NUREG–1482

Guidelines for Inservice Testing at Nuclear Power Plants

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

P. Campbell



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P. Campbell

Division of Engineering
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001



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ABSTRACT

The staff of the U.S. Nuclear Regulatory Commission (NRC) gives licensees guidelines and recommendations for developing and implementing programs for the inservice testing of pumps and valves at commercial nuclear power plants. The staff discusses the regulations; the components to be included in an inservice testing program; and the preparation and content of cold shutdown justifications, refueling outage justifications, and requests for relief from the American Society of Mechanical Engineers Code requirements. The staff also gives specific guidance on relief acceptable to the NRC and advises licensees in the use of this information at their facilities. The staff discusses the revised standard technical specifications for the inservice testing program requirements and gives guidance on the process a licensee may follow upon finding an instance of noncompliance with the Code.

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ABBREVIATIONS

ADS	automatic depressurization system
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BWR	boiling-water reactor
BWST	borated water storage tank
CFR	*Code of Federal Regulations*
CIV	containment isolation valve
CSJ	cold shutdown justification
ECCS	emergency core cooling system
FT	flow test
GE	General Electric Company
GL	generic letter
HPCI	high-pressure coolant injection
IN	information notice
IP	inspection procedure
ISI	inservice inspection
IST	inservice testing
LCO	limiting condition for operation
LOCA	loss-of-coolant accident
MSIV	main steam isolation valve
NIT	nonintrusive techniques
NRC	U.S. Nuclear Regulatory Commission
OM	Operations and Maintenance
PASS	post-accident sampling system
PD	positive displacement
P&ID	piping and instrument diagram
PORV	power-operated relief valve
PTC	Performance Test Code
PWR	pressurized-water reactor

RCIC	reactor core isolation cooling
RCS	reactor coolant system
RG	regulatory guide
RHR	residual heat removal
RPM	revolutions per minute
RWST	refueling water storage tank
RWT	refueling water tank
SAR	safety analysis report
SBLC	standby liquid control
SI	safety injection
SOV	solenoid-operated valve
SR	surveillance requirement
TI	temporary instruction
TS	technical specifications

EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) is issuing this report to assist the industry in eliminating unnecessary requests for relief and to give approval of an alternate method of inservice testing (IST) if that method is in accord with the latest edition of industry Codes and standards approved by the NRC. These Codes and standards are found in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code and the ASME/American National Standards Institute Operations and Maintenance (OM) Standards, Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," (OM-6) and Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants" (OM-10). If the guidance in this report is used, it will assist the industry in establishing a consistent IST approach, but implementation of the new guidance is strictly voluntary. No backfit is intended or approved in connection with issuance of this document. This report lists portions of OM-6 and OM-10 that licensees may partially implement if the related requirements stated in the applicable recommendation are met.

NRC is issuing this guidance for the following purposes:

(1) To approve portions of OM-6 and OM-10 that the staff has determined are acceptable to implement pursuant to the *Code of Federal Regulations*, Title 10, Paragraph 50.55a(f)(4)(iv).

(2) To give guidance on information that needs to be included in relief requests for prompt staff approval.

(3) To clarify issues that have been found in NRC inspections, from licensees' telephone calls or meetings, and through NRC staff participation on the OM committees.

(4) To indicate the acceptability or the need for caution in applying certain ASME/OM interpretations.

(5) To consolidate references to various documents that apply to IST.

(6) To clarify the information to be included in an IST program, the format for relief requests and cold shutdown/refueling outage justifications, and the scope of IST programs.

(7) To clarify certain ASME Code or NRC regulatory issues.

The staff discusses new IST issues and associated guidance that it found while participating in ASME Code committees, reviewing and evaluating relief requests or proposed alternatives, reviewing inspection findings and responses, meeting and discussing with licensees and industry groups, and issuing other generic correspondence.

The voluntary nature of the new guidance differs from the previously approved positions in GL 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," which were not entirely voluntary. The new guidance includes approval of the use of the new ASME Operations and Maintenance Standards, which have been incorporated into the regulations. The new guidance also approves the use of portions of these standards, pursuant to paragraph 50.55a(f)(4)(iv), before this regulation would take effect for individual licensees for updated 10-year interval IST programs. This approval is part of the staff's effort to refocus NRC

attention on inspections and audits. The actions that those licensees who choose to use the new guidance must take to satisfy paragraph 50.55a(f)(4)(iv) are included herein and will ensure that the implementation is acceptable. The new guidance will be useful to licensees in developing and implementing the regulations and ASME Code requirements, and is part of the plan for improving IST programs first established by GL 89-04. The staff plans to further revise the regulations and complete a summary of relief requests which have been submitted since GL 89-04 was issued.

PREFACE

On April 3, 1989, the NRC issued Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," which gave guidance to correct several weaknesses the NRC staff found in inservice testing (IST) programs at nuclear power plants. The staff issued the generic letter as part of its effort to improve IST programs so that the staff could verify a program was acceptable by doing audits and inspections at the plant site rather than by reviewing the program before it is implemented. GL 89-04 addressed frequently encountered issues such as relief requests, procedural implementation, and technical specification provisions for operability. The positions in GL 89-04 were not for voluntary implementation in all cases, since the staff requested certain licensees implement the positions of the generic letter. However, the guidance herein is strictly voluntary.

Certain terms in this document have gradations of regulatory significance to licensees. Where the requirements of NRC regulations or the ASME Code, as incorporated into the regulations, are discussed, the terms ***shall, must, requires,*** or ***requirements*** are used consistently to indicate their mandatory nature. The term ***must*** is also used in another manner in the context of implementing guidance (not requirements), as discussed below. The word ***should*** is used in two contexts: (1) in reiterating previously approved NRC staff positions or requirements promulgated by generic letter or other approved generic correspondence, and (2) in stating staff recommendations for voluntary implementation in the "NRC Recommendations" sections. The terms ***NRC recommendation, staff recommendation, recommends, acceptable to the staff, acceptable, licensee may***, and ***licensee typically would*** are used to discuss issues that have been evaluated in, and reflect NRC staff findings from, previous plant-specific safety evaluations related to IST relief requests, NRC inspection reports, meetings (ASME Code Committee meetings, meetings with licensees, and NRC/ASME symposia), and other generic correspondence. The term ***must*** is used with provisions of the guidance herein intended for voluntary implementation by licensees to indicate that, if a licensee chooses to implement the guidance of a section, the licensee is to follow such provisions in that section without deviation in order to receive credit for satisfactorily meeting the guidance of that section.

The new guidance herein is similar in appearance to NRC staff positions given in a regulatory guide because of the terms discussed above, and because certain recommendations indicate acceptable alternatives to Code requirements. However, this guidance is not equivalent to staff positions in a regulatory guide or other generic correspondence, because this guidance is intended strictly for voluntary implementation by licensees. Licensees may still need to seek approval for certain of these recommendations through the process described in 10 CFR 50.55a.

1 INTRODUCTION

1.1 Regulatory Basis

Section 50.55a of Title 10 of the Code of Federal Regulations (10 CFR 50.55a) defines the requirements for applying industry codes and standards to boiling or pressurized water-cooled nuclear power facilities. Each of these facilities is subject to the conditions in paragraphs (a), (f), and (g) of 10 CFR 50.55a for inservice inspection and inservice testing (IST). By rulemaking effective September 8, 1992 (see Federal Register Vol. 57, 34666), the U.S. Nuclear Regulatory Commission (NRC) established paragraph (f) to separate the IST requirements from the inservice inspection requirements in paragraph (g).

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI, Subsections IWP and IWV, specify the IST requirements for pumps and valves. The 1989 edition of Section XI was incorporated by reference into paragraph 50.55a(b) by the rulemaking effective September 8, 1992. The 1989 edition specifies that the rules for the IST of pumps and valves are stated in the ASME/ANSI Operations and Maintenance (OM) Standards, Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants." An exception to OM-10 was taken in the regulation related to leakage testing of containment isolation valves (see 10 CFR 50.55a (b)(2)(vii)).

Licensees are required to prepare IST programs which specify the components included in the program, and the testing and test frequencies for these components, and to implement the program in accordance with the Code. The regulations allow that where a test requirement of the Code is determined to be impractical for a facility, the licensee may submit requests for relief from the Code with information to support the determination. Relief requests generally detail the reasons for deviating from the Code requirements and describe proposed alternative testing. The Commission is authorized to evaluate the relief requests and may grant relief or impose alternative requirements, considering the burden upon the licensee that could result if the requirements were imposed on the facility. The Commission may also authorize alternatives to the Code requirements pursuant to 10 CFR 50.55a (a)(3)(i) and (a)(3)(ii) if the alternatives ensure an acceptable level of quality and safety or the requirements present a hardship without a compensating increase in the level of quality and safety.

Paragraph (f)(4)(iv) in 10 CFR 50.55a specifies that inservice tests of pumps and valves may meet the requirements in subsequent editions and addenda that are incorporated by reference in paragraph 50.55a(b), subject to the limitations and modifications listed in paragraph 50.55a(b), and subject to Commission approval. Portions of editions or addenda may be used if all related requirements of the respective editions or addenda are met. The Commission resolved various issues by approving OM-6 and OM-10 as discussed herein. Licensees may implement the later Code editions, or portions thereof, pursuant to paragraph 50.55a(f)(4)(iv) without relief, based on the approval as stated in Sections 3, 4, and 5 of this document, provided the IST program includes documentation of implementation of the later requirements in accordance with the new guidance herein.

1.2 Regulatory History

The NRC previously issued guidance for implementing IST requirements. After publishing the rule which established the requirements for IST (Federal Register notice of February 27, 1976), NRC sent letters to notify operating licensees of the new rules. In November 1976, after receiving inquiries from licensees regarding acceptable methods for complying with the regulation, the NRC issued letters to licensees which transmitted "NRC Staff Guidance for Complying with Certain Provision of 10 CFR 50.55a(g), 'Inservice Inspection Requirements.'"

To eliminate the backlog of IST program reviews for operating nuclear power plants, on August 3, 1989, NRC issued Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," which included 11 technical positions used by the staff in reviewing IST program relief requests and describing alternatives to the Code requirements acceptable to the staff. In GL 89-04, the staff also approved six of these positions (1, 2, 6, 7, 9, and 10) pursuant to 10 CFR 50.55a (g)(6)(i) with the provision that the licensee perform the alternative testing delineated in the applicable position. The staff approved these alternatives upon recognizing the impracticality in performing the required testing and the burden if the requirements were imposed.

GL 89-04 states that licensees are to document the use of Positions 1, 2, 6, 7, 9, and 10 in the IST program, but does not require that the documentation must be a relief request. Provided the provisions of GL 89-04 are followed, GL 89-04 granted approval to follow the alternative testing delineated in Positions 1, 2, 6, 7, 9, and 10, pursuant to 10 CFR 50.55a(g) [now (f)]. Most licensees have documented the use of these positions in relief requests for convenience; however, documentation in the program is acceptable in another format as long as it is clear that the provisions of the referenced positions are documented and discussed in adequate detail to indicate conformance with such provisions. Certain licensees may have submitted relief requests to ensure that the conformance was adequately documented in the program, though documentation in the program would also be acceptable, as stated in GL 89-04. The eleven positions are given in Apppendix A of this document.

The staff held four public meetings to discuss GL 89-04 and stated that GL 89-04 was a first step toward resolving various problems in developing and implementing IST programs at nuclear power plants. The staff found these problems while reviewing IST programs, inspecting and auditing IST programs at plant sites, participating on the American Society of Mechanical Engineers (ASME) Code committees, and meeting with licensees and industry groups.

The staff summarized the questions and answers from these meetings in a letter of October 25, 1989, "Minutes of the Public Meetings on Generic Letter 89-04," October 25, 1989. This letter contained information useful in applying the guidance in GL 89-04 and included discussion of issues of interest to licensees who attended the public workshops. In a letter of September 16, 1991, the staff issued "Supplement to Minutes of the Public Meetings on Generic Letter 89-04" to address a question on stop-check valve testing. The questions and answers are consolidated with the applicable position in Appendix A to this document.

Since issuing GL 89-04, the NRC has incorporated the 1989 edition of the Code in 10 CFR 50.55a(b). The 1989 edition of the Code incorporated OM-6 and OM-10, which include rules for IST that were written with the recognition of the maturity of the nuclear industry. Certain tests and measurements required by previous editions of the Code were eliminated or changed in these standards.

After issuing the generic letter, NRC improved IST by revising 10 CFR 50.55a to endorse the ASME Operations and Maintenance Standards on IST of pumps and valves, separating the IST and inservice inspection programs in Paragraph (f) of Section 50.55a, issuing additional guidance, and coordinating with ASME for regular symposia on testing pumps and valves. NRC has also held three symposia, and will schedule others biennially, with the fourth planned for July 1996.

1.3 NRC Recommendations and New Guidance

The recommendations herein supplement the guidance and positions in GL 89-04. Appendix A is a compilation of the 11 positions in GL 89-04, Attachment 1, with questions and answers from the meeting minutes, and a discussion of the current applicability of each position and the application of GL 89-04 to OM-6 and OM-10. The document is written for the latest edition incorporated into Paragraph (b) of 10 CFR 50.55a. To the extent practical, the document reflects the applicable section, subsection, or paragraph of the appropriate documents (subsections of Section XI and paragraphs of OM-6, OM-10).

The guidance in many sections herein may be used for requesting relief. However, licensees may also request relief that is not in conformance with the guidance. In evaluating such requested relief, the NRC will use the recommendations herein, where applicable. The NRC may reference a recommendation herein in future safety evaluations and grant relief or authorize the alternative if the licensee has addressed all of the aspects included in the applicable section, where applicable.

The document also discusses OM-6 and OM-10, which may be implemented by licensees pursuant to 10 CFR 50.55a (f)(4)(iv). This document gives the requisite approval for 10 CFR 50.55a (f)(4)(iv) for updating an IST program to the requirements of OM-6 and OM-10 (and OM-1 through reference in OM-10). Portions of OM-6 and OM-10 are also approved per (f)(4)(iv), as discussed in the following sections.

3.1.1	Deferring Valve Testing to Cold Shutdown or Refueling Outage
3.3.2	Concurrent Intervals (in part)
4.1.4	Extension of Test Interval to Refueling Outage for Check Valves Verified Closed by Leak Testing
4.2.5	Verification of Remote Position Indication for Valves by Methods Other Than Direct Observation
4.2.7	Stroke Time Measurements Using Reference Values
4.3.3	Test Supervisor Qualifications
4.3.4	Frequency and Method of Testing Automatic Depressurization Valves in Boiling Water Reactors
4.4.3	Multiple Containment Isolation Valve Leak-Rate Testing

4.4.5 Leak-Rate Testing Using OM-10 Requirements

5.1.2 Continued Measurement of Parameters Deleted from OM-6

5.3 Allowable Variance from Reference (for fixed resistance systems)

5.4 Monitoring Pump Vibration Per OM-6

5.7 Use of OM-6 Table 3b Ranges for Hydraulic Parameters

5.8 Duration of Tests

If a licensee chooses to implement this guidance for these issues approved under 10 CFR 50.55a (f)(4)(iv), deviations from the guidance require a relief request. If a licensee implements any or all of these recommendations, the use of each recommendation must be discussed (e.g., noted, listed, or detailed) in the IST program document. If a licensee updates to the requirements of OM-6 for pump inservice testing and OM-10 for valve testing **in their entirety**, it is recommended that the IST program so state in the introductory section, and need not state the use of the sections listed above.

1.4 Other Information

Other information on IST can be found in NRC inspection procedures (IPs) and temporary instructions (TIs) as follows:

IP 73756, "Inservice Testing of Pumps and Valves," March 16, 1987

TI 2515/110, "Performance of Safety-Related Check Valves," November 19, 1991

TI 2515/114, "Inspection Requirements for Generic Letter 89-04, `Acceptable Inservice Testing Programs,'" January 15, 1992

1.5 Synopsis of Report

Section 2 describes existing requirements on IST, discusses the scope of the IST program, and describes guidance for presenting information in IST programs, including cold shutdown justifications, refueling outage justifications, and relief requests. The section includes a sample list of plant systems for boiling-water reactors (BWRs) and pressurized-water reactors (PWRs) that typically (but not necessarily) contain Code pumps or valves that do a safety function. The section also includes information needed for licensees to establish the tests and test frequencies proposed for pumps and valves in an IST program.

Section 3 describes NRC recommendations and their bases for several general aspects of IST. Section 4 describes recommendations on valve issues. Section 5 describes recommendations on pump issues. Section 6 discusses the revised standard technical specifications. Section 7 discusses the process

for licensees to follow when a Code nonconformance is found.

In the appendices, the staff consolidates and updates the information from GL 89-04 and other sources related to IST programs, and includes examples of relief requests that have been submitted for evaluation and review.

Throughout Sections 3, 4, and 5, the staff discusses issues for which plants have requested relief and gives guidance on the type of information that would typically (or in some cases must) be included in relief requests for these issues. It also discusses Code and regulatory issues and gives recommendations. The discussions of issues and recommendations do not imply additional requirements beyond the Code or the regulations and do not represent backfits; however, some of these discussions address existing requirements of the Code or the regulations and are intended to be clarifying.

Certain terms in this document have gradations of regulatory significance to licensees. Where the requirements of NRC regulations or the ASME Code, as incorporated into the regulations, are discussed, the terms ***shall, must, requires,*** or ***requirements*** are used consistently to indicate their mandatory nature. The term ***must*** is also used in another manner in the context of implementing guidance (not requirements), as discussed below. The word ***should*** is used in two contexts: (1) in reiterating previously approved NRC staff positions or requirements promulgated by generic letter or other approved generic correspondence, and (2) in stating staff recommendations for voluntary implementation in the "NRC Recommendations" sections. The terms ***NRC recommendation, staff recommendation, recommends, acceptable to the staff, acceptable, licensee may***, and ***licensee typically would*** are used to discuss issues that have been evaluated in, and reflect NRC staff findings from, previous plant-specific safety evaluations related to IST relief requests, NRC inspection reports, meetings (ASME Code Committee meetings, meetings with licensees, and NRC/ASME symposia), and other generic correspondence. The term ***must*** is used with provisions of the guidance herein intended for voluntary implementation by licensees to indicate that, if a licensee chooses to implement the guidance of a section, the licensee is to follow such provisions in that section without deviation in order to receive credit for satisfactorily meeting the guidance of that section.

The new guidance in this document is similar in appearance to NRC staff positions given in a regulatory guide because of the terms discussed above, and because certain recommendations indicate acceptable alternatives to Code requirements. However, this guidance is not equivalent to staff positions in a regulatory guide or other generic correspondence, because this guidance is intended strictly for voluntary implementation by licensees. Licensees may still need to seek approval for certain of these recommendations through the process described in 10 CFR 50.55a.

2 DEVELOPING AND IMPLEMENTING AN INSERVICE TESTING PROGRAM

Licensees may use the following guidance for developing and implementing inservice testing (IST) programs. This guidance supplements existing requirements and previously approved guidance on IST.

2.1 Compliance Considerations

Code of Federal Regulations, Title 10, Section 50.55a (10 CFR 50.55a), "Codes and Standards," states requirements for IST of certain safety-related pumps and valves. These components are to be tested according to the requirements of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Subsections IWP for pumps and IWV for valves. The testing is intended to assess operational readiness of components. The tests conducted during the initial and successive 120-month intervals are to be based on the requirements in the applicable edition and addenda of the Code, to the extent practical, within the limitations of design, geometry, and materials of construction, as described in 10 CFR 50.55a(f)(4).

