorporates these provisions.

3.6 Diesel Generator Room Sump Pumps

3.6.1 Method of Testing

3.6.1.1 Relief Request. The licensee has requested relief from the test procedure requirements of Section XI, Paragraph IWP-3100, for pumps WN-1A2 (2A2), 1A3 (2A3), 1B2 (2B2), and 1B3 (2B3). The licensee has proposed making system modifications to enable the Code required testing by

the 1992 refueling outages. In the interim, the licensee has proposed that quantities of Table IWP-3100-2 which cannot be measured directly due to lack of installed instrumentation be calculated.

3.6.1.1.1 Licensee's Basis for Relief--The diesel generator room sump pumps are vertical pumps tested by filling the diesel generator room sump and pumping the sump down. No stable system conditions can be obtained due to the continuous decrease in sump level. No suction pressure, flow, bearing temperature, or lubricant level instrumentation is available.

The diesel generator room sump pumps will be tested for greater than or equal to emergency design flow by:

(1) Filling the sump and recording level.

(2) Pumping down the sump and recording both level and pump down time.

(3) An average flow rate will be determined from the time it takes to pump a known volume from the sump. Pumping down the sump takes approximately 60 seconds. An average discharge pressure will be determined and recorded. The flow rate will be compared with acceptance criteria established per Table IWP-3100-2.

The above testing procedure is an interim method until modifications are made to the system which will permit full flow testing using a recirculation loop back to the sump. Included in the test loop modification will be direct flow indication and throttling capability to set either differential pressure or flow. The modifications will be installed by the 1992 refueling outages.

No suction pressure instrumentation is required since this pressure can be calculated from sump level measurements.

No lubrication level verification is required for this pump. Lubrication is maintained under our routine preventative maintenance program.

The mechanical condition of the subject pumps will be determined from vibration data to be gathered quarterly. No bearing temperature

instrumentation is installed. ANSI/ASME OM-6 will not require bearing temperature measurements.

3.6.1.1.2 Evaluation--Vibration velocity measurements and bearing temperature measurements have already been discussed in sections 3.1.2 and 3.1.3 of this report.

Lubricant level should be observed for all pumps in the IST program where provisions exist. If provisions exist and the licensee determines that performing this testing is impractical, then the licensee should demonstrate the impracticality of the Code required testing in their basis for relief. For pumps where no provision exists for the measurement or observation of lubricant level or pressure (such as pumps with permanently lubricated sealed bearings or where bearing lubricant is the fluid pumped), this requirement is not applicable.

There are no suction pressure, discharge pressure, or flowrate instruments installed in this system. The licensee has committed to installation of the instrumentation necessary to perform the Code required testing. An interim period is necessary to give the licensee time to complete their investigation, the test procedures, and any necessary system design changes. The licensee's proposal to compute average discharge pressure and flow rate, and compare the computed flow rate to acceptance criteria per Table IWP-3100-2, demonstrates pump operability and provides a measure of pump degradation and would provide reasonable assurance of operational readiness in the interim. Imposition of immediate compliance would result in an extended outage which would result in hardship for the licensee due to the costs involved. Therefore, interim relief from all but the lubricant level testing requirements may be granted for one year or until the next refueling outage, whichever is greater.

3.7 Reactor Coolant System Standby Makeup Pump

3.7.1 Measurement of Test Quantities

3.7.1.1 Relief Request. The licensee has requested relief from the measurement requirements of Section XI, Paragraph IWP-3100, for the reactor

coolant system standby makeup pump, NV-1 (2). The licensee has proposed measuring pump vibration velocity quarterly and verifying that the pump flow rate is ≥26 gpm when discharge pressure is ≥2485 psig.

3.7.1.1.1 Licensee's Basis for Relief--Section XI does not provide appropriate provisions for testing positive displacement pumps.

The standby makeup pump is a single speed reciprocating positive displacement pump. The pump will be verified capable of performing its design function by testing for design flowrate (≥26 gpm) and pressure (≥2485 psig). The design system pressure requirement will be simulated using a throttle valve. The discharge pressure is a function of the system requirement and is independent of suction pressure.

The pump is located sufficiently below the fuel pool to assure that adequate NPSH is available and no suction gauge is required.

The mechanical condition of the pump will be determined from vibration data to be gathered quarterly. No bearing temperature instrumentation is installed. OM-6 will not require bearing temperature measurements.

3.7.1.1.2 Evaluation--The outlet pressure of positive displacement pumps is dependant on the pressure of the system into which they are pumping and is not affected significantly by either inlet pressure (providing adequate net positive suction head exists) or flowrate. For these pumps, differential pressure and flow rate are not dependant variables, as they are for centrifugal type pumps. Differential pressure is not a meaningful parameter for determining if hydraulic degradation is occurring. However, since pump degradation may result in the loss of capacity at higher pressures, flow rate measurement (at a reference speed) should be performed at a reference discharge pressure that is greater than or equal to the pressure at which the pump would be required to perform its safety function. Further, the measured values of flow should be compared to reference values and have acceptance criteria applied, as outlined by Paragraph IWP-3100.

Due to the location of the pump, net positive suction head will be maintained to the pump as long as the fuel pool has water in it. Blockage in the suction line would be indicated by a reduction in pump flowrate, therefore, the measurement of pump suction pressure should not be necessary.