Paragraph 50.55a (f)(4)(ii) requires that IST in each 120-month interval following the initial interval be conducted in compliance with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b), in effect 12 months before the start of the interval. Pursuant to 10 CFR 50.55a(f)(4)(iv), IST may meet the requirements of subsequent editions and addenda incorporated by paragraph (b) or portions of a revised edition of Section XI. When portions of a revised edition are used, all related requirements of the respective editions or addenda must be met. This document gives approval for licensees to implement the 1989 Edition of the ASME Code, Section XI, in its entirety or for certain portions, for IST programs.

The regulations specify the upper tier requirements for IST. The requirements of the ASME Code, as incorporated by reference into the regulation, have the force of law. The technical specifications include general and specific requirements for IST and other surveillance testing of pumps and valves. The plant safety analyses include information on the design limitations and functional requirements for the performance of pumps and valves for a facility. The IST program, including relief requests and data analysis methods, describes the means for implementing the various requirements for the specific plant. The implementing procedures include the lowest tier of IST elements. Other information such as bases documents, vendor manuals, trend data, and graphs is often used by IST engineers in developing, maintaining, and implementing the IST program.

The regulations are the authority governing the implementation of the various IST requirements. Therefore, the regulations must be met when a licensee finds a conflict between the regulations and any of the lower tier requirements (program or procedures). The staff's response to Question 69 (see Appendix A) gives guidance on cases where the licensee modifies its plant in a way that affects the basis for a relief that has previously been granted. Similarly, if a licensee has obtained approval of an alternative pursuant to 10 CFR 50.55a (a)(3)(i) or (ii), the licensee need not use the alternative if it determines that continued compliance with the Code requirements is

warranted or necessary for particular circumstances that may preclude implementation of the alternative method. When an implementing procedure is revised, the licensee typically ensures that the IST program reflects the required testing.

When a system, subsystem, or component is modified according to 10 CFR 50.59, or when an operating or test procedure or valve alignment is changed under Section 50.59, the licensee typically reviews the IST requirements to determine whether it must change the program for affected components.

Standard Technical Specification 4.0.5 and the corresponding technical specification for each plant, state that IST of ASME Code Class 1, 2, and 3 pumps and valves shall be performed in accordance with Section XI of the Code and applicable addenda as required by 10 CFR 50.55a. According to the regulation, if a revised IST program conflicts with the technical specifications for the facility, the licensee shall apply to the U.S. Nuclear Regulatory Commission (NRC) to amend the technical specifications to conform with the revised program, or otherwise meet the requirements of the technical specifications and 10 CFR 50.55a (see 10 CFR 50.55a (f)(5)(ii)). This provision in the rule specifies actions to be taken by a licensee when a revised inservice inspection (testing) program for a facility conflicts with the technical specifications (see 41 Federal Register 6256, "Statements of Consideration," February 12, 1976).

The NRC may authorize alternatives to Code testing requirements submitted as relief requests, or submitted in a similar format that includes a description of the requirements, a description of the proposed alternative, and the justification for approval of the alternative. Section 50.55a includes the following provisions for accepting alternatives or granting relief:

- Section 50.55a (a)(3)(i) allows the NRC to authorize alternatives if "the proposed alternatives would provide an acceptable level of quality and safety." The NRC will normally approve an alternative pursuant to this provision only if the licensee proposes a method of testing that is an equivalent method, or an improvement, to the Code method, or if the testing will comply or is consistent with later Code editions approved by NRC in Section 50.55a(b).

- Section 50.55a (a)(3)(ii) allows the NRC to authorize an alternative if "compliance [with the Code requirement] would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety." The NRC may approve an alternative pursuant to this provision if, although the proposed alternative testing does not comply with the Code, the increase in overall quality and safety at the plant would not compensate for the difficulty of compliance.

- Section 50.55a(f)(6)(i) states:

  > The Commission will evaluate determinations . . . that Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law . . . giving due consideration to the burden upon the licensee if the requirements were imposed on the facility.

The NRC may grant relief pursuant to this provision and may impose alternatives if the licensee demonstrates that the design or access limitations make the Code requirement impractical. The burden created by imposing the Code requirements on the licensee is considered in the staff's evaluation.

The NRC periodically issues revisions to Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability ASME Section XI Division 1," which lists the ASME Code cases suitable for use (see footnote 6 to 10 CFR 50.55a). Without obtaining further NRC review, the licensee may implement the Code cases listed in RG 1.147 for IST programs, if the Code cases are used in their entirety, with any supplemental conditions specified in the regulatory guide. The following Code cases are listed in Revision 11 of RG 1.147:

N-415, "Alternative Rules for Testing Pressure Relief Devices," which allows use of OM-1-1981 as alternative rules to Subsection IWV of Section XI for testing safety and relief valves.

N-427, "Code Cases in Inspection Plans," which describes how an owner may use a Code Case in an inspection or testing program. This case is acceptable if paragraph (b)(1) is replaced with the following: "Code Cases that were superseded with revised Code Cases and had been approved for use in accordance with (a) may continue to be used."

N-444, "Preparation of Inspection Plans," which gives guidance for preparing inspection plans, identifying the contents recommended for pump and valve tables. It also includes justification for substututing alternative examinations or tests. RG 1.147 notes that valve stroke times may be documented outside of the IST progam, but that if the stroke times are included and a maximum stroke time is revised, it is not necessary to submit a revised IST program to the NRC solely to docoument a revision in valve stroke time (see Footnote 9 of RG 1.147, Revision 10, July 1993).

N-465, "Alternative Rules for Pump Testing," which incorrectly references the 1987 Addendum of OM-6. The correct reference is OMa-1988, Part 6, since no 1987 Addenda were issued. N-465 allows that Part 6 may be used as alternative rules for pump testing in lieu of Subsection IWP of Section XI.

N-472, "Use of Digital Readout and Digital Measurement Devices for Performing Pump Vibration Testing," which lists the provision for using digital vibration measuring instruments under IWP-4000.

N-473, "Alternative Rules for Valve Testing." The correct reference is OMa-1988, Part 10, since no 1987 Addenda were issued. This code case allows that Part 10 may be used for valve testing in lieu of Subsection IWV of Section XI. The modification in paragraph (b)(2)(vii) of 10 CFR 50.55a regarding containment isolation valves continues to apply.

In the 1988 Addenda and the 1989 Edition of Section XI, Subsections IWP and IWV were revised to simply reference Parts 6 and 10 of the ASME Operation and Maintenance (OM) Standard, "Operation and Maintenance of Nuclear Power Plants, ASME/ANSI [American National Standards Institute] OM-1987" (1988a addenda of OM-6 and OM-10), respectively. The OM Standards were rewritten, though no significant technical changes were made, and were approved by the Board on Nuclear Codes and Standards in

1990 as the "Code for Operation and Maintenance of Nuclear Power Plants, ASME OM Code-1990." The OM Code includes pump, valve, and snubber IST and snubber examination requirements. While OM-6 and OM-10 have been incorporated into the regulation through the 1989 edition of ASME Section XI, the NRC has not yet incorporated the OM Code into 10 CFR 50.55a. The staff is considering incorporating the OM Code in a proposed rule expected to be published in the *Federal Register* in 1995.

An IST program, including implementing procedures, is subject to the requirements of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Changes to the scope, test methods, or acceptance criteria are subject to the requirements of Section 50.59, "Changes, Tests, and Experiments."

The technical specifications for most plants include IST requirements more restrictive than the regulations. Section 6 describes how licensees may amend their technical specifications requirements for IST to better address the regulations as the governing requirements.

2.2 Criteria for Selecting Pumps and Valves for the IST Program

Subsections IWP-1100 and IWV-1100 of Section XI, before the 1988 Addenda, define the scope of the IST program for pumps and valves with exceptions defined in IWP-1200 and IWV-1200. Both Section XI and 10 CFR 50.55a(f) state that the IST program includes certain pumps and valves classified as ASME Code Class 1, 2, or 3 and required to perform a specific function in shutting down a reactor, maintaining the shutdown condition, or mitigating the consequences of an accident. (NOTE: The length of time assumed for maintaining the safe shutdown condition would typically be stated in a plant's safety analysis. For example, if the safety analysis is based on the capability to maintain cold (safe) shutdown for 30 days, the pumps and valves within the scope of 10 CFR 50.55a that are used to meet this capability would be subject to IST.)

The 1986 Edition (through the Winter 1985 Addenda to the 1983 Edition) of Section XI expands the scope of IWV to include certain valves which give overpressure protection to Code class systems or subsystems which perform a required function in shutting down a reactor, in maintaining shutdown conditions, or in mitigating the consequences of an accident. "Accident" refers to the accident analyses in the safety analysis reports and a broad range of possible adverse events that could occur at a nuclear power plant (refer to the response to Question Group 104 of Appendix A). Parts 6 and 10 of the 1988 Addendum (OMa-1988) to the ASME/ANSI OM-1987 Standard, "Operation and Maintenance of Nuclear Power Plants," and Subsections ISTB 1.1 and ISTC 1.1 in the ASME OM Code, also define the scope of the IST program for certain pumps and valves. However, the scopes of the OM Standards and Code have been expanded to require that certain pumps and valves, whether ASME Code Class 1, 2, or 3, or not be included in the IST program. Until the scope of 10 CFR 50.55a is changed, the scope of the IST program will continue to include those components classified by the licensee as ASME Code Class 1, 2, or 3, generally as defined by the plant's safety analysis report.

Members of the OM Committee who participated at the time the scope statement was developed stated that they did not wish to increase the scope of OM-6 and OM-10

beyond the scope of the 1986 Edition of Section XI (other than safety and relief valves). Originally, the scope statement was written to apply to ASME Code Class 1, 2, and 3 components. The scope statements of OM-6 and OM-10 include Code Class 2 and 3 components because many plants were licensed before these components were included in the construction code and because including these components is consistent with 10 CFR 50.55a. Therefore, it may be inappropriate to assume that the scope of OM-6 and OM-10 is broader than 10 CFR 50.55a, even though the scope statement appears broader. Components outside the scope of 10 CFR 50.55a may be included in the scope of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (the "Maintenance Rule"). If codes and standards are developed for components other than ASME Code Class 1, 2, and 3, the NRC would determine if changes to the regulation would be needed. Any such changes would be subject to the provisions of 10 CFR 50.109, "Backfitting." However, if licensees elect to consolidate testing for pumps and valves, designating any non-Code components as such in the IST program may be acceptable to meet testing requirements for other safety-related pumps and valves.

Relief requests for non-Code components may be implemented without NRC evaluation and approval. Although deviations from the Code for non-Code components need not be written as "relief requests," a notation in the IST program would help to identify the deviations and indicate that they are related to non-Code components. If it is not clear that the deviations relate to non-Code components, it might be assumed that the requirements of 10 CFR 50.55a are not being met. Some licensees use the relief request format to document such deviations, while other licensees place notes, footnotes, or short descriptions in the program document.

The current scope defined by the Code includes pumps and valves required to achieve and maintain cold shutdown. If the plant was licensed for a safe shutdown condition of hot standby or hot shutdown rather than cold shutdown, the IST program document will stipulate that the plant was not designed and licensed for a safe shutdown condition of cold shutdown. In discussions with ASME Code committee members, the NRC informed the committee members that many early plants were licensed to operate with a "safe" shutdown condition of hot standby or hot shutdown, and were not required to achieve cold shutdown after a design basis accident. Components and systems necessary to achieve cold shutdown at such a plant may not, therefore, be safety-related or subject to quality assurance requirements. These components are not credited to achieve "safe" shutdown in plant safety analyses. Recognizing the discrepancy between the Code requirements and the licensing basis for such plants, the ASME Code committee recently revised the scope to "safe" shutdown rather than "cold" shutdown. Although a relief request is not required for plants licensed with hot shutdown or hot standby as the "safe" shutdown condition, the IST program document submitted to the NRC must state the special condition for the plant in an introductory section.

Refer to Information Notice 91-56, "Potential Radioactive Leakage to Tank Vented to Atmosphere," for discussion on potential leakage pathways that could affect offsite dose evaluations.

The scope of the IST program is defined in 10 CFR 50.55a, Paragraphs (f)(1), (f)(2), and (f)(3). For components that fall within the scope defined in these paragraphs, the IST

program is further narrowed by the scope of the ASME BPVC, Section XI, Subsections IWP and IWV, and, where applicable, OM-6 and OM-10. If there is a conflict with the scope in IWP/IWV or OM-6/OM-10 in a way that appears to be broader than 10 CFR 50.55a, the more narrow scope applies. If the FSAR indicates that a system or component is Code Class 1, 2, or 3, the system or component is within the scope of 10 CFR 50.55a. If the FSAR states that a system or component is designed, fabricated, and maintained as code class at the option of the Owner as permitted by Paragraph IWA-1320(e), then the application of the requirements in Section XI are also optional. If a licensee has made a commitment to include a component in the IST program, the component is considered within the scope of the program and may be removed only if the applicable criteria of 10 CFR 50.55a and 50.59 are met. Also, if the TS require a component to be tested per the IST program, it is considered within the scope.

As a result of a design basis document (DBD) review, many licensees have been reassessing their IST program scopes and considering deleting certain systems from the programs. To delete entire systems from the IST program, such as reactor core isolation cooling (RCIC) or standby liquid control (SLC), a licensee would do a review and prepare documentation under 10 CFR 50.59 (if necessary).

Plants licensed under the standard review plan (SRP) may have classified certain systems as Code Class 3 that would not be so classified in earlier plants. The SRP recommends rather than requires that these systems be classified as Quality Group C (corresponds to Code Class 3 in RG 1.26). Regulatory Guide 1.26 states that it does not cover systems such as instrument and service air, diesel engine and it generators and auxiliary support systems, diesel fuel, emergency and normal ventilation, fuel handling, and radioactive waste management systems, but that these systems should be designed, fabricated, erected, and tested to quality standards commensurate with the safety function to be performed.

The licensee is responsible for determining if the classification of Code Class 3 is required or if it is optional under IWA-1320(b). This requirement was discussed in a letter from W. T. Russell, Director of the Office of Nuclear Reactor Regulation, to R. K. Buckles, NUS Corporation, September 15, 1994. IWA-1320(b) states that optional construction of a component within a system boundary to a classification higher than the minimum class established in the component design specification shall not affect the overall system classification by which applicable rules are determined. IWA-1320(c) states that the rules of IWB, IWC, and IWD may be applied to the higher classification where all components within the system boundary or isolable portions of the system boundary are classified to a higher class than required by the group classification criteria,. See ISTA 1.3.2, "Classifications," of the OM Code for similar information on components within the scope of the OM Code. If the code classification is changed pursuant to 10 CFR 50.59, the pumps and valves may remain as augmented components (denoted as non-code) in the IST program, as noted in Position 11 of GL 89-04 (NOTE: NRC approval may be necessary as determined by the Section 50.59 evaluation).

2.3 Code Class Systems Containing Safety-Related Pumps and Valves

The plant safety analysis report (SAR), technical specifications (TS), and other documents list the systems and components that must function to support the safe operation and shutdown of the plant. Tables 2.1 and 2.2 list systems and components that have been included in the IST programs for pressurized-water reactors (PWRs) and boiling-water reactors (BWRs). These tables are not intended to apply to all plants, and not all of the systems or components listed in the tables are considered safety-related at every plant, nor are all classified as Code Class 1, 2, or 3. For information on quality group and Code classifications, see RG 1.26 and NUREG-0800, Section 3.2.2. The licensee's safety analysis generally contains a section describing the Code classification of components. The IST program scope must be consistent with the safety analysis.

2.4 IST Program Document

Section 2.4.1 applies to pumps, and Section 2.4.2 applies to valves. These sections describe the information generally needed to prepare and document the IST program. Section XI of the Code includes the rules for inservice inspection (ISI) and IST of nuclear power plant components. Subsection IWA includes general requirements for the inservice inspection and testing of components. Article IWA-6000 of Subsection IWA addresses records and reports required for these inspection programs. IWA-6210(a) states that the owner shall prepare plans and schedules for inservice examinations and tests to meet the requirements of Section XI. IWA-6220(a) states that examination, test, replacement, and repair records shall be prepared in accordance with the requirements of respective articles of Section XI. However, Articles IWP-6000 and IWV-6000 include minimal guidance for the information that could be included in the IST program for pumps and valves that perform a safety function. Appendix F of Section XI, which was introduced in the 1987 Addenda, gives voluntary guidance for the preparation of inspection and testing plans (also see ASME Section XI Code Case N-444 listed in Section 2.1 above).

Licensees have found that pump and valve tables are a convenient format for the information. The tables typically include enough information to allow NRC inspectors to determine if the testing complies with the Code requirements for test method and frequency. The tables could note applicable NRC positions or recommendations for each pump or valve.

It is intended that the IST Program reflect design modifications and other activities performed under 10 CFR 50.59 that relate to pumps and valves within the scope of the IST program. It is recommended that the program plan submitted to the NRC include documentation of the use of positions contained herein, GL 89-04 positions, and Code Cases.

2.4.1 Pumps

In preparing pump tables, it is recommended that the licensee consider the following information, which includes headings and a description of the text that could be included under each heading, as depicted in the example in Table 2.3.

Title: List the applicable plant and unit.

Page number: Include the page number and total number of pages in the program or program section.

Program revision or revision date: List the program or page revision number and date on each page. List the revision number for each program change submitted.

System and Code Class: List the plant system and code class and briefly describe the service of the pump.

Pump identification: List a unique identifier for each pump to be used consistently in all documentation for the IST program and design information such as system piping and instrument diagrams (P&IDs), test procedures, and relief requests.

Piping and instrument diagram number: List the P&ID or figure showing the pump in the system.

Drawing coordinates: List the coordinates of the pump on the piping and instrument diagrams.

Test parameters: List each of the seven inservice test quantities in Section XI, Table IWP-3100-1, or the five parameters in Table 2 of OM Part 6, for each pump. A column or a footnote is typically used to list factors affecting testing. List a relief request number where the testing cannot be performed as required.

Examples of notes often used with pump testing tables are as follows:

(a) The pump is directly coupled to a constant speed synchronous or induction-type driver, and measurement of rotative speed is exempted according to IWP-4400.

(b) The pump bearings are located in the main flow path of the working fluid, and measurement of bearing temperature is exempted according to IWP-4300 (not required by OM Part 6).

(c) Pump bearings are of the permanently sealed and lubricated design; therefore, this pump is exempt from the requirement to observe lubricant level or pressure (not required by OM Part 6).

The previous notes can be used where Code testing would otherwise be required. A relief request is not required in these cases because the test requirement is exempted by the Code or because the pump design makes the pump bearing lubricant level or pressure a parameter which cannot be observed.

Relief request(s): List any applicable relief requests in the pump table.

2.4.2 Valves

In preparing valve tables, it is recommended that the licensee consider the following information, which includes headings and a description of the test that could be included under each heading.

Title: List the applicable plant and unit.

Page number: Include the page number and total number of pages in the program or program section.

Program revision or page revision date: List the program or page revision number and date on each page. List the revision number for each program change submitted.

System and Code Class: List the plant system and code class and briefly describe the service of the valve.

Valve identification: List a unique identifier for each valve in a consistent manner in all IST and design documents, including system P&IDs, test procedures, and relief requests. If valves such as excess flow check valves are grouped together on the valve table, the number of valves and the valve number must be clearly indicated.

Piping and instrument diagram number: List the P&ID or figure showing the valve in the system.

Drawing coordinates: Specify the location of the valve on the piping and instrument diagrams.

Valve type: List the valve type (i.e., gate, globe, check, relief).

Valve size: Specify the valve size in inches, fractions of an inch, or in metric units.

Actuator type: List the type of valve actuator (i.e., motor, solenoid, pneumatic, hydraulic, self) with the type and function of the valves.

Code category: Specify the Code category (or categories), as defined in IWV-2100 and paragraph 1.4 of OM-10. This determines the applicable subsections of the Code. For example, a motor-operated gate valve could be in Code category A or B. A self-actuated check valve could be in category C or A/C.

Active/Passive: State whether a valve is active or passive as defined in Section XI (paragraph IWV-2100 before 1986 edition and paragraph IWA-9000 1986 edition and later), or OM-10, paragraph 1.3. Requirements vary based on the function of the valve. A valve neet not be considered active if it is only temporarily removed from service or from its safety position for a short period of time, such as manually opening a sample valve to take a sample while maintaining administrative control over the valve. If the plant is in an operating mode that does not require a passive valve to be maintained in its "passive" (safety) position, the position of the valve may be changed without imposing IST requirements on the valve. If a valve is routinely repositioned during power operations (or has an active safety function), it is an active valve. If a valve is repositioned to create a new valve alignment (e.g., as corrective action for a condition of another valve in the line), an evaluation, considering the impact on the IST program, may be required to assure operational readiness prior to positioning it in a new position, as determined on a case-by-case basis.

Safety position: List the safety function position(s), specifying both positions for valves that perform a safety function in each of the open and closed positions. Valves must be exercised to the position(s) required to fulfill their safety function(s).

Tests performed: Specify which tests are to be performed on each valve, including the different frequencies that may result for valves that have safety functions in both the open and closed positions.

Test frequency: If performing the test at the frequency specified in the Code is impractical or burdensome, reference cold shutdown or refueling outage justifications (OM-10), or relief requests for test frequency. List the actual test frequency.

Relief requests and cold shutdown/refueling outage justifications: List any applicable relief request(s) in the valve table. When the testing is deferred to cold shutdowns or refueling outages (OM-10), reference the technical justification (cold shutdown justification or refueling outage justification) for the test frequency.

Remarks: Include pertinent information not stated elsewhere in the table such as notes or a brief functional description of the valve. List any applicable GL 89-04 positions and note any special conditions.

Figures in Appendix B depict excerpts from valve tables for IST programs that have been submitted to NRC. Table 2.4 lists common abbreviations used in tables.

2.4.3 Piping and Instrument Diagrams

The staff recommends that piping and instrument diagrams (P&IDs) or system drawings be included in the program submittal to assist in finding the pumps and valves included in the program, and that the drawings be the latest revision at the time the program is submitted to NRC. This information will assist the staff in reviewing relief requests or proposed alternatives. Inservice inspection boundary system drawings and isometrics, or reduced size drawings are suitable to be included in the program document. If the reduced drawings are not complete P&IDs, the staff may request a set of full-size drawings for evaluating relief requests. A partial submittal of the program containing relief requests could include applicable drawings to support the relief requests or to supersede previous IST program drawings. Program drawings need not be updated regularly, but if drawings change because of modifications, or if relief requests are affected, the staff recommends drawings be revised and submitted to NRC in the next periodic submittal of revisions to the program document. The staff also recommends licensees include applicable drawings with relief requests that are very detailed and are submitted to supplement the IST program. These drawings are needed because neither the technical staff at the NRC nor the contractors who perform reviews of relief request maintain a set of SAR's for each plant. The IST reviewers do not receive a copy of the inservice inspection program plan which generally contains drawings. Drawings are helpful in reviewing relief requests, whether submitted as part of the program or as an attachment applicable to any relief requests or proposed alternatives.

2.4.4 Bases Document

The staff recommends that each licensee create a bases document for the IST program. A paper discussing the creation and management of a bases document is included in NUREG/CP-0123, Supplement 1, "Proceedings of the Second NRC/ASME Symposium on Pump and Valve Testing." Bases documents typically have included a description of the methodology used for preparing the IST program, with a list of each pump and valve in a system within the boundaries for a Code class, the basis for including the pump or valve in the IST program or excluding it there from, and the basis for the testing applied to each component. Appendix E contains examples from actual bases documents.

Although not required by the NRC, the bases document will help the licensee ensure continuity of the IST program when the responsibilities of personnel or groups change. A bases document will also enable the plant staff to clearly understand the reasons that the components are either in the program or not in the program. This document, though not a "Licensing Basis Document," is a useful reference for reviews performed under 10 CFR 50.59 when changes are made to a facility.

2.4.5 Deferring Valve Testing to Cold Shutdown or Refueling Outages

Exercising valves on a cold shutdown frequency is not a deviation from the Code. The Code allows for testing during cold shutdown outages if it is impractical to test quarterly during operation. OM-10 allows for a refueling outage frequency if it is impractical to conduct testing quarterly while in operation and during cold shutdown. The licensee must list these valves in the program and include cold shutdown justifications or refueling outage justifications for each valve or group of valves affected. It is recommended that these cold shutdown and refueling outage justifications be included in the IST program submitted to the NRC.

Impractical conditions justifying test deferrals are those that could result in an unnecessary plant shutdown, cause unnecessary challenges to safety systems, place undue stress on components, cause unnecessary cycling of equipment, or unnecessarily reduce the life expectancy of the plant systems and components. Examples of impractical conditions are (1) limitations of design, geometry, and materials of construction of components (e.g., no test taps, pumps cannot overcome pressure, no available flow path), (2) radiation exposure and personnel safety in certain plant modes (see Section 2.5.1 below for discussion on ALARA), (3) testing that could cause a plant trip or require a power reduction. This issue is discussed further in Sections 3 and 4, which give guidance on deferring testing.

2.5 Relief Requests and Proposed Alternatives

A licensee may submit a request for NRC to review and approve relief from requirements of the Code, or for authorization to use proposed alternatives. The staff recommends that the basis for relief address whether (1) the proposed alternative gives an acceptable level of quality and safety, (2) compliance would result in a hardship without a compensating increase in safety, or (3) complying with Code requirements is impractical. The justification must include adequate information for the staff to determine if the alternative can be authorized or relief can be granted (e.g., as applicable, damage to equipment, hazards to personnel, and the possibility of a plant trip in the details of the proposed alternative). The licensee may implement the proposed alternative testing while the NRC is reviewing the relief request if the request is for relief from those requirements that have been determined to be clearly impractical (see Section 6).

The staff performs a detailed review of each relief request, authorizes an alternative to the requirements or grants relief from the requirements, and may impose alternative requirements. When granting relief, the NRC considers the burden on the licensee that would result if the requirements were imposed.

2.5.1 Justifications for Relief

The NRC considers the merits of the submitted technical information when it determines to grant or deny relief from the Code requirements or to authorize alternatives. In requesting relief, the licensee would typically describe the specific Code requirement and associated paragraph for which relief is requested, describe the proposed alternative(s), describe the basis for relief or for the alternative, and clarify the burden that would result if the requirements were imposed. The following are examples of situations that warrant granting relief or authorizing alternatives as determined by the staff in previous safety evaluations for plant-specific requests:

- In complying with the Code requirements, the licensee would not obtain information more useful than the information currently available. For example, installing an analog gauge with a range of three times the reference value (or less) to comply with Code requirements may not yield more accurate reading than the accuracy of the one presently installed (see Section 5.5.1).

- Compliance with the Code is impractical because of design limitations. Imposition of the Code requirements would require significant system redesign and modifications. For example, a flow meter does not meet the accuracy requirements of IWP-4110 because the present system configuration does not have a straight section of pipe of sufficient length in which to measure flow accurately (see Sections 5.5.1 and 5.5.2).

- The required measurements or appropriate observations cannot be made because of physical constraints. Examples include a component located in an area inaccessible during power operation or a pump totally immersed in system fluid.

- The need to keep personnel radiation exposure as low as reasonably achievable (ALARA) may present an adequate justification. The licensee included information about the general area radiation field, local hot spots, plant radiation limits and stay times, the amount of exposure personnel would receive in doing the testing, and the safety significance of deferring testing or performing an alternative method. ALARA relates to controlling exposure during an activity, not specifically to eliminating activities; however, it may be a basis for relief or for deferring an impractical test when exposure limits to perform testing (or possibly to access a valve for repair in the event it could fail during a test) are prohibitive. If the exposure limits are prohibitive, defer testing to cold shutdowns or refueling outages when the exposure limits are no longer prohibitive. ALARA is part of an overall program as required by 10 CFR 20.1101, including activities such as IST. NRC has not extablished ALARA "predetermined acceptable limits" for deferring an IST activity. ASME Section XI Code Case N-444 gives guidance on documenting ALARA as justification for alternative examinations and tests.

- Testing as required by the Code could cause significant equipment damage. For example, shutting off cooling flow to an operating pump by exercising a valve in the cooling flow path could damage the pump.

- Failure of a component during testing could disable multiple trains of a reactor safety system. For example, a motor-operated suction valve common to both trains of high-pressure safety injection could not be tested during power operation because a failure of the valve results in both trains being out of service (see Section 3.1.2).

Inconvenience or administrative burden are not, alone, adequate justification for deviating from the Code requirements. Entering a TS limiting condition of operation (LCO), except when entering the LCO would be prohibited because the total system function would be out of service, is also not, alone, adequate

justification for deviating from the Code-specified frequency (see Section 3.1.2).

2.5.2 Categories of Relief Requests

General: A general relief request is appropriate when the relief being requested applies to a broad range of similar components in the program, such as all pumps or all containment isolation valves.

Specific: A relief request is specific when the relief being requested applies only to a single component or a specified group of similar components in the program, such as service water pump discharge check valves.

2.5.3 Content and Format of Relief Requests

The staff recommends that each relief request include the following information in the order stated, as a minimum. Appendix C includes examples of relief requests that have been submitted by licensees.

Title and relief request number: Entitle each relief request and specify a unique identifier. The identifier remains unique to avoid confusion when later revisions are made. Examples follow: (1) Relief Request Number 1, (2) Safety Injection Pumps Relief Request, (3) Check Valves in Series Relief Request.

Page number: List the page number and total number of pages in the program or program section, such as "Page 15 of 135."

Program revision or page revision date: List the program revision number or page revision date on each page.

System and Code class: List the plant system and Code class of the system in which the component is located.

Valve category: List the ASME category for each valve (i.e., A, A/C, B, C, or D).

Component identification: List the identification number for each component in a specific relief request. Each individual component need not be listed in a general relief request, such as one for all pumps in the IST program. However, it is recommended that the list of program components (pump or valve table) include the relief request number.

Component function: Briefly describe the functions of the components and specify the function which is the subject of the relief request.

ASME Code test requirement(s): List and describe the Code requirement(s) from which relief is being requested.

Basis for relief: Discuss the basis for requesting relief or proposing the use of an alternative including the reasons for which compliance with the Code requirements is impractical or the proposed alternative is a preferred test. Include justification for each test frequency deferred (i.e., quarterly, cold shutdown). State and justify the proposed frequency in the "basis." The relief request should contain all information needed for NRC review. Most relief requests for check valves list the test direction(s) for which the relief is required.

Proposed alternate testing: Clearly and thoroughly present the proposed alternative.

The following are acceptable examples of introductory statements for this section of the relief request:

- These valves will be part-stroke exercised quarterly by way of the minimum flow line for the pump. They will also be full-

stroke exercised with flow into the reactor coolant system during refueling outages.

- These valves will be part-stroke exercised during cold shutdown outages using the power operator on the test arm. They will also be full-stroke exercised during refueling outages by means of the full accident-required flow injected into the reactor coolant system.

- These valves will be part-stroke exercised during cold shutdowns with flow from the residual heat removal system. Their full-stroke capability will be verified during refueling outages. They will be disassembled, the internal components examined, and the valve disk manually stroked. The guidance in Generic Letter (GL) 89-04, Position 2, will be followed for the disassembly and inspection program, including a partial-flow test following reassembly.

Discuss the proposed alternate in sufficient detail to clearly illustrate that it is a reasonable alternative to the Code requirement.

Drawings and/or diagrams: If the relief request or alternative testing is complex, or if drawings or diagrams are available for further clarification, they could be included in the relief request or could be referenced and included in the IST program document.

References: List references to SAR sections, technical specifications, and other pertinent documents (e.g., applicable position of GL 89-04). A document referenced in the relief request must be submitted to the NRC on the plant docket. If a document is not docketed but contains pertinent information, the relief request must include the information rather than merely referencing the document.

Table 2.1 Typical systems and components in an inservice testing program for a pressurized-water reactor

Typical safety-related, Code class systems in pressurized-water reactors	Typical components in an inservice testing program
Reactor coolant system and flowpaths for establishing natural circulation	Power-operated relief valves and associated block valves Reactor high point and head vents Primary system safety and relief valves (pressurizer Code safety valves) Valves in any proposed flow path used for long-term core cooling or safe shutdown Pressure boundary isolation valves Valves in lines to pressurizer relief/quench tank
Main steam system	Main steam isolation valves (MSIVs) Main steam non-return valves (if applicable) Secondary system safety and relief valves Atmospheric dump valves Auxiliary feedwater turbine steam supply valves Steam generator blowdown isolation valves
High-pressure safety injection system	High-pressure injection pumps and discharge check valves Injection valves in injection flowpath Isolation valves Valves for the refueling water storage tank (RWST) borated water storage tank (BWST), refueling water tank (RWT), including vacuum breakers
Chemical and volume control or makeup system	Charging or makeup pumps and suction/discharge check valves Valves in charging/makeup flowpath Boric acid transfer pumps and suction/discharge check valves Valves in emergency boration flow paths Relief valves

Table 2.1 Typical systems and components in an inservice testing program for a pressurized-water reactor (continued)

Typical safety-related, Code class systems in pressurized-water reactors	Typical components in an inservice testing program
Low-pressure safety injection system	Injection pumps and suction/discharge check valves Valves associated with safety injection accumulators and core flood tanks Recirculation flowpath valves, including containment sump isolation valves Isolation valves (high-low pressure interface) Relief valves
Shutdown cooling, residual heat removal, or decay heat removal systems	Pumps and suction/discharge check valves Valves in flowpath Isolation valves (high-low pressure interface) Relief valves
Containment spray system	Containment spray pumps and suction/discharge check valves Valves in flowpaths to spray header Isolation valves Valves in spray additive flowpath Spray additive tank valves, including vacuum breakers
Main feedwater system	Main feedwater isolation valves
Auxiliary feedwater system	Auxiliary feedwater pumps and suction/discharge check valves Valves in flowpath to steam generators Valves in suction lines Valves between normal and ultimate heat sink suction sources Relief valves and isolation valves
Primary containment system	Containment isolation valves (various systems) Containment combustible gas venting valves Containment atmosphere sampling valves (if within the scope of 10 CFR 50.55a)

Table 2.1 Typical systems and components in an inservice testing program for a pressurized-water reactor (continued)

Typical safety-related, Code class systems in pressurized-water reactors	Typical components in an inservice testing program
Component cooling water system	Component cooling water pumps and discharge check valves Valves in letdown cooling water flowpath Valves in reactor coolant pump seal injection and cooling water flowpath Relief valves
Spent fuel pool/pit cooling system	Spent fuel cooling pumps and suction/discharge check valves Valves in flowpath from ultimate heat sink source supply
Service water system	Service water pumps and suction/discharge check valves Valves in flowpath to auxiliary feedwater system Valves in flowpaths to emergency room coolers Valves in flowpaths to containment emergency coolers Valves in flowpaths to emergency diesel generator heat exchangers Isolation and cross-tie valves Valves in ultimate heat sink source flowpaths Valves in standby or backup service water, if applicable
Emergency diesel generator system (within scope of 10 CFR 50.55a)	Fuel oil storage and transfer pumps and valves Diesel generator external cooling (service water) Engine air start check valves Air receiver relief valves
Ventilation systems	Pumps and valves in control room emergency cooling water supply flowpath
Instrument air system (if within the scope of 10 CFR 50.55a)	Air supply to containment purge valves Air supply to power-operated relief valves (PORVs) Air supply to MSIVs

Table 2.2 Typical systems and components in an inservice testing program for a boiling-water reactor

Typical safety-related, Code class systems in boiling-water reactors	Typical components in an inservice testing program
Nuclear boiler and reactor recirculation system	Primary system isolation valves Excess flow check valves
Main steam system	MSIVs and actuator valves (pilot valves, accumulator check valves) Main steam safety and relief valves Main steam safety valve discharge rupture diaphragm valve MSIV leakage valves
High-pressure core coolant injection (HPCI) system	Pump and suction/discharge check valve Valves in injection flowpath Isolation valves, including valves in test lines Excess flow check valves HPCI pump turbine valves, including turbine exhaust vacuum breakers (unless considered skid-mounted)
High-pressure core spray system	Pumps and suction/discharge check valves Valves in injection flowpath Isolation valves, including valves in test lines
Reactor core isolation cooling (RCIC) system (if safety-related)	Pump and suction/discharge check valve RCIC pump turbine valves Excess flow check valves Isolation valves
Reactor water cleanup system	Containment isolation valves
Residual heat removal (RHR) system	RHR pumps and suction/discharge check valves Isolation and cross-tie valves Pump suction relief valves RHR heat exchanger thermal relief valves Valves in injection flowpath Flow control valves

Table 2.2 Typical systems and components in an inservice testing program for a boiling-water reactor (continued)

Typical safety-related, Code class systems in boiling-water reactors	Typical components in an inservice testing program
Spent fuel pool cooling system	Fuel pool pumps and suction/discharge check valves Ultimate heat sink supply valve
Feedwater coolant injection and isolation condenser system (if applicable)	Reactor feedwater pumps and suction/discharge check valves Condensate pumps and suction/discharge check valves Condensate booster pumps and suction/discharge check valves Emergency condensate transfer pump and suction/discharge check and isolation valve Isolation and bypass valves Vent valves Makeup to condenser shell check valves
Standby liquid control (SBLC) system	SBLC pumps and suction/discharge check valves Relief valves Injection line valves Explosively-actuated squib valves
Main feedwater system	Isolation valves
Primary containment system	Containment isolation valves including excess flow check valves (various systems) Containment atmosphere monitoring system valves Containment atmosphere dilution system valves Containment pressure suppression and vents
Closed cooling or component cooling water system	Pumps and suction/discharge check valves Valves in flowpaths to safety-related coolers
Service water system	Pumps and suction/discharge check valves Isolation and cross-tie valves Valves in flowpaths to safety-related coolers Valves in flowpaths to diesel generator coolers Valves in standby or backup service water Valves in flowpath from ultimate heat sink source Valves in residual heat removal service water flowpath

Table 2.2 Typical systems and components in an inservice testing program for a boiling-water reactor (continued)

Typical safety-related, Code class systems in boiling-water reactors	Typical components in an inservice testing program
Control rod drive system (portions within the scope of 10 CFR 50.55a)	Scram dump valves Scram discharge volume vent valves Scram discharge volume drain valves Accumulator rupture disks Hydraulic control unit control valves Drive water backflow prevention valves
Emergency diesel generator systems (if within the scope of 10 CFR 50.55a)	Fuel oil storage and transfer pumps and valves Diesel generator external cooling (service water) Engine air start check valves Air receiver relief valves
Ventilation systems	Pumps and valves in control room emergency cooling water supply flowpath
Instrument air system (if within the scope of 10 CFR 50.55a)	MSIV accumulator check valves MSIV pilot valves Automatic depressurization system (ADS) valve accumulator check valves ADS pilot valves
Traversing incore probe system (if within the scope of 10 CFR 50.55a)	Containment isolation valves

Table 2.3 Example data table for pumps

PLANT NAME/UNIT

PUMP TESTING PLAN

Revision: 3
Date: 1-15-92
Page: 1 of 3

Pump List				Parameters						
SYSTEM	PUMP I.D.	P&ID NO.	COORD.	S	P_i	dP	Flow	V (PR-1)	T_b	L
Residual Heat Removal	RHR-01	M-402 Sh. 1	D-4	(1)	Q	Q	Q	Q	Y	Q
	RHR-02	M-402 Sh. 2	G-4	(1)	Q	Q	Q	Q	Y	Q
	RHR-03	M-402 Sh. 2	F-5	(1)	Q	Q	Q	Q	Y	Q
Auxiliary Feedwater	AFW-01	M-408 Sh. 1	B-5	(1)	Q	Q	Q	Q	PR-4	Q
	AFW-02	M-408 Sh. 1	B-8	(1)	Q	Q	Q	Q	PR-4	Q
	AFW-03	M-408 Sh. 1	B-11	Q	Q	Q	Q	Q	PR-4	Q
Service Water	SWS-01	M-335 Sh. 1	F-9	(1)	PR-7	Q	PR-3	PR-2	(2)	(4)
	SWS-02	M-335 Sh. 2	D-4	(1)	PR-7	Q	PR-3	PR-2	(2)	(4)
	SWS-03	M-335 Sh. 3	E-8	(1)	PR-7	Q	PR-3	PR-2	(2)	(4)
	SWS-04	M-335 Sh. 4	C-4	(1)	PR-7	Q	PR-3	PR-2	(2)	(4)
Standby Liquid Control	SLC-01	M-367 Sh. 1	D-9	(1)	PR-7	PR-5	PR-6	Q	PR-4	(3)
	SLC-02	M-367 Sh. 1	D-4	(1)	PR-7	PR-5	PR-6	Q	PR-4	(3)

Note (1): Pump is directly coupled to a constant speed synchronous or induction type driver.