Based on the determination that performing pump testing at a reference discharge pressure as outlined above would provide an acceptable level of quality and safety, relief may be granted on the condition that the licensee's proposed testing methods conform to these provisions.

4.0 VALVE TESTING PROGRAM

The McGuire Nuclear Station IST Program submitted by Duke Power Company was examined to verify that all valves included in the program are subjected to the periodic tests required by the ASME Code, Section XI, and the NRC positions and guidelines. The reviewer found that, except as noted in Appendix C or where specific relief from testing has been requested, these valves are tested to the Code requirements and NRC positions and guidelines. Each Duke Power Company basis for requesting relief from the valve testing requirements, and the reviewer's evaluation of that request is summarized below and grouped according to system and valve category. All relief requests and evaluations are applicable to both Units 1 and 2 unless otherwise noted. If valve and/or relief request numbers differ between Units, the numbers for Unit 2 will be stated in parentheses immediately following those for Unit 1.

4.1 General Relief Requests

4.1.1 Trending Rapid-Acting Valves

4.1.1.1 Relief Request. The licensee has requested relief from the trending requirements of IWV-3417(a) for all rapid-acting valves (those which stroke in 2 seconds or less). The licensee has proposed instead to declare any rapid-acting valve inoperable and initiate corrective action when its limiting value of full-stroke time is exceeded.

4.1.1.1.1 Licensee's Basis for Relief--Applying the 50% increase of stroke time corrective action requirements to valves that normally stroke in 2 seconds, or less, may result in unnecessary maintenance. The purpose of this requirement is to detect and evaluate degradation of a valve. For valves with stroke times in this range, much of the difference in stroke times from test to test comes from inconsistencies in the operator or timing device used to gather the data.

Power operated valves with normal stroke times of 2 seconds or less will be referred to as "rapid-acting valves". A maximum limiting value of full-stroke time of 2 seconds will be assigned to these valves and, upon

exceeding this limit, the valve will be declared inoperable and corrective action will be taken in accordance with IWV-3417(b).

4.1.1.1.2 Evaluation--The NRC staff position on evaluating stroke times of rapid-acting valves is explained in Generic Letter No. 89-04, Attachment 1, Position 6. The licensee's proposed testing is in accordance with this position and would provide an acceptable level of quality and safety.

Based on the determination that the proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

4.1.2 Trending Leak Rates of Containment Isolation Valves

4.1.2.1 Relief Request. The licensee has requested relief from the leak rate trending requirements of Section XI, Paragraph IWV-3427(b), for all containment isolation valves. The licensee has proposed that the requirements of IWV-3426 and 3427(a) be followed, and that the trending requirements of IWV-3427(b) be waived.

4.1.2.1.1 Licensee's Basis for Relief--For CIVs, "Based on input from many utilities and [NRC] staff review of testing data of some plants, the usefulness of IWV-3427(b) does not justify the burden of complying with this requirement." (From draft generic letter included with the 29 August letter from Ledyard B. Marsh of USNRC, NRR, to Thomas F. Hoyle, Chairman of the ASME Operations and Maintenance Working Group on Inservice Testing of Pumps and Valves.)

The Analysis of leakage rates and corrective action requirements of IWV-3426 and 3427(a) will be met.

4.1.2.1.2 Evaluation--The NRC staff position on leak rate testing containment isolation valves is explained in Generic Letter No. 89-04, Attachment 1, Position 10. The licensee's proposed testing is in accordance with this position and would provide an acceptable level of quality and safety.

Based on the determination that the proposed alternative would provide an acceptable level of quality and safety, relief may be granted as requested.

4.1.3 Verifying Closure of Inside Containment Isolation Check Valves

4.1.3.1 Relief Request. The licensee has requested relief from the check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following containment isolation valves located inside containment. The licensee has proposed verifying valve closure capability by leak rate testing at a refueling outage frequency. (Note: These valves were submitted under separate relief requests; however, since they are identical in content they have been combined into this single evaluation. The original relief request numbers are listed in the following table.)

Valve	System	P&ID	RR#
1(2)KC-47	Component Cooling	1(2)573-4.0	KC5
1(2)KC-279	Component Cooling	1(2)573-3.1	KC3
1(2)KC-280	Component Cooling	1(2)573-3.1	KC1
1(2)KC-322	Component Cooling	1(2)573-3.1	KC2
1(2)KC-340	Component Cooling	1(2)573-3.1	KC4
1(2)NB-262	Boron Recycle	1(2)556-3.0	NB1
1(2)NC-259	Reactor Coolant	1(2)553-4.0	NC1
1(2)NC-261	Reactor Coolant	1(2)553-4.0	NC1
1(2)NI-48	Safety Injection	1(2)562-2.0	NI3
1(2)NI-436	Safety Injection	1(2)562-2.1	NI5
1(2)NM-420	Nuclear Sampling	1(2)572-1.0	NM1
1(2)NM-421	Nuclear Sampling	1(2)572-1.0	NM1
1(2)NV-1002	Chemical and Volume Control	1(2)554-1.3	NV1
1(2)RF-823	Fire Protection	1(2)599-2.2	RF1
1(2)RV-126	Containment Ventilation Cooling Water	1(2)604-3.0	RV1
1(2)RV-130	Containment Ventilation Cooling Water	1(2)604-3.0	RV1
1(2)VB-50	Breathing Air	1(2)605-3.1	VB1
1(2)VI-40	Instrument Air	1(2)605-1.3	VI2
1(2)VI-124	Instrument Air	1(2)605-1.2	VI1
1(2)VI-149	Instrument Air	1(2)605-1.2	VI1
1(2)VI-161	Instrument Air	1(2)605-1.3	VI2
1(2)VS-13	Station Air	1(2)605-2.2	VS1
1(2)VX-30	Containment Air Return Exchange	1(2)557-1.0	VX1
1(2)WL-24	Liquid Waste Recycle	1(2)565-1.1	WL2
1(2)WL-385	Liquid Waste Recycle	1(2)565-7.0	WL3
1(2)YM-116	Makeup Demineralized Water	1(2)601-2.4	YM1