Note (2): Pump bearings are located in the main flow path of the working fluid.

Note (3): Pump bearings are of the permanently sealed and lubricated design.

Note (4): The pump bearings are located in the main flow path of the working fluid and are cooled and lubricated by the process fluid.

Legend:

S	Speed	T_b	Temperature, bearings
P_i	Pressure, inlet	L	Lubrication
dP	Differential Pressure	PR	Pump Relief Request
Q	Quarterly	V	Vibration

Table 2.4 Useful abbreviations for valve data tables

Parameter	Abbrevation	Description
Valve Type	GT	Gate valve
	GB	Globe valve
	CK	Check valve
	RV	Relief valve
	SC	Stop check
	BF	Butterfly valve
	DI	Diaphragm valve
	EX	Explosive valve
	BA	Ball valve
Actuator Type	MO	Motor operated
	SO	Solenoid operated
	AO	Air operated
	HO	Hydraulic operated
	SA	Self actuated
	MA	Manual
	PA	Pilot Actuated
Safety Position(s)	O	Open
	C	Closed
	O/C	Both open and closed
	T	Throttled
Test(s) Performed	FS	Full-stroke exercise valve to safety position(s)
	PS	Part-stroke exercise valve
	LT	Leak-rate test valve to Section XI requirements
	LJ	Leak-rate test valve to Appendix J requirements
	ST	Measure the full-stroke times of the valve
	FT	Observe the fail-safe operation of the valve
	PI	Verify the valve remote position indication
	RV	Safety and relief valve test
	EX	Explosive valve test
Test Frequency	Q	Test performed once every 92 days
	CS	Test performed during cold shutdowns but not more frequently than once every 92 days
	RF	Test performed each reactor refueling outage
	2Y	Test performed once every two years
	RV	Test relief valve at IWV or OM-1 schedule
	SD	Disassemble, inspect, and manually exercise one valve from specified group each reactor refueling outage

3 GENERAL SUPPLEMENTAL GUIDANCE ON INSERVICE TESTING

3.1 Inservice Test Frequencies and Extensions for Valve Testing

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code) generally requires quarterly testing of pumps and valves. Subsection IWV of Section XI of the Code allows for deferring valve exercising to cold shutdown outages if exercising is not practical during plant operation. Part 10 of the ASME Operations and Maintenance Standard (OM-10) has additional allowances discussed below. The U.S. Nuclear Regulatory Commission (NRC) staff may approve relief for extending a test interval for extenuating circumstances in which (1) compliance would result in hardship or unusual difficult without a compensating increase in the level of quality and safety or (2) the system design makes compliance impractical. Any requested relief would typically include a technical justification for the deferment. Table 3.1 lists the tests and test frequencies required by the Code.

3.1.1 Deferring Valve Testing to Each Cold Shutdown or Refueling Outage

Exercising valves at each cold shutdown outage is not a deviation from the Code and does not require a relief request. Testing at each refueling outage is a deviation from requirements in Subsection IWV of Section XI, but is an allowable deferral of the testing required by OM-10. The Code specifies testing at cold shutdowns if it is impractical to test quarterly during operation. OM-10 specifies full-stroke exercising at each refueling outage if testing is impractical both quarterly while in operation and during cold shutdown outages. The Code (IWV-3412, IWV-3522, and OM-10, paragraph 6.2) requires the valves for which testing is deferred be identified and the basis for determining impracticality be documented in the inservice testing (IST) program. The licensee may implement the portions of OM-10 which allow deferral of the testing in accordance with 10 CFR 50.55a(f)(4)(iv) if the following related requirements are met:

> Category A and B Valves: OM-10, Paragraph 4.2.1, including a partial-stroke exercise quarterly or during cold shutdown outages, if practical.
>
> Category C Valves: OM-10, Paragraph 4.3.2, including a partial-stroke exercise quarterly or during cold shutdown outages, if practical.
>
> Test Plans: OM-10, Paragraph 6.2, for documenting the basis of the deferral.

Therefore, although relief is not required, this section must be referenced in the IST program. Examples 3-1 and 3-2 depict acceptable cold shutdown justifications (CSJs). Examples 3-3 and 3-4 depict refueling outage justifications acceptable in accord with OM-10.

NRC issued guidance in letters to licensees in 1976 which included examples of valves to be specifically excluded from exercising (cycling) tests during plant operations. This guidance may not apply in all cases (e.g., HPCI turbine steam supply and pump discharge valves may be tested quarterly during pump testing). Examples of the excluded valves follow:

(1) All valves whose failure in a non-conservative position during the cycling

test would cause a loss of system function. Valves in this category would typically include all non-redundant valves in lines such as a single discharge line from the refueling water storage tank or accumulator discharge lines in pressurized-water reactors (PWRs) and the high-pressure coolant injection (HPCI) turbine steam supply and the HPCI pump discharge in boiling-water reactors (BWRs). Other valves may fall into this category under certain system configurations or plant operating modes. For example, when one train of a redundant system such as an emergency core cooling system (ECCS) is inoperable, non-redundant valves in the remaining train should not be cycled since their failure would cause a loss of total system function.

(2) All valves whose failure to close during a cycling test would result in a loss of containment integrity. Valves in this category would typically include all valves in containment penetrations where the redundant valve is open and inoperable.

(3) All valves, which when cycled, could subject a system to pressures in excess of their design pressures. It is assumed for the purpose of a cycling test that one or more of the upstream check valves has failed unless positive methods are available for determining the pressure or lack thereof on the high-pressure side of the valve to be cycled. Valves in this category would typically include the isolation valves of the residual heat removal/shutdown cooling system and, in some case, certain ECCS valves.

If a technical specification surveillance requires a test, even when one train is out of service, the possible safety consequences of performing the test have been weighed against the benefits of testing. The guidance herein and in the 1976 letters does not supersede technical specification requirements.

Check valves that can be stroked quarterly, but must be monitored by a nonintrusive technique to verify full stroke, may be full-stroke tested during cold shutdowns or refueling outages if another method of verifying full-stroke exists at these plant conditions. However, the quarterly partial-stroke testing would continue to be required. Also, the NRC would not require a licensee to invest in nonintrusive equipment for the purpose of testing check valves quarterly in lieu of testing during cold shutdowns or refueling outages, though the use of nonintrusive techniques is recommended where practical.

When considering deferring valve testing to cold shutdowns or refueling outages, some valves could be tested quarterly, but the testing involves a hardship; i.e., a limiting condition for operation of 3 to 4 hours in length, the repositioning of a breaker from "off" to "on," and necessity of manual operator actions to restore the system if an accident occurred while the test is in progress. The risk of performing a test quarterly for such situations may outweigh the benefit achieved with a quarterly test. Section 3.1.2 gives guidance on these situations. Otherwise, it would be appropriate to weigh the safety impact against the benefits of testing as a basis for deferring testing from quarterly to cold shutdowns or refueling outages. A method is described in NUREG/CR-5775, "Quantitative Evaluation of Surveillance Test Intervals Including Test-Caused Risks."

The following sections discuss issues related to valve testing deferrals. These sections do not

apply to testing required after maintenance or repair.

3.1.1.1 IST Cold Shutdown Testing

Subsection IWV does not include provisions for plant startup from cold shutdown when all IST of valves tested at a cold shutdown frequency has not been completed. However, OM-10 allows that plant startup need not be delayed to complete IST. Valves tested on a cold shutdown frequency may be tested at each cold shutdown (e.g., based on a licensee commitment) or may be tested sequentially during cold shutdown outages. Valves tested within 92 days before changing modes from cold shutdown need not be tested. Valves tested at a cold shutdown frequency may include valves tested while decreasing power to cold shutdown or while increasing power to steady state power operation.

NRC Recommendation

In accordance with OM-10, paragraphs 4.2.1.2(g) and 4.3.2.2(g), valve exercising shall commence within 48 hours of achieving cold shutdown, and continue until all testing is complete or the plant is ready to return to power. For extended outages, testing need not begin in 48 hours provided all valves required to be tested during cold shutdown will be retested before plant startup. However, the licensee need not keep the plant in cold shutdown solely to complete cold shutdown testing. All valves tested during cold shutdown outages shall also be tested before startup from refueling outages, unless testing has been completed within the previous 92 days. If an outage lasts beyond 92 days, all cold shutdown testing shall be completed within the last 92 days of the shutdown. A licensee should make a "good faith" reasonable effort to test valves during a cold shutdown; however, the Code does not require documentation for valves not tested during a cold shutdown outage other than as would be required to maintain the IST schedule. Although OM-10 does not include schedules for cold shutdown testing, an acceptable method is for the valves tested in the preceding cold shutdown to be the last valves on the schedule for the next cold shutdown, except for valves tested each cold shutdown. The following is a sample schedule for 15 cold shutdown tests:

> First cold shutdown: Tests 1, 2, 3, 4, 5, and 6 completed.
>
> Second cold shutdown: Tests 7, 8, 9, and 10 completed.
>
> Third cold shutdown: Tests 11, 12, 13, 14, 15, 1, 2, and 3 completed.
>
> Fourth cold shutdown: Tests 4, 5, 6, and 7 completed.

The staff has determined that paragraphs 4.2.1.2(g) and 4.3.2.2(g) of OM-10 are acceptable for all licensees to implement pursuant to Section 50.55a (f)(4)(iv) of Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(f)(4)(iv)). If a licensee chooses to implement this guidance, this section must be referenced in the IST program.

Basis for Recommendation

The NRC recommendation is consistent with OM-10, which states the most recent requirements for IST of valves approved by NRC in 10 CFR 50.55a and may be applied to plants continuing to use the requirements in Subsection IWV of Section XI. The technical specifications (TS) govern the restart of the plant. The staff has determined that startup need not depend on the completion of Section XI testing because, if the licensee were required to complete all cold shutdown testing before restarting the plant, it may have the

unneeded burden of extending cold shutdown outages solely to complete surveillance testing. However, a licensee should make reasonable efforts in scheduling and performing the tests.

3.1.1.2 Testing at a Refueling Outage Frequency for Valves Tested During Power Ascension

OM-10 requires that valves tested on a refueling outage frequency be tested prior to returning the plant to operation. Several licensees have indicated that certain valves cannot be tested until power ascension begins. This section was included to give guidance for such valves and to indicate that the operability of technical specifications would control the time for testing such valves. It is intended that such valves will be indicated in the IST program as tested on a refueling outage frequency, even though the plant may return to "operation" before the testing is completed. A similar intent applies to valves tested during power ascension from cold shutdowns which are not refueling outages; however, the language in OM-10 is different for valves tested on a cold shutdown frequency.

Before beginning power ascension from a refueling outage, the licensee normally completes the tests of those valves tested at each refueling outage. However, to test any valves that can only be tested during power ascension, the licensee may begin raising the power level and changing modes in accordance with TS requirements and test the applicable valves when plant conditions allow testing. If maintenance has been performed on a valve during the outage, the licensee is required to consider the valve inoperable until completing post-maintenance testing in accord with the operability requirements in the TS. This situation could also apply to valves tested during power ascension from a cold shutdown outage.

NRC Recommendation

OM-10 requires that all valve testing schedules for performance during a refueling outage shall be completed before returning the plant to operation; however, for valves which must be tested during power ascension for which technical specification requirements for the valves or the system determine when the valves are required to be operable, the testing for these valves may be scheduled for refueling outages (or cold shutdown outages). The NRC has determined that paragraphs 4.2.1.2(h) and 4.3.2.2(h) of OM-10 are acceptable for all licensees to implement pursuant to 10 CFR 50.55a (f)(4)(iv). Therefore, relief is not required provided the licensee meets all requirements of these paragraphs and references this section in the IST program (also see Section 3.1.1.1 above).

Basis for Recommendation

The staff has determined that the guidance of this section is consistent with Paragraphs 4.2.1.2(h) and 4.3.2.2(h) of OM-10 and the TS requirements and is acceptable for meeting those provisions.

3.1.1.3 De-inerting Containment of Boiling Water Reactors to Allow Cold Shutdown Testing

According to 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors," each BWR equipped with a Mark I or Mark II containment must have provisions for an inerted containment atmosphere during power operation to protect against a burn or explosion of hydrogen gas generated by the

core metal-water reaction after a loss-of-coolant accident (LOCA).

Oxygen content in the containment atmosphere is monitored during normal power operation. Technical specifications specify the maximum oxygen concentrations allowed. Since hydrogen generation is not a concern during cold shutdown or refueling outages, the technical specifications allow the containment atmosphere to be de-inerted. However, licensees do not routinely de-inert the containment during cold shutdown outages because of the impracticality of the time needed to de-inert and re-inert and because the nitrogen used for inerting is lost.

OM-10 and Section XI of the Code allow the licensee to test certain valves located in the inerted containment during cold shutdown outages because it is not practical to test them during power operation. However, access to the valve may be required to perform the testing or repair the valve if it failed. The staff has determined that de-inerting the containment at each cold shutdown outage solely to perform this testing is impractical.

NRC Recommendation

Valves may be tested during refueling outages if they would otherwise be tested during cold shutdown outages that require the containment to be de-inerted for performance of this testing. The NRC staff does not consider that containment de-inerting solely for the purpose of valve testing is warranted and approves the test deferral pursuant to 10 CFR 50.55a (f)(4)(iv) provided the licensee meets all requirements of Paragraphs 4.2.1, 4.3.2, and 6.2 of OM-10 and describes this section in the IST program (also see Section 3.1.1.1 above).

The staff determined that there are few outages that require de-inerting and that maintaining a separate schedule for valve testing was not warranted. When an extended cold shutdown occurs which necessitates de-inerting the containment, testing is at the discretion of the licensee. The length of the shutdown and the extent of other outage activities could be factored into a decision. Also, for extended outages of several months, the requirements of Paragraph 4.3.2.5 of OM-10 or IWV-3416 of Section XI for valves in systems out of service may apply (see Section 3.1.3). Additionally, guidance on minimizing shutdown risk that may impact such a decision may be applicable for extended outages.

Basis for Recommendation

Unless the licensee would need to enter the drywell for other reasons, de-inerting the drywell during cold shutdown outages to perform testing is impractical because of the time and effort needed to de-inert, re-inert, and replace lost nitrogen gas which could delay the return to power operation. Most plants with custom TS must reduce the primary containment oxygen content to less than 4 percent within 24 hours of placing the reactor mode switch in the run position. If proper oxygen concentration cannot be established for any reason, the plant is required to return to the startup mode. Plants using the standard technical specifications are also restricted in that the proper oxygen level must be established within 24 hours of exceeding 15-percent thermal power or the plant must enter an action statement. In either case, the return to power can be greatly delayed, which results in lost power generation.
OM-10 allows for valve testing during refueling outages if such testing is impractical at quarterly intervals or during cold shutdown outages. The applicable BWR licensees would face hardship if required to de-inert, or to require individuals to enter a de-inerted containment to manipulate valves, solely to perform tests. Because the test interval is allowed to be extended to refueling outages

for valves which cannot be tested during power operations or cold shutdowns, it is similarly acceptable to extend the test interval for those valves which cannot be tested unless the containment is de-inerted.

3.1.1.4 Stopping Reactor Coolant Pumps for Cold Shutdown Valve Testing

Licensees frequently schedule to test during cold shutdown outages the valves in support systems that perform a function vital to the continued operability of the reactor coolant pumps, such as component cooling and the supply and return of seal water. Exercising these valves when the pumps are operating could result in pump damage. Stopping the reactor coolant pumps could extend the cold shutdown period and would be burdensome to the licensee.

NRC Recommendation

Reactor coolant pumps need not be stopped for cold shutdown valve testing. The staff recommends affected valves be tested during plant outages when reactor coolant pumps are stopped for a sufficient period of time and on a refueling outage schedule, but not more often than once every 92 days. OM-10 allows the test interval to be extended to refueling outages when the tests cannot be practically performed during power operation or cold shutdown outages. The staff has determined it is acceptable to implement this portion of OM-10 pursuant to 10 CFR 50.55a (f)(4)(iv) as discussed in Section 3.1.1.1 above. The licensee must reference this section in the IST program.

Basis for Recommendation

The NRC determined that the licensee need not stop and restart reactor coolant pumps at each cold shutdown solely to allow for the testing of certain valves. This requirement would increase the wear and stress on pumps, increase the number of cycles of plant equipment, and extend length of cold shutdown outages. The licensee may consider establishing a schedule to account for extended cold shutdown outages which would allow for valve testing when the reactor coolant pumps are stopped for a sufficient length of time. Valves are to be tested at least each refueling outage.

3.1.2 Entry into a Limiting Condition for Operation to Perform Testing

Unless accompanied by other acceptable rationale, a required entry into a limiting condition for operation (LCO) to perform IST would not justify deferring testing until a cold shutdown or refueling outage. Guidance on three issues regarding the applicability of LCO and surveillance requirements was issued by the NRC in Generic Letter (GL) 87-09 as follows:

(1) unnecessary restrictions on mode changes by TS 3.0.4 and inconsistent application of exceptions to it;

(2) unnecessary shutdowns caused by TS 4.0.3 when surveillance intervals are inadvertently exceeded; and

(3) two possible conflicts with TS 4.0.3 and 4.0.4:

   (a) Surveillance requirements that become applicable due to action requirements.

   (b) Surveillance requirements to TS 4.0.4.

The enclosures to GL 87-09 include the bases for TS 3.0.1 — 3.0.4 which discuss entry into LCO, stating that

> It is not intended that the shutdown ACTION requirements be used as an operational convenience which permits (routine) voluntary removal of a system(s) or component(s) from service in lieu of other alternatives that would not result in redundant systems or components being inoperable. The specified time limits of the ACTION requirements are applicable from the point in time it is identified that a Limiting Condition for Operation is not met. The time limits of the ACTION requirements are also applicable when a system or component is removed from service for surveillance testing or investigation of operational problems. Individual specifications may include a specified time limit for the completion of a Surveillance Requirement when equipment is removed from service. In this case, the allowable outage time limits of the ACTION requirements are applicable when this limit expires if the surveillance has not been completed.

In GL 87-09, the NRC stated its position that the structure of the referenced TS accounts for entry into an LCO to perform surveillance testing. If the time allowed for equipment to be out of service is not sufficient to perform a surveillance test, a TS change requesting additional out-of-service time to allow for surveillance if safety is not compromised by the increased out-of-service time is appropriate. The NRC issued guidance on the entry into LCO as documented in NRC Inspection Manual Part 9900, "Technical Guidance - Maintenance - Voluntary Entry into Limiting Conditions for Operation Action Statements to Perform Preventive Maintenance," which generally discourages the voluntarily entry into an LCO to perform maintenance.