4.1.3.1.1 Licensee's Basis for Relief--The system design does not provide any indication for verifying valve closure upon flow reversal. Closure can only be verified by a local leak rate test. To perform a leak test every three months would result in unnecessary radiation exposure.

These valves will be verified closed with a leak rate test performed in accordance with Appendix J.

4.1.3.1.2 Evaluation--These valves are containment isolation check valves located inside containment and are, therefore, inaccessible during reactor operation. The only method available to verify valve closure is leak rate testing which would require a containment entry. Testing these valves during cold shutdowns would result in increased radiation doses to plant personnel. Further, this testing would require a significant amount of time for test equipment setup, test performance, and test equipment removal and could result in a delay in the return to power. These delays, and the increased expense and manpower requirements due to testing at a cold shutdown frequency would result in hardship for the licensee due to the costs involved. Further, due to the infrequent occurrence of cold shutdowns of long duration, the extra expense and manpower requirements necessary to perform this testing during cold shutdowns would not yield a significant increase in quality or safety.

The licensee's proposal to verify valve closure capability during leak testing per Appendix J at least once every two years would provide reasonable assurance of operational readiness and would be a reasonable alternative to the Code requirements.

Based on the determination that the licensee's proposed testing would provide reasonable assurance of operational readiness, and that full-stroke exercising these valves to the closed position quarterly and during cold shutdowns would result in hardship for the licensee without a compensating increase in safety, relief may be granted as requested.

4.2 Auxiliary Feedwater System

4.2.1 Category C Valves

4.2.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, for the nuclear service water to auxiliary feedwater header check valves, 1(2)CA-165 and 166. The licensee has proposed to disassemble and full-stroke exercise these valves on a sampling basis during refueling outages.

4.2.1.1.1 Licensee's Basis for Relief--Flow cannot be put through these valves because this would contaminate the auxiliary feedwater system with raw water.

At least one of these two valves will be disassembled and full-stroked during each refueling outage, and both valves will have been disassembled and full-stroked after two consecutive refueling outages. Failure of one valve to properly full-stroke during a refueling outage will result in the remaining valve being disassembled and full-stroked during that outage.

4.2.1.1.2 Evaluation--These check valves have a safety function in the open position to supply raw water from the service water system to the auxiliary feedwater system should the condensate storage tank not be available for use. Full- or part-stroke exercising these valves using service water flow could cause contamination of the auxiliary feedwater system with raw water which could lead to accelerated corrosion and degradation of the feedwater system and steam generators.

The Code required testing could only be performed after significant system modifications which would be burdensome for the license due to the cost involved.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable

Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely. The licensee should investigate methods of part-stroke exercising these check valves. One of the options the licensee may consider is a part-stroke exercise test using air combined with diagnostic testing to verify disk movement.

An interim period is necessary to give the licensee time to complete their investigation, the test procedures, and any system design changes necessary to perform post-inspection part-stroke exercising. Immediate compliance could result in an extended outage which would be a burden for the licensee due to the costs involved. The licensee's proposed alternative, while not acceptable for the long term, should provide reasonable assurance of operational readiness in the interim since the incidence of improper reassembly should be low. Therefore, based on the determination that compliance with the Code requirements is impractical, and considering the burden on the licensee if the Code requirements were imposed, interim relief may be granted for one year or until the next refueling outage, whichever is greater. In the interim, the licensee may use disassembly and inspection to verify the full-stroke operability of these check valves without an ensuing part-stroke exercise test with flow.

The NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke

capability of these check valves, this relief request should be revised or withdrawn.

4.2.1.2 Relief Request. The licensee has requested relief from the requirements of Section XI, Paragraph IWV-3521, to exercise these check valves to the closed position quarterly, for the auxiliary feedwater pump suction check valves from the service water system, 1(2)CA-8, 10, and 12. The licensee has proposed to disassemble and inspect these valves on a sampling basis during refueling outages to verify their closure capability.

4.2.1.2.1 Licensee's Basis for Relief--These valves cannot be tested to close without contaminating the auxiliary feedwater system with raw service water. These valves will not be tested during cold shutdown because disassembly is required.

These valves will be sample disassembled each refueling outage to verify valve closure capability.

4.2.1.2.2 Evaluation--A reverse flow closure test of these valves using service water would result in contamination of the auxiliary feedwater system with raw water which could lead to accelerated corrosion and degradation of the feedwater system and steam generators.

The Minutes of the Public Meeting on Generic Letter No. 89-04 state that the use of disassembly to verify closure capability may be acceptable depending on whether verification by flow or pressure measurements is practical. With the present system design, verifying the closure of these valves by leak testing or with reverse flow is not possible. The Code required testing could only be performed after system modifications, such as the addition of test connections to enable leak rate testing, which would be burdensome for the licensee due to the costs involved.

The Minutes of the Public Meeting on Generic Letter No. 89-04 also state that partial-stroke exercise testing with flow is expected to 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 that the disk moves freely.

The licensee's disassembly and inspection program, combined with a part-stroke exercise test after reassembly, should adequately determine valve condition and provide reasonable reasonable assurance of operational readiness. 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. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure that is not equivalent to the Code required exercise testing. This procedure has risks which may make its routine use as a substitute for testing undesirable when some other method of testing is possible. The licensee should actively pursue the use of non-intrusive diagnostic techniques such as acoustics or radiography to demonstrate that these valves close when subjected to reverse flow conditions.

Based on the determination that it is impractical to verify the reverse flow closure capability of these valves by leak testing or observation of system parameters, and considering the burden on the licensee if the Code requirements were imposed, relief may be granted provided the licensee part-stroke exercises the valves to the open position with flow after they have been reassembled. The licensee should investigate ways, other than disassembly and inspection, of verifying the reverse flow closure capability of these valves. If another method is developed to verify the reverse flow closure capability of these check valves, this relief request should be revised or withdrawn.

4.3 Safety Injection System

4.3.1 Category A/C Valves

4.3.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, for the cold leg accumulator discharge to the reactor coolant system (RCS) check valves,

1(2)NI-59, 70, 81, and 93. The licensee has proposed that these valves be part-stroke exercised during cold shutdowns, but not more frequently than once every nine months, and manually full-stroke exercised during refueling outages using sample disassembly.

4.3.1.1.1 Licensee's Basis for Relief--These valves cannot be full- or part-stroked during power operation since the accumulator pressure is about 600 psig and cannot overcome RCS pressure. These valves will not be tested during cold shutdowns since disassembly is required. Disassembly would render one train of residual heat removal (RHR) inoperable for an extended time period.

These valves will be partial stroked during cold shutdown, but not more often than once per nine months. These valves will be full stroked at refueling by sample disassembly. The valves will be leak tested in accordance with Technical Specification 4.4.6.2.2.

4.3.1.1.2 Evaluation--Demonstration of a full-stroke exercise of check valves with flow requires the passage of the maximum required accident flow rate through the valves. The only full-flow test path for exercising these valves is into the RCS. These valves cannot be full- or part-stroke exercised with flow quarterly during power operation because RCS pressure is greater than accumulator pressure. During cold shutdown, a full-stroke exercise with flow cannot be accomplished because it could lead to a low-temperature overpressurization of the RCS due to the lack of expansion volume necessary to accommodate the large quantity of water which must be discharged into the RCS. Further, this flow path is not equipped with the flow rate instrumentation necessary to verify a full-stroke of these check valves.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved. Further, the addition of valves and piping penetrations could result in reduced plant reliability.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

These valves are required to be leak rate tested after they are actuated due to flow through the valves. Leak rate testing these valves requires a pressure source on the downstream side of this valve, and some test configuration to detect leakage through the valve (i.e., leak testing per IWV-3420). Performance of this test necessitates isolating sections of piping. This plant reconfiguration, in addition to the significant amount of time required for test equipment setup, test performance, test equipment removal, and returning the plant to normal could result in a delay in the return to power. The increased time and manpower requirements to individually leak rate test each valve more frequently than once every nine months, would be burdensome for the licensee due to the costs involved. The licensee's proposed alternative, combined with a part-stroke exercise test after reassembly, would provide reasonable assurance of operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valves before they are

returned to service. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

4.3.1.2 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, for the cold leg accumulator and safety injection (SI) pumps combined discharge to the reactor coolant system (RCS) check valves, 1(2)NI-60, 71, 82, and 94. The licensee has proposed that these valves be part-stroke exercised during cold shutdowns but no more frequently than every nine months, and manually full-stroke exercised during refueling outages using sample disassembly.

4.3.1.2.1 Licensee's Basis for Relief--These valves cannot be full- or partial-stroked at power since a driving head to force the valves open does not exist. Instrumentation is not present to measure the flow through individual valves. These valves will not be tested during cold shutdowns since disassembly is required. Disassembly would render one train of RHR inoperable for an extended time period.

These valves will be partial-stroked during cold shutdowns on a 9 month frequency and leak tested per Technical Specification 4.4.6.2.2. The valves will be full-stroke exercised at refueling by sample disassembly.