When the licensee removes a train from service to perform surveillance testing, technical specifications typically require that the other train is operable. It is recommended that the out-of-service time of the tested train be minimized. The probability of a design basis accident occurring during the short period of time a train is out of service is considered low, while the assurance of component operational readiness through surveillance testing provides an increased level of safety. However, IST which results in a system being completely removed from service may not be acceptable for safety. Entry into multiple LCO is to be avoided (although the safety analysis may not prohibit certain situations and plant configurations).

If a system or subsystem is designed to realign automatically during testing and, therefore, is not considered out of service, the licensee need not enter an LCO. The NRC has approved relief requests for situations which would have required operators to manually manipulate one or more valves to restore a system to an operable status if the system function became required during IST.

Therefore, if the licensee chooses the deferral of testing from quarterly to cold shutdown, or to refueling outages, other justification must be included in addition to entry into an LCO. If the deferral is not justified by additional basis, the licensee must perform tests quarterly, or during cold shutdown (as justified), with entry into the LCO for IST to be completed within the out-of-service time allowed by TS.

NRC Recommendation

No new guidance or recommendations are contained in this section. This section discusses previously issued guidance and experience.

3.1.3 Scheduling of Inservice Tests

Most TS define the test frequencies and intervals specified for IST activities in Section XI of the ASME Code. Any changes to this test frequency, such as testing a specific pump every 184 days (biannually), would require a technical specification change and a relief request to extend the test interval, unless otherwise allowed by the Code.

NRC Recommendation

To remove the ambiguity of the periods as stated in the Code, the staff recommends that the licensee use these test frequency definitions even if the frequencies are not included in TS. For example, paragraph IWV-3411 in Section XI requires Category A and B valves to be "exercised at least once every 3 months." This requirement can be met by testing at the beginning of a 3-month period and the end of the next 3-month period; however, the intent is that the actual time between tests be approximately equal. For quarterly testing, the staff recommends the pump and valve tests be scheduled such that a particular test is performed at approximately the same time within each quarter. For example, if a test procedure applies for many valves and thus requires 2 to 3 weeks or more to complete, the licensee would typically begin the procedure at approximately the same time in each quarter and include directions to perform tests in a specified order to ensure that specific valves are tested "at least once per 92 days."

Table 3.1 ASME Boiler and Pressure Vessel Code terms for inservice testing activities

Term	Required frequency for IST activities (at least once every)
Monthly	31 days
Quarterly or every 3 months	92 days
Yearly or annually	366 days
Refueling	refueling outage
2 years	24 months

Each applicable test is required by TS to be performed within the specified time interval with a maximum allowable extension not to exceed 25 percent of the test interval. However, the licensee would not extend the test intervals for safety and relief valves defined in OM-1 and Paragraphs IWV-3510 — IWV-3514 and Table IWV-3510-1 of Section XI, other than to coincide with a refueling outage. If the conjunction ***and*** is used in specifying test frequencies such as "once every refueling outage and following modifications or maintenance," the test is to be performed at both specified frequencies. The test is to be performed at either frequency for a schedule such as "once every refueling outage or once every 2 years." A 25-percent extension may be applied to the 2 years unless the TS or relief request stipulate "whichever is more conservative," or another statement to this effect.

The Code requires performing the tests throughout extended shutdown periods for operable equipment. Most equipment must be

tested before being placed into service after being out of service for an extended period in accordance with TS requirements (if applicable). Code requirements (IWV-3416/OM-10, Paragraph 4.2.1.7, and IWP-3400(a)/OM-6, Paragraph 5.4) specify that testing be performed after returning an out-of-service component to service if the component was not out of service to be repaired or replaced.

Basis for Recommendation

This recommendation is based on the standard technical specifications which have been developed, reviewed, and approved by the NRC staff. These intervals and extensions apply directly to IST which is a technical specification surveillance requirement for certain pumps and valves. In interpretation XI-78-01 for Section XI, the ASME Code Committee clarified the intent of the "2-year" frequency specified in IWV-3300 for position indication verification and IWV-3420 for leak rate testing stating that the intent of the Code test and examination frequency be related to periods of time rather than refueling outages. Refueling outages are referenced to preclude the necessity to shut down the plant for Section XI intent only. The requirement of the Code for Paragraph IWV-3300 is that the valve position indicator test may be done each one to two years without regard to the frequency of refueling outages. The requirement for Paragraph IWV-3420 is that the valve leak rate test may be done each 1 to 2 years without regard to the frequency of refueling outages.

The NRC recommendation for extended shutdown periods is consistent with TS and Code requirements, whichever are more restrictive. Responding to inquiry IN92-025A, the ASME Code Committee stated that it is the intent of Paragraphs IWV-3410 and IWV-3520 of Section XI to require testing of valves every 3 months, including during extended shutdown periods, for valves other than those declared inoperable in accord with Paragraph IWV-3416. The OM Committee made a similar clarification in OM interpretation 93-1, responding that it is the intent of paragraphs 4.2.1 and 4.3.2 to require testing of valves every 3 months, including during extended periods for valves other than those that are declared inoperable or not required to be operable.

3.2 Start of the Time Period in Technical Specification Action Statements

Section XI, IWP-3220, "Time Allowed for Analysis of Tests," states that all test data shall be analyzed within 96 hours after the completion of a test. If the deviations fall within the required action range, the pump is to be declared inoperable. Paragraphs IWV-3417 and IWV-3523 of Section XI stipulate that corrective action is to be implemented immediately for valves, and if the condition is not corrected within 24 hours, the valve shall be declared inoperative. The NRC issued guidance in the bases for TS 4.0.5 and in GL 87-09, "Sections 3.0 and 4.0 of the Standard Technical Specifications on the Applicability of Limiting Conditions for Operation and Surveillance Requirements." The NRC stated in the "Bases" for TS 4.0.5:

> Under the terms of this specification, the more restrictive requirements of the Technical Specifications take precedence over the ASME Boiler and Pressure Vessel Code and applicable Addenda. . . . The Technical Specification definition of OPERABLE does not allow a grace period before a component, that is not capable of performing its specified function, is declared

inoperable and takes precedence over the ASME Boiler and Pressure Vessel Code provision which allows a valve to be incapable of performing its specified function for up to 24 hours before being declared inoperable.

In Position 8 of GL 89-04, the NRC stated that a pump or valve which exhibits performance in a required action range must be declared inoperable and the TS action period started as soon as the data is recognized as being in the required action range (or a valve exceeds a limiting stroke time or fails to exhibit the required change of disk position). Pumps and valves covered by Section XI are frequently in systems covered by TS. Upon declaring a component inoperable, the licensee may be required to place the plant in an action statement, which generally allows a specific time period for continued operation. If the equipment remains inoperable after the time period, the licensee may be required to take action such as to begin a plant shutdown.

NRC Recommendation

The staff recommends that test procedures include test parameter reference values and acceptance criteria to enable the licensee to quickly determine the condition of a component. Using this information would allow those responsible for conducting the test to both determine whether the data meet requirements and ensure the pump or valve is operable. The staff recommends that the determination, at a minimum, be made by the same duty shift that performed the test unless the test results are not available before the end of the shift, in which case the on-coming duty shift may have to make the determination.

After declaring a component inoperable and determining that an engineering analysis of the condition is appropriate to determine if the component can be returned to service, the analysis would, typically, be performed within the allowable time of the TS action statement. If particular engineering expertise is necessary, a preliminary analysis may be acceptable for declaring the pump or valve operable and exiting the action statement, with a more detailed analysis to follow. The preliminary analysis would typically contain sufficient basis on which to determine that a component is operable in the degraded condition, with the component placed on an increased test frequency as specified in the Code, if applicable. In performing the analysis, the licensee would also typically determine that the redundant train or trains are operable to perform the safety function of the affected equipment in case this equipment is later determined by more detailed analysis to have not been capable of performing its safety function. The operability of a redundant train may be determined based on its last surveillance and the maintenance condition of the system. Testing may be appropriate, but cannot be performed if all trains of the system would be inoperable during testing. The more detailed analysis would follow in a timely manner; that is, within a period appropriate to the circumstances and level of detail necessry to complete the analysis. Upon completion of the detailed analysis, appropriate actions relative to the operability of the component would be taken. The licensee's analysis would typically address the condition of the component and not be based solely on a system condition, with a determination of the cause of the degrading condition to ensure that redundant components would not be degraded by the same cause. To complete an engineering analysis, the licensee would not

typically exceed the time allowed in a limiting condition for operation.

Basis for Recommendation

The limits established for IST are based on Code requirements or the limits in either the TS or the safety analysis, whichever are more conservative. The plant safety analyses includes the minimum required performance parameters for a component to meet the most limiting conditions under which it may be required to operate for various scenarios.

For example, a pump may have three times the capacity required to meet the maximum analyzed capacity for accident conditions. The reference values for the pump and the Code-required action limits may be much higher than the required capacity of the pump since the Code limits are not based on system requirements (see Section 5.6.2 below). However, in exceeding the Code limits, the pump exhibits degraded performance and may soon fail. NOTE: If the testing indicates that instruments are erratic, the test may be discontinued and the instruments recalibrated (or replaced by a calibrated instrument that meets the code requirements for accuracy, range, vibration parameters, etc.) without declaring the pump inoperable (see IWP-3230(d), paragraph 6.1 of OM-6, and Question 46 of the minutes to GL 89-04 meetings).

For example, upon finding the pump in the Code required action range, technical specifications (if applicable) would require the licensee to declare it inoperable while reviewing the test results and making comparisons to previous test results to ensure that a condition has not developed that will further degrade the pump and cause it to exceed the safety analysis limits. If the licensee finds that the pump is not in danger of further degradation over an acceptable period of time, the licensee's engineering analysis may be an acceptable alternative to the repair or replacement of the pump for that period until such time that repairs can be effected, as allowed by the Code. However, if the licensee determines that the condition will soon result in further degradation, the analysis may indicate that immediate action is required to repair or replace the pump.

If particular expertise is needed but not readily available, this NRC recommendation allows the licensee to avoid an unnecessary plant shutdown by scheduling a preliminary engineering analysis to be performed by an engineer on shift, such as the shift technical advisor or shift engineer.

When a preliminary analysis is performed to assess operability, a more detailed analysis may be necessary if additional expertise is needed to review the condition of a component. The more detailed engineering analysis is to be performed in a timely manner following declaring a component operable based on a preliminary analysis. The more detailed analysis may result in determining that the component is incapable of performing its safety function. By making this assessment in a reasonable time period, the time a component is considered operable (based on the preliminary analysis) is limited to a short period of time. In many cases, the preliminary analysis will be sufficient for long-term assessment. In many cases, the more detailed analysis will reconfirm the preliminary analysis. It is expected that the situations where a more detailed analysis is necessary and results in declaring the component inoperable will be few.

3.3 120-Month Updates Required by 10 CFR 50.55a(f)(4)(ii)

After the initial 120-month interval, the licensee must, in accord with the regulation,

conduct inservice tests during successive 120-month intervals to verify operational readiness of pumps and valves, whose function is required for safety. In conducting these inservice tests, the licensee must comply with the requirements of the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) 12 months before the start of the 120-month interval, subject to the limitations and modifications listed in paragraph (b). Paragraph (f)(5)(iv) specifies that the licensee list the Code requirements found to be impractical for the new interval such that "the basis for this determination . . . be demonstrated to the satisfaction of the Commission not later than 12 months" from the start of the interval. Therefore, it is recommended that relief requests for new intervals be submitted approximately 6 months prior to the interval to account for a period for NRC review.

3.3.1 Extension of Interval

If an extended outage hinders a licensee from complying with the inservice inspection requirements for items such as piping welds, vessel welds, or pressure testing, it may extend the interval in accordance with IWA-2400(c) (1983 edition; the reference paragraph may vary among editions), which states:

> Each inspection interval may be decreased or extended (but not cumulatively) by as much as one year. For power units that are out of service continuously for 6 months or more, the inspection interval during which the outage occurred may be extended for a period equivalent to the outage.

The licensee will typically also extend the interval for IST to maintain the programs on the same interval for inspection and testing.

NRC Recommendation

When the date for the new interval is established, the next updated program is required to be established to the latest edition of the Code incorporated in the regulation 12 months before the new date. For example, if a licensee has an extension from December 14, 1994, to September 16, 1995, in accordance with the Code, the licensee's program for the new interval must meet the edition of the Code incorporated in 10 CFR 50.55a(b) as of September 16, 1994. The staff recommends the licensee inform the NRC of any extension before the date that would have been the end of the current interval. An extension beyond 1 year (other than for outages) requires approval of an alternative to or exemption from the Code or 10 CFR 50.55a.

Basis for Recommendation

Subsection IWA of Section XI applies to both IST and inservice inspections. While it is not mandatory to maintain identical intervals for inservice inspections and IST, it is often desirable for maintaining the same edition of the Code for all plant activities related to Section XI. Even though 10 CFR 50.55a does not discuss extending the intervals, the Code is incorporated by reference in the regulation, and therefore, has the same effect as the regulation. Although the Code does not require NRC approval for 1-year extensions of the interval, the licensee would avoid any discrepancies in the interval dates by informing the NRC of the extension and documenting it in the IST program. Because the Code does not allow extension beyond one year, other than for extended outages, such an extension

would require an alternative to the Code or exemption in order to comply with the regulatory requirements.

The ASME Code allows intervals to be extended or decreased up to one year cumulative and also allows intervals to be extended when outages greater than 6 months occur. In response to an inquiry (ASME Section XI File Number IN93-002), the ASME Boiler and Pressure Vessel Committee indicated that Section XI, IWA-2430(d), allows the inspection interval to be extended or decreased for reasons other than to enable an inspection to coincide with a plant outage. This would apply to IST intervals as well. In Interpretation XI-1-86-54, the committee stated that the one year extension need not be applied only during the last one-third of the interval and that the extensions may be applied serially for both out-of-service and plant outage conditions.

3.3.2 Concurrent Intervals

Several licensees have established concurrent intervals for all units at sites with multiple units so that each unit is updated to a newer edition of the Code at the same starting date. Because the regulations do not specifically allow concurrent intervals, when the interval start dates are to be concurrent, the licensee may request a one-time alternative to or exemption from 10 CFR 50.55a. If the licensee prefers not to request an alternative or exemption, the establishment of concurrent intervals would require that program updates be performed more often than once every 120 months. Paragraph 50.55a (f)(4)(iv) allows that IST of pumps and valves may meet the requirements in subsequent editions of codes and addenda or portions thereof which are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed, and subject to Commission approval. This regulation allows a licensee to update programs before the end of a 120-month interval.

NRC Recommendation

If a licensee elects to use the same Code edition for multiple units, the staff recommends that an alternative to or exemption from the regulation be requested to place the multiple units on a concurrent interval for IST. To establish concurrent intervals without an alternative or exemption, the licensee must update the referenced edition of the Code more frequently to remain in compliance with Section 50.55a, except in the case where the interval dates are within 12 months, whereby the Code allowance for an extension would result in concurrent intervals. If the licensee elects to use paragraph (f)(4)(iv) of Section 50.55a to update to later editions of the Code, this section gives the requisite approval for the IST program, but not for inservice inspection, if the following guidelines are used.

- Without obtaining an alternative or exemption, the licensee may perform the IST program for multiple units using the same edition of the Code at concurrent intervals if the initial interval for combining the programs is established such that no single unit is tested at an interval of over 120 months (or no greater than the interval extension allowed by Code). Thus, the licensee must use the interval for the first unit that was licensed for commercial operation to establish the interval dates and establish the correct Code edition according to the most recent required for either unit.

- To exceed 120 months, other than as addressed in the Code for an extension, the licensee must first obtain approval of an alternative to or an exemption from 10 CFR 50.55a; therefore, establishing

two units on the same interval requires an alternative or exemption unless the licensee intends to repeatedly update both units more often than the required 120 months. That is, the licensee will test each unit according to the most recent edition of the Code required for either unit.

The request for the alternative or exemption and the IST program document would typically describe the method for selecting the interval dates, specifying the dates at which it will begin and end, and comparing the effect of these dates with that of the dates required otherwise.

Basis for Recommendation

By obtaining an alternative or an exemption, a licensee may test multiple units at the same interval, which is less confusing than performing more frequent program updates. However, the licensee may choose to update without requesting an alternative or exemption, perhaps to periodically maintain an IST program with a more current edition of the Code.

The regulations allow for concurrent intervals among multiple units if the program is updated each time an interval for either unit is due. The preferred manner for establishing concurrent intervals is to consider each unit on the same 120-month period with updates occurring at the end of the 120 months through an alternative or exemption. While the example presented is acceptable for IST programs in which test frequencies for components other than safety and relief valves do not exceed 18 to 24 months, this arrangement may not be acceptable for inservice inspection intervals for schedules of 3-1/3-year and 10-year examinations. The staff might change this recommendation if future changes to the regulation or the Code do not allow for the extension of IST intervals.

3.3.3 Implementation of Updated Programs

Updating the IST program to a revised edition and addenda of the Code is an extensive effort that involves changes to administrative and implementing procedures. Often, the revised requirements will necessitate establishing new reference values, such as by implementing a vibration program using velocity measurements rather than displacement measurements, or by establishing stroke-time reference values for power-operated valves. New reference values would be necessary for parameters not currently measured. New "reference values" for currently monitored parameters may not be necessary if previous reference values were acceptable. However, the code does not specifically require new reference values to be established simply because a later edition is used.

NRC Recommendation

The staff recommends that, before beginning the first tests during the new interval, the implementing procedures be revised according to the appropriate requirements. When the testing requires baseline values to be reestablished to meet Code changes, this would typically involve the new baseline (reference) values being established during the first quarterly or cold shutdown outage test performed in the new interval, if not before. Before performing tests during the first refueling outage, the licensee would typically revise implementing procedures for the tests to be performed during that outage to incorporate any new requirements or new components.

All tests required to be performed during the refueling outage must be completed before or during startup from the refueling outage, as required by the Code (OM-10, paragraphs 4.2.1.2(h) and 4.3.2.2(h)). If the licensee determines that a timely implementation is not possible, the staff recommends that a schedule be submitted to NRC (1) before the beginning of the interval, or (2) if the interval begins while a plant is shut down for refueling, before the startup from the refueling outage.

Therefore, the staff recommends that the relief requests be submitted to the NRC before the new interval begins, and in any case, no later than 12 months following the new interval start date per 10 CFR 50.55a(f)(5)(iv).

In accord with the regulations, an updated program to the later edition of the ASME Code must be implemented at the beginning of a 120-month interval. The regulations state that where a pump or valve test requirement by the code or addenda is determined to be impractical by the licensee and is not included in the revised inservice test program, the basis for the determination must be demonstrated to the satisfaction of the Commission not later than 12 months after each 120-month interval. Therefore, when a licensee updates the IST program and identifies impractical code requirements, the relief requests must be submitted within 12 months from the beginning of the interval. Section 6 of the NUREG discusses a revision to technical specifications and the effect on relief requests for impractical code requirements. Experience has indicated that impractical requirements are also identified throughout the interval. In such cases, relief is requested as soon as the condition is identified. Because the requirements are impractical, the licensee would test the applicable components by the method proposed in the relief request(s) in the period of time from the beginning of the new interval (or from the time of identification) until the NRC evaluation is complete (e.g., if a licensee identifies a solenoid valve that is in the IST program and stroke-time tested but has no position indication, the code requirements cannot be met due to design limitations and an alternative method may not comply with the code requirements). Relief requests that do not relate to "impractical" requirements, but propose alternatives to the code requirements, are not to be implemented until the NRC evaluation is complete (e.g., if a licensee proposes to implement a vibration program based on using spectral analysis rather then the code specified method, the code requirements must continue to be met until NRC evaluation is complete).