4.3.1.2.2 Evaluation--Demonstration of a full-stroke exercise of check valves with flow requires the passage of the maximum required accident flow rate through the valves. The only full-flow test path for exercising these valves is into the RCS. These valves cannot be full- or part-stroke exercised with flow quarterly during power operation because RCS pressure is greater than accumulator pressure. During cold shutdown, a full-stroke exercise cannot be accomplished because it could lead to a low-temperature overpressurization of the RCS due to the lack of expansion volume necessary to accommodate the large quantity of water which must be discharged into the RCS. Further, the combined accumulator and SI pump discharge headers are not equipped with the flow rate instrumentation necessary to verify a full-stroke of these check valves.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved. Further, the addition of valves and piping penetrations could result in reduced plant reliability.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

These valves are required to be leak rate tested after they are actuated due to flow through the valves. Leak rate testing these valves requires a pressure source on the downstream side of this valve, and some test configuration to detect leakage through the valve (i.e., leak testing per IWV-3420). Performance of this test necessitates isolating sections of piping. This plant reconfiguration, in addition to the significant amount of time required for test equipment setup, test performance, test equipment removal, and returning the plant to normal could result in a delay in the return to power. The increased time and manpower requirements to individually leak rate test each valve more frequently than once every nine months, would be burdensome for the licensee due to the costs involved. The licensee's proposed alternative, combined with a part-stroke exercise test after reassembly, would provide reasonable assurance of operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move

to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valves before they are returned to service. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

4.4 Ice Condenser Refrigeration

4.4.1 Category A Valves

4.4.1.1 Relief Request. The licensee has requested relief from the 10CFR50, Appendix J, requirements that the local leak rate measurement be performed using air or nitrogen for valves 1(2)NF-228A, 233B, and 234A, the ice condenser glycol supply and return containment isolation valves. The licensee has proposed that these valves be leak rate tested without draining the glycol from the penetrations.

4.4.1.1.1 Licensee's Basis for Relief--To prevent melting of ice in the ice condenser, Technical Specification 4.6.1.2.d.4 allows testing the valves without draining the glycol from the penetrations.

Leak rate testing of these valves will be performed per Technical Specification 4.6.1.2.d.4.

4.4.1.1.2 Evaluation--The NRC staff considers Appendix J, Type C, leak rate testing to be equivalent to the requirements of Section XI, Paragraph IWV-3421 through 3425 in this case. In order to prevent duplication of effort, the licensee performs Appendix J, Type C, leak rate tests on category A and A/C valves at a refueling outage frequency to meet the requirements of Section XI and Appendix J. However,

while Appendix J specifies the test medium, Section XI, Paragraph IWV-3425, allows the test medium to be specified by the licensee. Therefore, relief from Section XI requirements is not necessary.

This technical evaluation report (TER) addresses Section XI requirements only. The licensee's request for relief from Appendix J requirements is beyond the scope of this TER and should be identified to the NRC by separate correspondence relating to Appendix J testing.

4.4.2 Category A/C Valves

4.4.2.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, and the leak rate testing requirements of 10CFR50 Appendix J, for check valve 1(2)NF-229, the ice condenser glycol supply line containment isolation valve. The licensee has proposed that closure capability be demonstrated by Appendix J, Type C, leak rate testing at a refueling outage frequency and that leak rate testing of this valve be performed without draining the glycol from the penetration.

4.4.2.1.1 Licensee's Basis for Relief--The system design does not provide any indication for verifying valve closure upon flow reversal. To prevent melting of ice in the ice condenser, Technical Specification 4.6.1.2.d.4 allows testing the valve without draining the glycol from the penetration.

This valve will be verified closed by leak testing performed in accordance with Appendix J. Leak rate testing of this valve will be performed per Technical Specification 4.6.1.2.d.4.

4.4.2.1.2 Evaluation--This valve is a containment isolation check valve located inside containment and is, therefore, inaccessible during reactor operation. The only method available to verify valve closure is leak rate testing which would require a containment entry. Testing these valves during cold shutdowns would result in increased radiation doses to plant personnel. Further, this testing would require a significant amount of time for test equipment setup, test performance, and

test equipment removal and could result in a delay in the return to power. These delays, and the increased expense and manpower requirements due to testing at a cold shutdown frequency result in hardship for the licensee due to the costs involved. Further, due to the infrequent occurrence of cold shutdowns of long duration, the extra expense and manpower requirements necessary to perform this testing during cold shutdowns would not yield a significant increase in quality or safety.

The licensee's proposal to verify valve closure capability during leak testing per Appendix J during refueling outages would provide reasonable assurance of operational readiness and would be a reasonable alternative to the Code requirements.

While Appendix J specifies the test medium, Section XI, in Paragraph IWV-3425, allows the test medium to be specified by the licensee. Therefore, relief from Section XI requirements is not necessary to use a test medium other than air or nitrogen. This TER addresses Section XI requirements only. The licensee's request for relief from this Appendix J requirement is beyond the scope of this TER and should be identified to the NRC by separate correspondence relating to Appendix J testing.

Based on the determination that the licensee's proposal to verify the closure capability of this valve by Appendix J, Type C, leak rate testing during refueling outages would provide reasonable assurance of operational readiness, and that compliance with the Code exercising frequency requirements would result in hardship for the licensee without a compensating increase in safety, relief may be granted for this Section XI requirement.

4.5 Containment Spray System

4.5.1 Category C Valves

4.5.1.1 Relief Request. The licensee has requested relief from the check valve exercising requirements of Section XI, Paragraph IWV-3521, for the following containment spray header check valves. The licensee has

proposed that these valves be part-stroke exercised during cold shutdowns, but not more frequently than once every nine months, and manually full-stroke exercised during refueling outages using sample disassembly.

1(2)NS-13	1(2)NS-16	1(2)NS-30
1(2)NS-33	1(2)NS-41	1(2)NS-46

4.5.1.1.1 Licensee's Basis for Relief--Full-stroke exercising of these check valves is not practical since there is no external indication of disk movement. Full-stroke exercising would require the pumps and spray nozzles to be activated which would require a large scale cleanup effort. These valves will not be tested during cold shutdowns since disassembly is required.

These valves will be verified to fully cycle each refueling by sample disassembly. All valves will be partial stroked during cold shutdowns, but not more frequently than once per nine months, and following disassembly.

4.5.1.1.2 Evaluation--These check valves are in the discharge line of the containment spray pumps. Full-stroke exercising these check valves with flow using the containment spray pumps, in any Mode of plant operation, would result in spraying down the containment building which could cause equipment damage.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved. Further, the addition of valves and piping penetrations could result in reduced plant reliability.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using

flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

The licensee has not provided a technical justification which demonstrates the impracticality or burden of part-stroke exercising these Category C valves every three months during cold shutdowns and refueling outages. Part-stroke exercising these valves every three months during cold shutdowns and refueling outages, combined with disassembly and inspection on a sampling basis during refueling outages, would provide reasonable assurance of operational readiness provided the licensee part-stroke exercises the disassembled valves before they are returned to service. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valves before they are returned to service and part-stroke exercises all valves every three months during cold shutdowns and refueling outages. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

4.5.1.2 Relief Request. The licensee has requested relief from the check valve exercising requirements of Section XI, Paragraph IWV-3521, for the containment spray pump suction check valves from the RWST, 1(2)NS-4 and 21. The licensee has proposed that these valves be part-stroke exercised

quarterly, and manually full-stroke exercised during refueling outages using sample disassembly.

4.5.1.2.1 Licensee's Basis for Relief--Full-stroke exercising with flow would require spraying the reactor building.

At least one of these two valves will be disassembled and full-stroked during each refueling outage, and both valves will have been disassembled and full-stroked after two consecutive refueling outages. Failure of one valve to properly full-stroke during a refueling outage will result in the remaining valve being disassembled and full-stroke exercised during that outage. These valves will be partial-stroked quarterly.

4.5.1.2.2 Evaluation--These check valves are in the suction line of the containment spray pumps. Full-stroke exercising these check valves with flow using the containment spray pumps, in any Mode of plant operation, would result in spraying down the containment building which could cause equipment damage.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved. Further, the addition of valves and piping penetrations could result in reduced plant reliability.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the disassembled valve has been reassembled properly and that the disk moves freely.

The licensee's proposed alternative, combined with a part-stroke exercise test after reassembly, would provide reasonable assurance of operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valves before they are returned to service. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

4.6 Chemical and Volume Control System

4.6.1 Category C Valves

4.6.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, for the centrifugal charging pump suction check valves from the boric acid tank, 1NV-411 and 413. The licensee has proposed that these valves be part-stroke exercised during cold shutdowns, but not more frequently than once every nine months, that 1NV-411 be disassembled for inspection during Unit 1 refueling outages, and that 1NV-413 be disassembled for inspection during Unit 2 refueling outages.

4.6.1.1.1 Licensee's Basis for Relief--These is no instrumentation to measure the flow rate through these valves. The valves do not have any external means of verifying their position. The valves will not be tested during cold shutdown since disassembly is required.

To open 1NV-411 (Unit 1) or 1NV-413 (Unit 2), boric acid would be injected into the reactor coolant system (RCS) of the respective unit. At power, this would cause a reactor transient.

These valves will be disassembled for inspection. 1NV-411 will be inspected during Unit 1 refueling outages, and 1NV-413 will be inspected during Unit 2 refuelings. The valves will be partial stroked during respective unit cold shutdowns, but not more often than once per nine months.

4.6.1.1.2 Evaluation--Demonstration of a full-stroke exercise of check valves with flow requires the passage of the maximum required accident flow rate through the valves. The only full-flow test path for exercising these valves is into the RCS. Exercising these valves with flow would require the injection of high concentration boric acid from the boric acid storage tank into the RCS. During power operation this would result in pressure, temperature, and reactivity transients which could cause a reactor trip. Further, this testing flow path is not equipped with the flow rate instrumentation necessary to verify a full-stroke of these check valves.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the

disassembled valve has been reassembled properly and that the disk moves freely.

The licensee has not provided a technical justification which demonstrates the impracticality or burden of part-stroke exercising these Category C valves every three months during cold shutdowns and refueling outages. Part-stroke exercising these valves every three months during cold shutdowns and refueling outages, combined with disassembly and inspection on a sampling basis during refueling outages, would provide reasonable assurance of operational readiness provided the licensee part-stroke exercises the disassembled valves before they are returned to service. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valves before they are returned to service and part-stroke exercises all valves every three months during cold shutdowns and refueling outages. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

4.7 Nuclear Service Water System

4.7.1 Category C Valves

4.7.1.1 Relief Request. The licensee has requested relief from the exercising requirements of Section XI, Paragraph IWV-3521, for the nuclear service water system makeup supply to the spent fuel pool check valves,

1(2)RN-113 and 214. The licensee has proposed that these valves be part-stroke exercised quarterly, and manually full-stroke exercised during refueling outages using sample disassembly.