Basis for Recommendation

In updating the IST program to a revised edition and addenda of the Code, the staff recognizes that changes might be completed over a period of time to allow for adequate review and approval and recommends completion of the procedural revisions in a timely manner. The regulations do not allow that a licensee continue with a previous program until the NRC has reviewed the relief requests for the next interval.

When the rule was initially established, the interval (period) for updating inservice inspection (ISI) programs was 40 months and the interval for updating inservice testing (IST) programs was 20 months. Early guidance given to licensees in 1976 letters recognized that relief requests would be submitted for review and approval and suggested that licensees submit the programs as early as possible prior to the beginning of a new interval. The revised programs were to comply with the requirements of editions of the code and addenda in effect no more than 6 months prior to the start of the 40-months and 20-periods. However, the ISI intervals established for examination schedules in

accordance with Section XI were based on 120-months. The rule included the provision for demonstrating "to the satisfaction of the Commission not later than 12 months after the expiration of the initial 120-month period of operation from the start of facility commercial operation and each subsequent 120-month period of operation during which the examination or test is determined to be impractical."

When the rule was changed to increase the length of the intervals for both ISI and IST programs to 120-months (November 1979), the 12-month provision remained as it was previously stated. The phrase "to the satisfaction of the Commission" seems to indicate that the relief request would be submitted, and at most that the NRC staff has reviewed it and is "satisfied" that it is acceptable. Future rule changes may clarify the appropriate time period for submitting and implementing relief requests for updated programs. Refer to Section 6 and Section 7 for more discussion on relief requests.

3.3.4 General Comments on Inservice Testing Intervals

The NRC has received requests for IST programs and partial submittals that lack the dates of the intervals or the Code edition in use. At more than one plant, the individuals responsible for the IST programs were not aware that the Code of Federal Regulations is updated throughout the year. Therefore, when they revised their programs, they used the bound version of 10 CFR Part 50 to determine the Code edition cited in paragraph 50.55a(b) 12 months before the interval start date. However, a more recent edition had been incorporated by reference in paragraph 50.55a(b), which resulted in the program being developed to an incorrect edition of the Code. Additionally, several plants have asked questions concerning phasing-in the updated program. Generally, this is an acceptable approach for testing that does not involve any relief requests from the code requirements.

NRC Recommendation

The staff recommends that the interval dates and Code edition be included in each IST submittal, whether it is for an entire program or only a partial submittal containing new or revised relief requests. The staff must ensure that the interval dates are correct and that the evaluation is performed using the edition of the Code from which relief is requested. The staff recommends that the individuals responsible for developing and maintaining the IST program be aware of the regulatory changes made in 10 CFR 50.55a throughout the year and review any new or revised requirements for any effect on the IST program.

For phasing-in a new edition or addenda of the code before the interval date (or during an interval), the NRC recommends that a licensee submit a plan and schedule to the staff. If there are no issues that require NRC review, (1) the testing can be phased-in during the 12 months prior to the interval start date to the appropriate edition of the code, or (2) during any time period identified by the licensee up to an interval start date, if the phasing-in begins in the middle of an interval and a licensee wants to use a later edition of the code incorporated into 10 CFR 50.55a(b).

Basis for Recommendation

The NRC has noted incorrect interval dates and Code editions cited in submittals for IST programs. The Code stipulates that the licensee shall calculate the inspection interval according to the number of calendar years that

have passed since the power unit was placed into commercial service. The NRC lists, for information, the licensing and commercial operation dates for nuclear power plants in the annual "NRC Information Digest" (NUREG 1350). The licensees for several plants established the initial interval as beginning on the date of their operating licenses, or some other unspecified milestone. However, if the NRC revised 10 CFR 50.55a after the date cited by the licensee and before the date of the operating license, and if this revision incorporated a later edition of the Code, the regulations may have required use of a more recent edition than was actually used. Therefore, it is important that the IST Program state the Code edition and addenda used to develop the program.

3.4 Skid-Mounted Components and Component Subassemblies

The Code class piping systems at a plant may include skid-mounted components or component subassemblies such as valves in diesel air-start subassemblies, diesel skid-mounted fuel oil pump(s) and valves, steam admission and trip throttle valves for high-pressure coolant injection or auxiliary feedwater pump turbine drivers, steam traps, and air supply system check valves and solenoid-operated valves for main steam isolation valves. If these components are identified as ASME Code Class 1, 2, or 3, in the SAR, they are subject to IST. If these components are not identified as ASME Code Class 1, 2, or 3, in the SAR (or the SAR indicates that they are maintained as Code class, but are not required to be Code class), they are not subject to IST in accordance with 10 CFR 50.55a. However, as discussed in Position 11 of GL 89-04, Attachment 1, these components may be subject to periodic testing in accordance with 10 CFR 50, Appendix A and Appendix B.

NRC Recommendation

Pending endorsement of OM codes and standards which specifically address skid-mounted components which are subject to IST, the staff has determined that the testing of the major component is an acceptable means for verifying the operational readiness of the skid-mounted and component subassemblies if the licensee documents this approach in the IST Program. This is acceptable for both Code class components and non-Code class components tested and tracked by the IST Program.

Basis for Recommendation

Various pumps and valves procured as part of larger component subassemblies are often not designed to meet the requirements for components in ASME code classes 1, 2, and 3. In Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," the NRC gives guidance on classifying components for quality group A (Code Class 1), B (Code Class 2), C (Code Class 3), and D (ASME Code Section VIII; American National Standards Institute (ANSI) B31.1). Also see NUREG-0800, Section 3.9.6. When many of the components were procured, the requirements for IST did not apply and thus the components may not have included features for IST. If the NRC specifies that these individual components be included in the scope of 10 CFR 50.55a, it would need to complete a backfit analysis to justify imposing modifications to enable testing. The OM Committee, including the OM-16 Working Group for diesels, is considering clarifying whether skid-mounted components are within the defined scope of the OM Codes and Standards, or if additional guidance on testing these components is needed. Licensees may elect to use the IST program for testing these

components and state in the IST program that the surveillance tests of these components adequately test the skid-mounted components. Also refer to Question Group 110 in Appendix A.

In the June 1994 OM Committee meetings, proposals for skid-mounted pumps and valves were being considered at various committee levels. It is expected that the published position will be included in the 1995 Addenda to the OM Code. The scope addresses components actually mounted on the skid and also includes components that are not mounted on the skid, but that function much the same as skid-mounted components (e.g., check valves in the service water system that supply cooling water to a pump) where testing the major component can be considered adequate to test the function of the pumps or valves.

NOTE: For components outside the scope of 10 CFR 50.55a, it is not required that the NRC evaluate relief requests. For further information in this area, refer to staff response to Question 53 of the public meetings on GL 89-04. The NRC discussed its position for testing components outside the scope of 10 CFR 50.55a (see Appendix A).

3.5 Testing in the As-Found Condition

The Code does not specifically require testing to be performed for components in the as-found condition except for safety and relief valves, but does not define as-found even in the context of safety and relief valves. Measurement of the initial lift of safety relief valves is required to determine if additional valves are to be tested, by IWV-3513, paragraphs 1.3.3.1.4/5 and 1.3.4.1.4/5 of OM-1-1981, or paragraphs 1.3.3.1(d/e) and 1.3.4.1(d/e) of OM-1-1987. OM-1-1981 and OM-1-1987 specify that periodic testing of all pressure relief devices is required and that no maintenance, adjustment, disassembly, or other activity which could affect the as-found set pressure or seat tightness data is permitted before testing.

The as-found condition is generally considered to be the condition of a valve without pre-stroking or maintenance. Section XI does not require stroke-time testing or check valve stroking prior to maintenance; however, degradation mechanisms may not be identified if no as-found testing is performed. Post-maintenance testing is required when the maintenance could have affected the valve's performance (e.g., IWV-3200, OM-10/3.4). Similarly, as-found testing may apply to pumps as well. Most inservice testing is performed in a manner that generally represents the condition of a standby component if it were actuated in the event of an accident (i.e., no pre-conditioning prior to actuation).

NRC Recommendation

This is included for clarification only.

Table 3.2 Required tests and test frequencies for pumps and valves

Test	Frequency
Measure pump parameters	Once every 3 months Exceptions: Pumps in regular use (record parameters) Pumps in systems out of service Pumps lacking required fluid inventory
Exercise Category A and B valves	Once every 3 months Exceptions: Extension because of impracticality Valves in regular use Valves in systems out of service
Measure stroke times of power-operated Category A and B valves	Once every 3 months Exceptions: Extension because of impracticality Valves in regular use Valves in systems out of service
Verify remote position indication	Once every 2 years
Observe operation of fail-safe actuators for applicable valves	Once every 3 months, except for extension because of impracticality
Leak-test Category A and A/C valves	Once every 2 years.[1]
Test safety and relief valves, primary containment vacuum relief valves, and non-reclosing pressure relief devices	Test interval specified by Table IWV-3510-1 or as specified by OM-1.
Exercise check valves	Once every 3 months Exceptions: Extension because of impracticality Valves in regular use Valves in systems out of service
Test explosively-actuated valves	20 percent tested once every 2 years. Charges shall not be older than 10 years.

[1] An allowance for demonstration of the leak tight function during the course of operation is treated an an exception to the scope of IWV-3420, with certain provisions for record requirements (Paragraph 4.2.2.1 of OM-10), and the test frequency for valves not subject to the exception continues to be once every 2 years (see IWV-3421 or Paragraph 4.2.2.3(a) of OM-10).

Example 3.1 Cold shutdown justification CSJ-4

Applicable Valve: CV-00112C

System: Chemical Volume and Control System

Function: Volume Control Tank Outlet Valve

Basis for Deferring Testing: Closing this valve while operating a charging pump would isolate the volume control tank from the charging pump suction header, damaging any operating charging pumps and interrupting the flow of charging water flow to the reactor coolant system. This action could result in a reactor coolant system transient and a plant trip.

Example 3.2 Cold shutdown justification RBC-1

SYSTEM: REACTOR BUILDING CLOSED LOOP COOLING

COMPONENTS:	15RBC-24A,B	**CATEGORY:** AC
	15RBC-26A,B	**CATEGORY:** A

SAFETY FUNCTION: These valves close for containment isolation.

JUSTIFICATION: Exercising these valves will interrupt the flow of cooling water to one of the two operating cooling water trains for the containment vessel (drywell). Since the drywell cooling system has a limited capacity, this interruption during normal operating conditions could significantly increase the temperature in the drywell which could result in a plant trip on "high containment pressure."

Example 3.3 Refueling outage justification

SYSTEM: Safety Injection

VALVE: SI-8958 **Code Class:** 2

CATEGORY: C **P&ID:** M-65, D-7

FUNCTION: This check valve opens to supply water from the refueling water storage tank (RWST) to the suction for the residual heat removal (RHR) pumps.

BASIS FOR DEFERRAL OF TESTING TO REFUELING OUTAGES: This check valve cannot be full-stroke exercised open during unit operation because the shutoff head of the pumps is lower than the reactor coolant system pressure.

The valve cannot be partially stroked during normal operation or during cold shutdown when running or testing the RHR pumps on mini-flow recirculation. Alternative flow paths were investigated and evaluated. The 8-inch [20.32-cm] recirculation line to the RWST with the RHR return valve, SI-8735, is not a prudent method to partially-stroke exercise this valve quarterly or during cold shutdowns. The following are the reasons for this determination:

1. This is the only valve in the line that isolates the RHR system from the RWST. Failure of this valve (single failure) to close would render the RHR system inoperable and not able to fulfill its design basis function during an accident.

2. Operators would not have sufficient time to close this valve within 25 to 27 seconds because of its large size.

TEST FREQUENCY: Refueling outages.

Example 3.4 Refueling outage justification ROJ/SI-4

Valves: SI-8815, SI-8900A, B, C, D, SI-8969A
High Head Safety Injection Flowpath Check Valves

SI-8819A, B, C, D, SI-8905A, B, C, D
SI-8922 A &B, SI-8926, SI-8949A&D and SI-8969B
Intermediate Head Safety Injection Flowpath Check Valves

Reason for ROJ:

These valves are full-stroke exercised at refueling outages. These valves cannot be fully or partially opened during plant operation or during cold shutdown outages because the flowpaths discharge into the reactor coolant system (RCS).

Justification:

The valves for the high head subsystem cannot be full-stroke exercised during plant operation because the high RCS pressure will prevent the maximum required injection flow rate. Part-stroke exercising during plant operation is not practicable because any flow through the valves results in unnecessary thermal transients on the RCS cold leg nozzles for which they are not designed and imposes hydraulic transients on the charging system and on the reactor coolant pump seals which can cause them to cock. The check valves in the high head injection path cannot be full-stroke exercised at cold shutdowns because the high flow rates could challenge the RCS cold overpressure mitigation system and would impose hydraulic transients on the charging system and on the reactor coolant pump seals which can cause them to cock. Part-stroke exercising at cold shutdowns is not practicable because the high head injection flowpath is not designed for throttled operation.

The valves in the intermediate head subsystem cannot be fully or partially exercised during plant operation because the high-pressure of the RCS will not allow flow forward through these paths. (An exception to this is valve 8926 which is in the mini-flow path of the safety injection (SI) pumps and thus is part-stroke exercised open during quarterly pump tests.) Using the SI test header to part-stroke exercise certain check valves during plant operation is not practicable because this path yields flow rates too small (approx. 5 gpm [0.315 L/sec]) for assessing the operational readiness of these valves. The check valves in the intermediate head injection paths cannot be full-stroke exercised at cold shutdown outages because the high flow rates could challenge the RCS cold overpressure mitigation system. Part-stroke exercising these valves during cold shutdown outages is not practicable because the flowpaths are not designed for throttled operation.

Test Frequency:

The subject check valves are full-stroke exercised closed during refueling outages at the same frequency as the full-stroke open exercise for the reasons described above. Close exercising of valve 8926 is not practicable after its quarterly part-stroke exercise open because that would defeat both trains of the intermediate head subsystem. Therefore, valve 8926 is also full-stroke close exercised at refueling outages coincident with its full-stroke open exercise.

Editorial Note: This ROJ combines various check valves and could be simplified if divided into two or more ROJs.

4 SUPPLEMENTAL GUIDANCE ON INSERVICE TESTING OF VALVES

The following are recommendations of the U.S. Nuclear Regulatory Commission (NRC) staff for valves that may be a part of an inservice testing (IST) program. The types of valves discussed herein are covered by Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code) and Part 10 of the ASME Operations and Maintenance (OM) Standards (OMa-1988 edition).

4.1 Check Valves

The NRC considers check valves, and other automatic valves designed to close without operator action after an accident and for which flow is not blocked, as "active" valves which would be classified as such in the IST program (reference, for example, Section B 3.6.3 of the Westinghouse Revised Standard Technical Specifications). Similar criteria could be applied to the opening function of a check valve. The flow through a check valve would be blocked by any condition precluding flow through the system. For example, installing a flange or closing another valve (other than a check valve) in the line would block flow. A valve that is "positively held in place" would be one that has an operator or other auxiliary device that maintains the disk in an open or closed position such as a stop check valve. SECY-77-439, "Single Failure Criterion," which was referenced in several plants' licensing basis, discusses the failure of a check valve to move to its correct position as a passive failure; however, this does not correspond to the issue of "active" versus "passive" for the intent of IST.

IWV-3414 discusses valves in regular use and states that valves that operate in the course of plant operation at a frequency which would satisfy the exercising requirements need not be additionally exercised, provided the observations otherwise required for testing are made and analyzed during such operation, and are recorded in the plant record at intervals no greater than specified in IWV-3411. Even if check valves are "exercised" in accordance with IWV-3414, they need to be included in the valve list in the IST program and the record (e.g., plant log, test procedure) needs to indicate that the test requirements are met.

Those check valves (Category C valves) which must also be leak-tight (Category A valves) would be designated as "Category A/C" in the IST program.

For "grouping" of similar check valves, refer to the guidance given in Position 2 of GL 89-04 (see Appendix A). For grouping valves in multiple units of like design and construction (e.g., Point Beach Nuclear Plant), if the units are "identical" and the grouped valves have similar operational experience and otherwise meet the grouping criteria, it is acceptable to group valves from multiple units. Position 2 states that if a potentially generic problem is identified during a disassembly and inspection during a refueling outage, all valves in the group in that unit must be inspected during the refueling outage. If the other unit is not also in a refueling outage, inspection of the valves in the group which are installed in that unit may be deferred to the next refueling outage if the licensee's evaluation of the problem indicates that it could impact the safety of continued operation. "Grouping" may also be applied to the use of nonintrusive techniques as discussed in Section 4.1.2 below, though the focus is slightly different in that all the valves in the

group are tested, while the nonintrusive techniques are applied to only one valve of the group; therefore, all valves in the group must be in the same unit.

The NRC issued the following information notices (INs) on IST for check valves:

IN 82-08 "Check Valve Failures on Diesel Generator Engine Cooling System"

IN 83-03 "Check Valve Failures in Raw Water Cooling System of Diesel Generators"

IN 83-54 "Common Mode Failure of Main Steam Isolation Nonreturn Check Valves"

IN 88-70 "Check Valve Inservice Testing Program Deficiencies"

4.1.1 Closure Verification for Series Check Valves without Intermediate Test Connections

Many plants have piping configurations which include two check valves in series with no provision (such as intermediate test taps) for verifying that each valve can close. These valves may perform a safety function in the closed position. For example, the valves may be required to prevent the gross diversion of flow rather than to be leak-tight. The Code requires valves performing safety functions to be stroked to the position(s) required for the valves to perform those functions.

Systems containing these valves may have provisions for verifying that at least one of the two valves in a pair is closed. The provisions would enable the licensee to measure or observe an operational parameter such as leakage, pressure, or flow for the pair of valves. The verification may be done each quarter or during each cold shutdown outage as practical. However, this in-situ testing demonstrates only that at least one valve of the pair is capable of reverse flow closure. The only indication of a problem would be the failure of both valves to close.

IST of a pair of valves does not enable the licensee to verify the operational readiness of each component as intended in the Code, because this testing method would not detect if one valve of the pair failed open. However, testing the pair of valves would be acceptable if the configuration does not require two valves. The safety analysis for such a configuration would credit either of the two valves.

NRC Recommendation

If the licensee has no practical means for verifying the ability of each valve in a series to close, it may review the plant safety analysis to determine if both valves are required to function. If only one of the two valves is credited in the safety analysis (that is, if one valve could be removed without creating an unreviewed safety question or creating a conflict with regulatory or license requirements), then verification that the pair of valves is capable of closing is acceptable for IST. If relief is requested on this basis, both series check valves must be included in the IST program and be subject to equivalent quality assurance criteria. Testing (such as the use of pressure indication to verify the closure of one of the check valves) is required during each quarter or at an extended interval in accord with the Code. No additional testing need be performed unless the licensee finds indication that the closure capability of the pair of valves is questionable. If so, both valves must be

declared inoperable and corrective actions taken for both valves, as necessary, before being returned to service.

When testing of the pair of valves in accordance with the Code is not practical, the licensee may demonstrate the capability of both valves to close by disassembly and inspection (GL 89-04, Position 2), or other positive means in combination, during testing. If the series valves are specifically required by the plant safety analysis assumptions, the Code requires verification of the capability of each of the pair of valves to function. The licensee may follow the guidance in GL 89-04, Position 2, to disassemble and inspect each as an alternative means of verifying that individual closing capability, but not for verifying leak-tightness (Category A valves).