4.7.1.1.1 Licensee's Basis for Relief--These valves function to prevent backflow of potentially contaminated water from the spent fuel pool makeup header to the nuclear service water system when the manual isolation valves are opened. The safety function is to open to supply assured makeup from the nuclear service water system to the spent fuel pool. These valves cannot be full-stroked at any time without putting raw service water into the spent fuel pool.

These valves will be partially-stroked quarterly and full-stroke exercised during refueling by sample disassembly.

4.7.1.1.2 Evaluation--Full-stroke exercising these valves using service water flow would cause the addition of raw water to the spent fuel pool. This would result in the loss of chemistry control in the spent fuel pool and could lead to accelerated corrosion and degradation of system components.

The Code required testing could only be performed after significant system modifications, such as installation of a full flow test loop for exercising these valves, which would be burdensome for the licensee due to the cost involved.

The licensee has proposed verifying the full-stroke open capability of these check valves by sample disassembly and inspection. The NRC staff positions regarding check valve disassembly and inspection are explained in detail in Generic Letter No. 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes on the public meetings on Generic Letter No. 89-04 regarding Position 2, Alternatives to Full Flow Testing of Check Valves, further stipulate that a partial stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing provides a degree of confidence that the

disassembled valve has been reassembled properly and that the disk moves freely.

The licensee's proposed alternative, combined with a part-stroke exercise test after reassembly, would provide reasonable assurance of operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure with inherent risks which make its use as a routine substitute for testing undesirable when other testing methods are possible. It may be possible to verify that these valves move to their fully open position by use of non-intrusive diagnostic testing techniques during a reduced flow test at least once each refueling outage.

Based on the determination that the Code required testing is impractical, and considering the burden on the licensee if Code requirements were imposed, relief may be granted provided the licensee performs a partial flow test of the disassembled valves before they are returned to service. The licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these check valves, this relief request should be revised or withdrawn.

APPENDIX A
IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

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IST PROGRAM ANOMALIES IDENTIFIED DURING THE REVIEW

Inconsistencies and omissions in the licensee's program noted during the course of this review are summarized below. The licensee should resolve these items in accordance with the evaluations, conclusions, and guidelines presented in this report.

1. Pump Relief Requests I.4(C), I.4(D), and I.4(E) for the Unit 1 IST program, and I.4(B), I.4(C), and I.4(D) for the Unit 2 IST program request relief from the pump testing procedure requirements of Section XI, Paragraph IWP-3100 for the safety injection, residual heat removal, and centrifugal charging pumps. The licensee has proposed measuring vibration velocity and verifying the Technical Specification limits on pump operability quarterly, and performing the Code required testing during refueling outages. The licensee has not stated precisely what testing, other than vibration velocity measurements, will be performed to verify the operability of these pumps each quarter. The licensee's proposed alternative would be acceptable if at least pump differential pressure and vibration are measured and trended as required by IWP-6000 during quarterly pump testing. Also, the licensee has not provided a justification which demonstrates why the residual heat removal pumps cannot be tested during cold shutdowns. Relief may be granted perform the Code required testing of the safety injection and centrifugal charging pumps at full or substantial flow during refueling outages, and the residual heat removal pumps during cold shutdowns, provided the licensee measures and trends at least pump differential pressure and vibration during quarterly pump testing. (Reference Sections 3.3.1.1, 3.4.1.1, and 3.5.1.1 of this report.)

2. Lubricant level should be observed as required by the Code for all pumps in the IST program where provisions exist. If provisions exist and the licensee determines that performing this testing is impractical, then the licensee should demonstrate the impracticality of the Code required

testing in their basis for relief. For pumps where no provision exists for the measurement or observation of lubricant level or pressure (such as pumps with permanently lubricated sealed bearings or where bearing lubricant is the fluid pumped) this requirement is not applicable. Pump relief requests I.4(B) and I.4(F) for Unit 1, and pump relief requests I.4(A) and I.4(E) for Unit 2, state that lubricant level verification is not required because lubrication is maintained under their routine preventative maintenance program. Since this justification does not demonstrate the impracticality of the Code required testing, relief should not be granted. (Reference sections 3.2.1.1 and 3.6.1.1 of this report.)

3. The licensee's proposal to compute flow rate of the diesel fuel oil transfer pumps based on the rate of increase in the day tank level would be a reasonable alternative to the Code requirements and is acceptable provided the licensee's computational method meets the accuracy requirements of IWP-4110. However, the licensee has not provided an acceptable technical justification to support their request for deviation from the acceptance criteria of Table IWP-3100-2. Therefore, relief for deviation from the acceptance criteria of Table IWP-3100-2 should not be granted. (Reference section 3.2.1.1 of this report.)

4. Pump relief requests I.4(G) for Unit 1 and I.4(F) for Unit 2 for the standby makeup pumps No.1 and 2 propose ensuring that the measured flowrate of the pump is above a specified minimum value. However, since pump degradation may result in the loss of capacity at higher pressures, flow rate measurement should be performed at a reference discharge pressure that is greater than or equal to the pressure at which the pump would be required to perform its safety function. Further, the measured values of flow should be compared to reference values and have acceptance criteria applied, as outlined by Paragraph IWP-3100. Relief may be granted provided the licensee complies with these testing methods. (Reference section 3.7.1.1 of this report.)

5. The licensee has requested relief from the annual bearing temperature measurement requirements of Section XI, Paragraph IWV-3100, 3300, and

3500 for the control area chilled water pumps, CRA-P-1 and 2. Since relief from these Code requirements was requested for all pumps in the IST program under relief request I.3(C), relief request I.4(A) (Unit 1 only) for the control area chilled water pumps is not addressed in this report and should be deleted from the IST program.

6. In valve relief requests RR-CA1, CA2, NI4, NI6, NS1, NS2, NV4, and RN1 the licensee has proposed verifying the full-stroke capability of check valves by sample disassembly and inspection. The licensee should investigate methods of part-stroke exercising the service water to auxiliary feedwater check valves, 1(2)CA-165 and 166. One of the options the licensee may consider is a part-stroke exercise test using air combined with diagnostic testing to verify disk movement. Interim relief may be granted until the next refueling outage to use disassembly and inspection to verify the full-stroke operability of these check valves without an ensuing part-stroke exercise test with flow. The licensee has not provided a technical justification which demonstrates the impracticality or burden of part-stroke exercising the containment spray header check valves, 1(2)NS-13 16, 30, 33, 41, and 46, or the centrifugal charging pump suction check valves from the boric acid storage tank, 1NV-411 and 413, every three months during cold shutdowns and refueling outages. Therefore, relief to allow part-stroke exercising of these valves no more frequently than once every nine months during cold shutdowns should not be granted. Except as noted above, relief may be granted for all relief requests that propose disassembly and inspection as the alternative to the Code exercising requirements provided the licensee performs a partial flow test of the disassembled valves before they are returned to service. In all cases, the licensee should actively pursue the use of non-intrusive diagnostic techniques to demonstrate that these valves swing fully open during partial flow testing. If another method is developed to verify the full-stroke capability of these valves, these relief requests should be revised or withdrawn. (Reference sections 4.2.1.1, 4.2.1.2, 4.3.1.1, 4.3.1.2, 4.5.1.1, 4.5.1.2, 4.6.1.1, and 4.7.1.1 of this report.)

7. The licensee has requested relief from the 10CFR50, Appendix J, requirements that the measurement of local leak rate be performed using

air or nitrogen for the ice condenser glycol supply and return containment isolation valves 1(2)NF-228A, 233B, 234A, and 229. The licensee has proposed that these valves be leak rate tested without draining the glycol from the penetrations. While Appendix J specifies the test medium, Section XI, Paragraph IWV-3425, allows the test medium to be specified by the licensee. This technical evaluation report (TER) addresses Section XI requirements only. The licensee's request for relief from Appendix J requirements is beyond the scope of this TER and should be identified to the NRC by separate correspondence relating to Appendix J testing. (Reference sections 4.6.1.1, and 4.6.2.1 of this report.)

8. Cold shutdown justification CS-SM2 states that "the main steam isolation bypass valves, 1SM-9AB, 10AB, 11AB, and 12AB, are exercised quarterly using a manual loader and, because of this, stroke timing can only be performed at a cold shutdown frequency". Section XI, Paragraph IWV-3413(b), states that the stroke time of power operated valves shall be measured whenever the valves are full-stroke tested. The Code makes provisions for exercising, at a cold shutdown frequency, those valves which cannot be exercised quarterly during plant operation. However, no provision in the Code allows stroke timing valves at a cold shutdown frequency which are tested quarterly. Therefore, relief is required and the licensee should submit this justification as a relief request. However, the information provided in CS-SM2 does not provide sufficient technical justification for granting relief. Specifically, the licensee has not provided information in their technical justification which explains why stroke timing can be performed only during cold shutdowns. Further, the licensee's justification does not indicate the difference, if any, between quarterly testing and cold shutdown testing. This information must be included in the relief request to evaluate the adequacy of the proposed alternate testing, as required by 10 CFR 50.55a.

9. The following cold shutdown justifications state that the applicable valves will be full-stroke exercised during cold shutdowns but not more often than once every nine months. However, the licensee has not provided a justification which demonstrates that it is impractical or

burdensome to full-stroke exercise these valves every three months during cold shutdowns and refueling outages. Therefore, the valves in these cold shutdown justifications should be tested every cold shutdown. If it is burdensome or impractical to test the valves at this frequency, the licensee should submit a request for relief from the Code requirements. To obtain relief, the licensee's basis for relief should explain, in detail, the burden or impracticality. The relief requests should not be implemented before being reviewed and approved by the NRC. Also, cold shutdown justification CS-ND5 states, in the basis for relief, that valve 1ND-71 can only full flow tested during refueling outages, but then proposes that the valve be full stroke exercised during cold shutdowns. This discrepancy should be corrected.

CS-FW2	CS-ND4	CS-ND5	CS-ND6	CS-NI13	CS-NI14	CS-NI15
CS-NI16	CS-NI17	CS-NI18	CS-NI19	CS-NI20	CS-NV14	CS-NV15