Both valves in a series pair must be verified to function if the plant safety analysis credits or otherwise requires both valves. For example, the valves in the reactor coolant pressure boundary are required by Criterion 14 in Appendix A to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50). Pressure isolation valves are a special case of reactor coolant pressure boundary valves which generally are required to be individually leakage tested at a frequency specified by technical specifications and the Code.

To perform testing of the pair of valves as described above, the licensee must obtain relief because the Code requirements for individual valves are not met. The relief requests typically include information on the safety analysis, quality assurance requirements, the acceptance criteria, and the corrective actions that would be taken if excessive leakage is identified.

Basis for Recommendation

Many plants contain piping configurations with series check valves that have no provision (such as test taps) for testing the closure capability of each valve. Some of these check valves perform a safety function in the closed position to prevent the gross diversion of flow. The Code requires that each valve performing a safety function be stroked to the position required to perform that function.

Systems containing these valves may have provisions for verifying that at least one valve is capable of closing. These provisions enable the licensee to measure or observe operational parameters such as leakage, pressure, or flow each quarter, during cold shutdown outages, or during refueling outages. However, this testing provides no assurance that both valves close. The only indication of a problem would be the failure of both valves in the series.

Keep-fill valves are a special case in that they are redundant valves in redundant systems in which only one valve of a series is actually necessary to perform a system's intended function. Licensees have proposed to exclude the upstream valve from the IST program. However, recognizing that neither valve can be individually demonstrated to shut, the NRC previously determined for the alternative test method discussed in this section that both valves must be included in the IST program and operationally tested as a pair to prevent reverse flow. The NRC specified that, upon observing leakage, the licensee disassemble, inspect, and repair or replace both valves as necessary before the return to service.

4.1.2 Exercising Check Valves with Flow and Nonintrusive Techniques

The Code requires check valves to be exercised to the position(s) required to fulfill their safety function(s). To verify the disk

position of check valves that do not have external disk position indication, the Code allows the use of indirect evidence (such as changes in system pressure, flow, temperature, or level) or other positive means. Instruments used to verify flow or pressure measurements for check valve full-stroke are not subject to the range and accuracy requirements for such instrumentation used for pump IST; however, there may be testing techniques that necessitate a high degree of instrument accuracy. An acceptable test method must demonstrate that a check valve disk opens to the position necessary to fulfill its safety function, which may not be "full-open" to the backstop, but which may be verified either by passing design flow or by another positive means such as nonintrusive techniques. The "other positive means" must be repeatable to meet the intent of the Code.

NRC Recommendation

In supplementing the guidance from Position 1 in Generic Letter (GL) 89-04, the NRC determined that the use of nonintrusive techniques is acceptable to verify the full stroke of a check valve. The licensee may use nonintrusive techniques to verify the capability to open, close, and fully stroke in accord with quality assurance program requirements. These techniques are considered "other positive means" in accordance with Paragraph IWV-3522 of Section XI (Paragraph 4.3.2.4(a) of OM-10), and relief is not required except as would be necessary for the testing frequency if the test interval extends beyond each refueling outage as allowed by OM-10.

When using nonintrusive testing techniques in a sampling plan, the licensee may implement a program such that similar valves in the same service are grouped for testing purposes, not to exceed four valves in a single group (for valve groups of greater than four, the grouping and test schedule must be justified in the description of the testing plan). GL 89-04 indicates that the valves in the group selected be of the same size, model number, and system function. During the initial test of each valve, the licensee would typically use nonintrusive techniques to verify that the system pressures and flow conditions specified in the test procedures cause the valves to fully stroke.

During subsequent testing, if the system conditions are repeatable, each valve would typically be fully stroked; however, the nonintrusive verification need be performed for only one valve of the group on a rotating schedule each time testing is performed. Under a sampling program for check valves, one valve would typically be nonintrusively tested each time the testing is performed, on a rotating schedule, and the balance of the group would be flow tested. If problems are found with the sample valve that are determined to affect the operational readiness of the valve, all valves in the group must be tested using nonintrusive techniques during the same outage (the group may not consist of valves in more than one unit). The following table,

Table 4 Sample testing using nonintrusive techniques (NITs) and the flow testing (FT) procedure

Cycle of refueling	Train 1 Valve	Train 2 Valve	Train 3 Valve	Train 4 Valve
1	FT/NIT	FT/NIT	FT/NIT	FT/NIT
2	FT/NIT	FT	FT	FT
3	FT	FT/NIT	FT	FT
4	FT	FT	FT/NIT	FT
5	FT	FT	FT	FT/NIT

which is based on testing during each refueling outage, illustrates this recommendation.

The staff has determined that nonintrusive techniques meet the Code requirements for verifying disk movement for the full-stroke exercising — opening and closing — of check valves. The nonintrusive reverification allows flow testing at repeatable conditions to be performed on all valves in a group while requiring nonintrusive tests of only one of the group on a rotating schedule. Relief is not required because this test method is considered an acceptable "other positive means," even if used on a rotating basis. However, if the recommended alternative methods of this section are implemented, the licensee must describe the implementation of this section in the IST program document. This recommendation is not intended to mandate the use of nonintrusive techniques.

Basis for Recommendation

The recommended test method is applicable to tests performed with less than accident flow rate. If accident flow rate is passed through the check valve being tested, nonintrusive techniques are not necessary to establish the functionality of the valve. The nonintrusive techniques would be used for verifying that the test at reduced flow would indicate adequate disk movement for full-stroke exercising the valve in accordance with the Code. An allowable flow variation would be established during the baseline testing using the nonintrusive techniques. If the flow rate during future testing cannot be established within the range, the test is unacceptable and (1) nonintrusives could be used to verify that even at different flow conditions, full-stroke exercising is achieved, or (2) corrective actions to determine the cause of the failure to meet the acceptance criteria for the test would ensue. If other valves meet the acceptance criteria, only the valve that indicates a problem (if it is not the valve used for reverification by nonintrusive techniques) needs to be addressed for corrective action unless the cause is determined to be applicable to the other valves as well. The rotation of the nonintrusive techniques over the four outages (in the example) is for reverifying the test method and test conditions.

By performing nonintrusive testing initially on all valves in the group, the licensee demonstrates that the full-stroke capability verification is acceptable. By repeating the flow test under the same conditions, with nonintrusive verification of only one of the four valves, the licensee verifies that the testing is repeatable. If the licensee finds a problem with one train, it must check all four trains with the nonintrusive techniques. When the system has not been modified and the flow and pressure conditions are repeated, no phenomena would be expected to invalidate the testing as verified initially that would not be indicated in one of the four trains. If the licensee modified the system or performed the testing with a different valve alignment or test condition, it must perform "initial" verifications for the new test conditions. A copy of an NRC safety evaluation for a relief request to adopt this method is included in Appendix D.

If all the valves in the group are flow tested, a "sampling" of one valve each refueling outage to verify that the test method is repeatable is acceptable to the staff for implementing nonintrusive test methods. If the "sampling" indicates problems with repeatability of the test conditions, or other problems that might affect the testing of the other valves, the nonintrusive techniques must be used for the other valves during the same outage to comply with the sampling criteria. Relief is not required because the method meets the "other positive means" of the Code if each valve in the group is flow tested at the regular frequency. When extending the test interval per OM-10, a test

deferral justification may be necessary. If a sampling program is employed that does not include a flow test of each valve on a regular basis, NRC evaluation of the alternative would be necessary. The OM-22 working group on check valves initiated a change to the OM Code to allow a similar sampling program using nonintrusive techniques for disassembly and inspection as discussed in Position 2 of GL 89-04. OM-22 is also considering a sampling plan with broader applications referred to as "condition monitoring."

General guidance in qualifying a nonintrusive method is given in Position 1 of GL 89-04. Further information on qualification is available through the OM working group for check valves and the Nuclear Industry Check (NIC) Valve group. Disassembly and inspection may be necessary as part of the initial verification or periodic reverification, depending on the techniques used. Disassembly and inspection would not otherwise be necessary to meet the requirements of IST, but may be used to confirm a nonintrusive conclusion, for corrective actions, or for preventative maintenance as part of an overall check valve program.

]the use of nonintrusive techniques in addition to the issues discussed in Section 4.1.2. Additional issues are discussed below:

(1) Several licensee have asked whether measurement of the C_v of a check valve in conjunction with the application of meaningful flow versus differential pressure criteria would be considered "other positive means" in accordance with IWV-3522 of the Code. The NRC contracted with Oak Ridge National Laboratory (ORNL) to perform a review of such a test method used at the Fort Calhoun and Beaver Valley plants. The review was to determine if the measurements and reduction of the data give adequate assurance of the functionality of the tested valves which were, for both plants, the accumulator discharge check valves.

The results indicate that the data are useful if the test is performed in a controlled manner with accurate instruments. The tests can also be verified using nonintrusive techniques during the initial testing. A safety evaluation was issued for the Fort Calhoun test which included the report prepared by the ORNL staff on the results of their review (ORNL/NRC/LTR-94-04). Both the study and a copy of the Fort Calhoun safety evaluation were provided to the NIC Valve group for distribution to members.

(2) Licensees have asked about the appropriate corrective actions to take when nonintrusive techniques cannot be verified. The types of corrective actions taken when a test is inconclusive or when the results indicate unacceptable functioning of the check valve are determined by the licensee. Actions may include additional testing. Disassembly and inspection may be one element of corrective actions, as mentioned in Section 4.1.2 above, to ensure the functional capability of the valve. GL 89-04, Position 2, states that a flow test for part-stroke exercising of the valve should be performed following reassembly, if practical.

(3) Some of the flow tests used with nonintrusive techniques impart just enough energy to the disk to generate a

marginally audible impact of the disk against the backstop. In these cases, variations in initial conditions could produce inconclusive nonintrusive test results. There are several nonintrusive methods available to verify disk position without requiring audible disk-backstop impact such as radiography, ultrasonics, and magnetics. The method selected must give conclusive results and be repeatable for the application.

When using audible techniques, including acoustic probes, the qualification method must address concerns associated with other potential noise sources that could affect the sound pattern of the disk striking the backstop or valve seat. The licensee is cautioned that this method is subjective. For example, the license would benefit by using test equipment that produses a trace to objectively measure the initial qualification of a nonintrusive method that yields only audible acoustic results. Potential noise sources include noise from a disk separated from the swing arm, broken parts in the piping, pump noise, loose structures.

NRC Recommendation

The discussion provides general information regarding nonintrusive testing methods. The NRC recommends that the basis for the qualification and use of nonintrusive techniques be well documented. For issues that a licensee believes are unclear, a proposed alternative could be submitted to the NRC for review and evaluation.

4.1.4 Extension of Test Interval to Refueling Outage for Check Valves Verified Closed by Leak Testing

Section XI requires that check valves performing a safety function in the closed position be exercised to that position. OM-10 allows for the licensee to verify the exercise by visually observing the valve, recording an electrical signal initiated by a position-indicating device, observing the appropriate pressure indication in the system, performing seat leakage testing, or using other positive means. IST programs include check valves that perform a safety function in the closed position. Certain of these valves cannot be verified in the closed position quarterly because they do not have remote position indication and are generally located inside reactor containment or at other inaccessible locations. These valves may lack design provisions for system testing to verify closure capability at any plant condition. The only practical means of verifying valve closure may be by performing a seat leakage test. Many of these valves are Category A/C valves that are Type C leak-rate tested during each refueling outage as specified in Appendix J to 10 CFR Part 50.

NRC Recommendation

If no other practical means is available, it is acceptable to verify that check valves are capable of closing by performing leak-rate testing, such as local leak rate testing in accord with Appendix J to 10 CFR Part 50, at each reactor refueling outage. Recognizing that the setup and performance limitations may render leak testing impractical during power operation and cold shutdown outages, the staff has determined that implementation of an extension of the test frequency for such valves is acceptable in accord with 10 CFR 50.55a(f)(4)(iv).

Thus the licensee may perform testing in accordance with the provisions of Paragraph 4.3.2.2(e) of OM-10. That is, if valve exercising is not practicable during plant operation or cold shutdowns, it is acceptable to limit testing to full-stroke exercising during

refueling outages. To use this position, the licensee must include a refueling outage justification describing the impracticality of performing testing at the Code frequency and referencing this position in the IST program. If these valves also perform a safety function in the open position, they would typically be exercised open at the Code-required frequency, or the refueling outage justification would typically include the technical justification for not testing the valves quarterly or during cold shutdown outages.

In the justification for the Code cold shutdown outage or refueling outage frequency, the basis for the impracticality of performing testing during power operations and, if applicable, during cold shutdown outages, must be described. The NRC has determined that the need to set up test equipment is adequate justification to defer backflow testing of a check valve until a refueling outage. When testing at the Code interval is practical, the licensee would need to obtain relief to test at another frequency (e.g., once per fuel cycle; once per six months). Entering an LCO is not, alone, sufficient basis for deferring testing, as the LCOs were established with testing in mind; however, if a test necessitates entry into an LCO, that may be an element of the justification for deferring the test (refer to Section 3.1.2.).

Basis for Recommendation

Leak rate testing verifies valve closure and provides more information about the closed position than a simple backflow test. However, leak rate testing generally necessitates that certain systems necessary for plant operation be taken out of service for extended periods. Additionally, containment access may be needed. Therefore, this testing is not practical to perform quarterly as backflow testing might be on certain other valves. This testing may not be practical to perform during cold shutdown outages because the installation and removal of test equipment could delay plant startup. OM-10 recognizes the limitations of performing testing during power operations and cold shutdown outages and allows testing to be performed during refueling outages for those valves which cannot be practically exercised otherwise. Open exercising and verification is required at the Code-specified frequency and is not required to be performed at the same time the leak rate testing is performed.

4.2 Power-Operated Valves

Power-operated valves are equipped with actuators that use motive force to change the position of the valve obturator. The types of actuators include motor operators, pneumatic actuators, hydraulic actuators, and solenoid actuators. Certain valves, such as main steam isolation valves and valves that have a fail-safe function, may actuate open (or closed) on spring force. The NRC discussed the IST of several types of power-operated valves in NRC IN 86-50, "Inadequate Testing to Detect Failures of Safety-Related Pneumatic Components or Systems," and IN 85-84, "Inadequate Inservice Testing of Main Steam Isolation Valves." The NRC issued GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," upon finding a common mode failure with motor-operated valves. Testing programs addressing GL 89-10 include condition monitoring capabilities beyond the stroke-time measurement requirements for IST, but may be an alternative method of monitoring the condition of valves for which conventional stroke timing is not practical.

4.2.1 Increased Frequency of Testing for Valves That Can Be Tested Only During Cold Shutdown Outages

The licensee for one pressurized-water reactor (PWR) plant performed stroke time tests of the main steam isolation valves (MSIVs) during power ascension and initially found the stroke times acceptable upon comparing them with previous values. However, after further review with the plant at 100-percent power, the licensee found that the stroke time for at least one valve had increased such that the corrective action requirements of IWV-3417(a) applied. In accordance with the Code, this increase necessitated that the test frequency be increased to monthly until corrective action was taken. To conduct monthly full-stroke tests of MSIVs, the licensee would have had to reduce plant power and possibly bring the plant to a shutdown mode.

The NRC granted the licensee's request for exigent relief from the requirements of IWV-3417(a) to avoid shutting down the plant based on an analysis that the valve stroke time remained well within the plant's safety analysis limits and that an increase was not expected to exceed the limits prior to the next planned cold shutdown. The licensee found that the need for this exemption resulted from a weakness in the administration and implementation of its IST program.

There is no advance notice of which valves tested during cold shutdown will be in a range for stroke time which requires increased testing as specified in IWV-3417(a). Since a cold shutdown justification has demonstrated that the test can only be performed at cold shutdown, it is not practical to prepare a relief request, submit the request to the NRC for evaluation, and obtain approval within 30 days, when the next test would be required.

Paragraph 4.2.1.9(c) of OM-10 allows the use of analysis for declaring a valve operable, after testing indicates the stroke time is above the limiting value or has increased above the reference value by a specified percentage. This approach may be used to the extent that it applies. In cases where a valve stroke time exceeds the limits of the safety analysis, it could not be declared operable until a reanalysis indicates the new (increased) stroke time is acceptable. A relief request would not be necessary to perform the analysis (or reanalysis). The intent of this section is to inform licensees that the requirements of IWV-3417 for increased testing apply to valves independent of the exercising frequency specified in IWV-3412.

NRC Recommendation

If the licensee cannot test safety-related power-operated valves during power operation and must increase the testing frequency as a result of tests performed during cold shutdown outages in accordance with IWV-3417(a), the licensee must take corrective action as specified in IWV-3417(b) before returning the plant to power operation, or must return the plant to a mode that permits testing the valves each month.

This requirement does not apply to testing performed in accordance with OM-10, which does not include this requirement; rather, OM-10 requires corrective action if a limiting stroke time is exceeded and does not specify an increased test frequency for an increasing stroke time. Therefore, the increased testing is not required if a licensee is testing against portions or all of the stroke time requirements of OM-10 in accord with 10 CFR 50.55a (f)(4)(iv). However, corrective actions are required more expeditiously under OM-10.

With test results indicating that some degradation has occurred, it would not be

conservative to allow an extension of the testing interval from once each month to once each cold shutdown outage. To avoid a plant shutdown in one month, the staff recommends that these valves be repaired or otherwise analyzed and the increase in stroke time determined acceptable before the return to power. However, the licensee may elect to periodically place the plant in a mode that allows for monthly testing of the valve which would meet Code requirements.

Basis for Recommendation

Paragraph IWV-3412(a) of Section XI permits the licensee to defer valve testing from a quarterly interval until cold shutdown outages, if it is impractical to perform during power operation. However, the Code requires the licensee to increase the frequency of testing to once each month until corrective action is taken if the licensee, while conducting cold shutdown testing, finds that a power-operated valve fails to exhibit the required change of position within the stroke time limits of IWV-3417(a). Although the affected valves may be degrading, they need not be considered inoperable if placed on an increased frequency of testing. Since these valves are technically operable, the technical specifications (TS) may yet permit plant startup. However, the licensee may have previously determined to test these valves only during cold shutdown outages because they cannot be practically tested during power operation.

In contrast to Section XI, IWV-3417, OM-10 includes specific requirements for the limiting stroke times such that, if the test results are not acceptable, the licensee must consider the valve degraded and take corrective action. OM-10 does not specify an intermediate condition that allows continued operation of the valve without corrective action, but with increased testing.

4.2.2 Stroke Time Measurements for Rapid-Acting Valves

New technologies and new applications of existing technologies enable licensees to time the strokes of rapid-acting valves with accuracy measured in milliseconds, though the Code does not require such accuracy. Using new technology, the licensee could establish an appropriate limit based on a multiple of a reference value to ensure corrective actions are taken if degrading conditions are evidenced.

The traditional method of stroke timing power-operated valves was to use stopwatches to measure the stroke time from initiation of the signal at the handswitch to the change in position-indicating lights (switch to light). The traditional method includes signal processing time from the switch to the valve actuator. Monitoring stroke times for valves that stroke in milliseconds using the diagnostic equipment that measures only actual valve travel is acceptable for indicating degrading trends; however, the method does not indicate increases that could occur in the signal to the valve, which may be important in meeting safety analysis limits for certain valves. Typically, the valves that would benefit from this monitoring are rapid-acting valves. The traditional method would have a set limit of 2 seconds which masks any signal processing time unless a gross change occurs. If measuring the stroke times locally needs to be supplemented by a periodic test to include the signal processing times, a periodic 2-second limit test could be performed to augment the IST. The code does not specify a particular method, so there would be no conflict in using more than one method.

NRC Recommendation

Although the licensee is not required to do so by the Code, if a licensee uses new technology for stroke-time measurements of rapid-acting valves, the staff recommends that the licensee determine if continued reliance on the 2-second acceptance criterion of Position 6 of GL 89-04 or paragraph 4.2.1.8(e) of OM-10 is appropriate when actual stroke times are measured to within milliseconds.

Basis for Recommendation

The NRC and the OM Committee established the 2-second limit for rapid-acting valves for the conventional method of measuring stroke-times using a stop watch. Other methods have been developed as technology has improved. The latest technology may improve the monitoring of the condition of these valves or serve to verify that a valve actuates within a safety analysis limit which is less than 2 seconds.

4.2.3 Measurement of Valve Stroke Time

The Code requires that the stroke time of power-operated valves be measured to at least the nearest second (IWV-3413, for valves that stroke in less than 10 seconds, and OM-10, paragraph 4.2.1.4(b), for all power-operated valves). However, many licensees use instruments that can measure stroke times accurately to fractions of a second.

NRC Recommendation

To comply with Code requirements, the licensee measures stroke times for power-operated valves to at least the nearest second. Similarly to Section 4.2.2 above, if using a more precise technique, it may be desirable, though not required, to establish stroke-time limits based on a multiple of the reference value.

When it is impractical to measure stroke times by any other method, a program of diagnostic methods for valves may be an acceptable alternative test method. One example is a program established in accord with GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," for monitoring motor-operated valves. Relief may be necessary if the test schedule is not consistent with the IST requirements. If a licensee requests relief, the submittal would typically specify the details of the proposed alternative and describe the impracticality or hardship of performing testing in accordance with the Code.

The staff has determined that this alternative can ensure an acceptable level of quality and safety if the licensee has an established program of periodic testing. In this context, the staff has found acceptable the testing programs established to GL 89-10 guidance. Because this alternative is not in accord with the Code requirements for test frequency, relief is required.

Basis for Recommendation

Basing measurements and reference values on the nearest second meets the code requirements. However, valve diagnostic programs for monitoring valve operating parameters such as stroke times yield significant information about the valve assembly (the valve and actuator). When IST requirements are impractical, the periodic verification performed using valve diagnostic techniques may be an adequate alternative method for monitoring these valves for degrading conditions, including stroke timing. Because the testing addresses much more than only timing the valve strokes, the additional information obtained on the condition of the valves could justify the extension of the test interval for performing diagnostic testing.

4.2.4 Main Steam Isolation Valves

The NRC described an inadequacy in the IST of MSIVs in IN 85-84, "Inadequate Inservice Testing of Main Steam Isolation Valves." The staff stated that two different licensees were testing their MSIVs using the nonsafety-related instrument air to achieve closure. Fail-safe IST of MSIVs as required by IWV-3415 and OM-10, paragraph 4.2.1.6, necessitates the removal of the instrument air supply and electric power. Recent concerns related to MSIVs are described in IN 94-08, "Potential for Surveillance Testing to Fail to Detect an Inoperable Main Steam Isolation Valve," and IN 94-44, "Main Steam Isolation Valve Failure to Close on Demand Because of Inadequate Maintenance and Testing."

NRC Recommendation

The staff recommends that licensee review their inservice and fail-safe testing to ensure compliance with Code requirements.

Basis for Recommendation

The practice of performing IST of components which are relied on to mitigate the consequences of accidents and which are relied on to do so with sources of power not considered in the safety analyses is not in keeping with the objective of periodic IST for fail-safe testing. In IN 85-84, the NRC informed licensees that, with low or no steam flow, the MSIV might not close unless instrument air is available to power the actuator.

In Service Information Letter 477, General Electric (GE) described a related concern for boiling-water reactors (BWRs) in which excessive tightening of gland flanges in the MSIV can prevent the valve from closing from spring force alone. During a postulated design basis accident in which a recirculation line breaks with the MSIVs open, containment pressure may increase significantly, exerting an opening force on the valve actuators inside containment. Under such circumstances, the MSIV springs alone will not close the MSIV unless the spring force can overcome the combination of the opening force caused by containment pressure and the resistive force caused by stem packing friction. GE recommended a review of packing chamber maintenance practices, "springs-only" full-stroke closing tests, a force balance in which containment pressure is considered, a leak tightness test of the MSIV actuator and accumulator, and a modification of the applicable licensing basis documents. GE noted that this would necessitate measurement of the actual valve stem travel because the final 10-percent of stem travel coincides with the weakest spring force. GE stated that, by monitoring position switches alone, the utility could not determine that the valve is fully closed because the switches monitor the valve only when it is 90-percent open and 90-percent closed. The issue has not yet been resolved. One BWR recently identified that the MSIVs would not pass local leak rate testing after closing on spring force only.

NOTE: Related to MSIVs, a number of plants perform a partial-stroke exercise quarterly during power operations. The revised standard technical specifications bases for MSIV surveillance requirements states that "MSIVs should not be tested at power, since even a part-stroke exercise increases the risk of a valve closure when the unit is generating power."

4.2.5 Verification of Remote Position Indication for Valves by Methods Other Than Direct Observation

The Code (IWV-3300 and OM-10, paragraph 4.1) requires that valves with remote position indicators be observed at least once every 2 years to verify that valve position is accurately indicated. Many valves such as sealed solenoid valves and valves with enclosed stems have no provision for verifying the position by direct observation. To verify the position by observation, the licensee can disassemble the valve which could introduce additional valve failure mechanisms. Other methods, such as nonintrusive techniques, causing the flow to begin or cease, leak testing, and pressure testing can yield a positive indication of position.

NRC Recommendation

If remote valve position cannot be verified by local observation at the valve, an acceptable approach is for the licensee to observe operational parameters such as leakage, pressure, and flow that give positive indication of the valve's actual position(s). This is consistent with paragraph 4.1 of OM-10. The staff determined that the use of this portion of OM-10 is acceptable pursuant to 10 CFR 50.55a (f)(4)(iv) and that relief is not required if all requirements of paragraph 4.1 of OM-10 are implemented. No other related requirements apply.

For certain types of valves that can be observed locally, but for which valve stem travel does not assure the stem is attached to the disk, the local observation must be supplemented by observing an operating parameter as required by OM-10.

Basis for Recommendation

Paragraph IWV-3300 of Section XI requires that "valves with remote position indicators shall be observed at least once every two years to verify that valve operation is accurately indicated." Often, licensees cannot verify the accuracy of remote position indication by local observation of many valves such as those with enclosed stems or sealed solenoid valves, and these valves may not have position indicators, such as pointers, on the valve actuators.

Accurate position indication for safety-related valves is important for reactor operation during all plant conditions. Therefore, the Code requires verification of the accuracy of the remote position indication for all valves in the IST program with remote position indication. Many positive ways are available to verify the indication that a valve is open or closed. Leak-rate testing may yield positive indication that the disk is in the closed position. An in-line flow rate instrument can indicate system flow or flow stoppage. System pressures or differential pressure across a valve seat may also give a positive indication of actual valve position.

Paragraph 4.1 of OM-10 states that where local observation is not possible, other indications shall be used to verify valve operation. Such indications are also useful to ensure that a valve disk is connected to the stem.

4.2.6 Requirements for Verifying Position Indication

The Code does not restrict the verification of position indication to only active valves. OM-10, Table 1, indicates that the licensee must also verify the position indication for Category B passive valves. Also, the Code does not require the licensee to verify the indication at the remote panels. In Interpretation XI-1-89-

10, the ASME Code committee stated that it is the intent of Section XI, IWV-3300, that for valves having remote position indicators at multiple locations (such as in the control room and also on a remote shutdown panel or sampling panel) that only the remote position indicator at the location utilized in exercising the valve (IWV-3412) and timing the stroke of the valve (IWV-3413) be verified for accurately indicating valve operation.

NRC Recommendation

This is for clarification of existing Code requirements only.

4.2.7 Stroke Time Measurements Using Reference Values

Position 6 of GL 89-04 states that it is acceptable for the licensee to measure changes in stroke times from either a reference value or the previous test value as required by IWV-3413. In Position 5, the NRC gave guidance on establishing limiting values, but did not list acceptable percentages of the reference values.

NRC Recommendation

OM-10 specifies the allowable changes in stroke times from reference values. Therefore, when a licensee elects to compare measured stroke times to reference values, the requirements of paragraph 4.2.1.8, "Stroke Time Acceptance Criteria," of OM-10 and all related requirements such as testing requirements and corrective action apply. The staff has determined that it is acceptable for a licensee to implement this method in accord with 10 CFR 50.55a (f)(4)(iv) for use of portions of later editions of the Code approved in 10 CFR 50.55a(b) if all related requirements are met which include paragraphs 3.3, 3.4, 3.5, 4.2.1, 5, and 6.

Basis for Recommendation

The licensee can follow the requirements of OM-10 for establishing reference values of stroke times because the stroke timing acceptance criteria for power-operated valves in IWV were based on a change from the previous values. This removes the inconsistencies of applying acceptance criteria where no previous guidance was available. Variance from these requirements of OM-10 would necessitate relief describing the details of the alternative method of setting acceptance criteria, establishing appropriate multipliers, etc. Appendix C includes a sample relief request for the use of stroke time reference values in accord with OM-10.

The recommendation is intended to allow the use of OM-10 requirements in lieu of IWV-3413 for power-operated valves. The discussion refers to the use of reference values. Guidance included in GL 89-04, Position 6, did not discuss details of using reference values and licensees have typically made proposals for implementing such an alternative that have been reviewed and evaluated by the NRC. Guidance for establishing "limiting" values of stroke times was given in GL 89-04, Position 5, and remains acceptable even when using OM-10. Paragraph 4.2.1.4 of OM-10 specifies that the limiting value(s) of full-stroke time be specified by the Owner. The use of reference values, alone, differs from the recommendation to use the multipliers specified in Paragraph 4.2.1.8 of OM-10. Limiting values and reference values are two distinct values, though interrelated in establishing the stroke times at which corrective action is required. Additionally, licensees using reference values establish these values in various ways, such as averaging three stroke times following maintenance, or using the first test value. OM-10 does not specify a

particular method for establishing reference stroke times.

Paragraph 3.5 of OM-10 gives the requirements for establishing additional reference values. It appears that different reference values may exist for a single valve if there is justification. For example, test conditions could impact the reference stroke time depending on pressure or flow in the system. It may be necessary to have more than one test condition, such as dynamic versus static, which would necessitate different reference values.

4.2.8 Solenoid-Operated Valves

The NRC has received many relief requests to not measure the stroke times of enclosed solenoid-operated valves (SOVs) that do not have position indication. Most of the requests proposed no alternative to monitor the valves for degradation.

NRC Recommendation

If the licensee cannot time the stroke of an SOV by the conventional method using position indication, the Code would require that it propose a method to time the stroke of the valve or otherwise monitor for degrading conditions to give adequate assurance of operational readiness. The staff has determined that, while an exercise of the valves on a quarterly schedule ensures that the valves actuate properly, this is not adequate for IST. If the frequency requirements of the Code are met, no relief is required to use methods such as acoustics or diagnostic systems for stroke timing. If a method to monitor for degradation other than by measuring stroke time is proposed as an alternative, NRC approval is required. For example, an enhanced maintenance program or periodic replacement may be acceptable when testing methods cannot be used effectively.

Basis for Recommendation

In NUREG-1275, Vol. 6, "Operating Experience Feedback Report - Solenoid-Operated Valve Problems," the NRC described common-mode SOV problems that could significantly reduce plant safety. Several methods have been developed recently to measure stroke time or monitor the condition of SOVs using parameters such as the acoustic effects of disk movement, electric resistance, and the temperature of the coil. Such methods and continuing research are described in papers from Session 2A, "Solenoid and Air-Operated Valve Performance and Testing," published in NUREG/CP-0123, "Proceedings of the Second NRC/ASME Symposium on Pump and Valve Testing." Valve diagnostic systems can be used to trace the stroke of an SOV and thus indicate the stroke time in milliseconds. It is recommended that the technique evaluates actual disk movement and not just movement of the pilot valve or valve stem.

4.2.9 Control Valves with a Safety Function

Often a safety function is performed by control valves that fail in the safe position, whether that is open or closed. Unless control valves have a safety function which may include a "fail-safe" function, as valves that respond to system conditions, these valves would be exempt from IST as discussed in IWV-1200 or Paragraph 1.2 of OM-10; however, the valves are required to be tested in accordance with the requirements for IST if they perform a safety or fail-safe function. The staff has received many requests for relief from stroke-time measurement requirements based on the impracticality of performing the measurement by the conventional method using position indication lights. Typically, the control valves do not have position indication, and testing can only be performed by bypassing control

signals. To allow stroke timing by bypassing the control signals of those control valves with position indication, the licensee may also have to drain entire systems which makes testing at the Code frequency impractical.

NRC Recommendation

Control valves that perform a safety or fail-safe function are required to be tested in accordance with the Code requirements for IST to monitor the valves for degrading conditions. Simply verifying that the valves function is not an acceptable alternative when the stroke time measurement by the conventional method is impractical. Acceptable alternatives exists for monitoring the valves for degrading conditions.

The staff recommends that the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages that involve bypassing control signals, and a control system signal calibration to verify the stroke times of the valves. The motor-operated valve testing program established in accordance with GL 89-10 and performed on a periodic schedule is an acceptable alternative, along with a periodic valve stroke, because it would yield more information on valve condition including stroke time, although the information would be obtained less frequently. The alternative method proposed by the licensee would typically be described in detail in the relief request, if required, in order for the staff to determine the acceptability of the alternative method.

Basis for Recommendation

Many control valves are not exempt from IST because they perform a safety function other than "control." The Code requires stroke timing of power-operated valves, but the features that enable testing have often not been provided for control valves. Therefore, an alternative test method is acceptable if the method, possibly in combination with a periodic valve stroke, provides an indication of degrading conditions. Although stroke timing by an alternative method is preferred based on the Code requirements, the licensee can use other methods if stroke timing is impractical. However, the licensee must obtain relief for alternatives that do not comply with the Code.

In interpretation XI-1-83-59, the ASME Section XI Committee responded to a question on whether control valves that have safety-related functional requirements for flow shutoff or operation to full open status are required to be classified as Category A or B valves. The response was originally that the valves were required to be tested in accordance with Subsection IWV, but the response was later revised in XI-1-83-59R to indicate that it is the owner's responsibility to categorize valves as required by IWV-1400 and in accordance with the criteria of IWV-2200.

4.3 Safety and Relief Valves

The NRC has received many relief requests for the IST of safety and relief valves.

4.3.1 Scope

In Paragraph IWV-1100 of the 1986 edition of Section XI, the Code committee increased the scope of the valves subject to IST to include those valves which protect certain Code class

systems that are required to perform a specific function in shutting down the reactor, maitaining the safe shutdown condition, or in mitigating an accident, from overpressure. Pressure relief valves which are installed in the applicable systems to protect against overpressure may not, themselves, appear to perform a specific function to shutdown the reactor, maintain it in a safe shutdown condition, or mitigate the consequences of an accident (automatic depressurization valves in BWRs are an example of relief valves which perform both an overpressure protection function and a function to depressurize the primary system when opened on an automatic signal or by an operator). However, certain of these valves are now required to be included in the IST program and tested according to the schedules stipulated in OM-1-1981 or OM-1-1987 "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices." OM-1 does clarify that it applies only to pressure relief devices required for overpressure protection. The regulation requires this testing to be included in 120-month updated IST programs.

The revised scope in Part 1 of the OM Code, OMc-1994, more clearly indicates that the requirements are applicable to safety and relief valves which are required to protect systems or portions of systems that perform a specific function in shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident. An inquiry on "thermal relief valves" was discussed in the OM-1 working group meetings in September and December 1993 and in the OM subcommittee on valves meeting in March 1994. The inquiry originally asked if "thermal relief valves" were in the scope of Part 1. The working group requested the inquiry be rewritten because there is no definition for "thermal relief valves." When rewritten, the inquiry questioned wither it is the intent of the OM Code to require testing of relief valves that protect systems or portions of systems that perform a specific function in shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident, against overpressurization due to a temperature increase. The working group recommended to the subcommittee that the response be "Yes." Further actions are ongoing to give more clarification.

It is important to note that the requirement to perform testing of safey and relief valves which protect against overpressure is based on the requirements of Section III of the ASME Code, or the applicable code of construction. The IST engineer may not have the documentation for the system design or development of the Section III overpressure analyses. However, if there are safety or relief valves that do not appear to perform a necessary safety or overpressure protection function, it may be possible to coordinate with a design engineering group for reanalyses. If the results of the overpressure protection "reanalysis" for a particular system indicate that a relief vale is not necessary, it may be removed from the scope of the IST program.

NRC Recommendation

None. This discussion is for clarification of existing requirements and discussion of questions that have been posed concerning the scope of OM-1.

Basis for Recommendation

The basis for the clarification is the scope statement of OM-1, as well as the revised scope statement in Appendix 1 (OM-1) of the OMc-1994 Addenda to the OM Code. Also, in a paper presented by Thomas F. Hoyle, "Introduction to OM-10, Technical Differences Between IWV and OM-10,"

NUREG/CP-0111, the expansion of scope is discussed. The expanded scope includes only ASME Code Class 1, 2, and 3 valves and is, therefore, within the scope of 10 CFR 50.55a.

4.3.2 OM-10 Reference to OM-1

The 1989 Edition of Section XI, IWA-1600, references the 1987A Addenda of OM Parts 6 and 10, and the 1987 Edition of Part 1. As discussed in 10 CFR 50.55a(b)(2)(vii), when using the 1987 Addenda, 1988 Addenda, or the 1989 Edition of Section XI, the OMa-1988 Addenda of Parts 6 and 10 shall be used. This was corrected in the 1990 Addenda of Section XI, as errata. Part 10 does not reference a specific edition of Part 1.

NRC Recommendation

None. This discussion is for clarification of existing requirements.

4.3.3 Test Supervisor Qualifications

Performance Test Code (PTC) 25.3-1976 is the PTC referenced in Section XI, IWV-3512, for setpoint testing of safety valves and relief valves. Paragraph 3.02, "Qualification of Person Supervising the Test," of the PTC is a requirement for IST. The OM committee recognized that PTC 25.3-1976 was written for testing at the manufacturer's facility and includes requirements that are difficult to apply to an operating power plant. Also, it does not include all testing for monitoring inservice valves. Therefore, the OM Committee issued OM-1, "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices," for application to both preservice and IST. When OM-1 was issued for testing safety valves and relief valves in nuclear power plants, it did not include specific requirements for the qualifications of test supervisors. Paragraph 1.3.2.1(d) of OM-1, lists "the qualification of personnel who perform testing and maintenance" as an item for which the owner has responsibility.

The PTC specifies that a test supervisor who has obtained an academic degree in a branch of engineering from a recognized school of engineering, and who has at least two years of practical experience in fluid-flow measurement, may be considered qualified to supervise the test. Code Case N-442, "1977 Addendum to ASME PTC 25.3-1976, `Safety and Relief Valves,' Class 1, 2, 3, and MC [metal containment] Section III, Division 1," stated that the 1977 Addendum to PTC 25.3-1976 could be used as alternative rules for ASME Section III safety and relief valve testing. The 1977 Addendum specifies that a person who supervises the test shall have a formal education in thermodynamics and fluid mechanics, experience in supervising tests, and at least 2 years practical experience in measuring fluid flow.

A licensee often issues a purchase order contract for a testing contractor to conduct the setpoint testing of safety valves and relief valves, either at a test facility or on site. In following OM-1 requirements such that the owner specifies the qualifications, licensees typically have specified the applicable requirements in the purchase order and have documents from the testing contractor to verify that the individuals performing the tests meet the specified qualifications. These criteria also apply for testing supervised by the owner such that test procedures specify the qualifications of the individuals performing the tests and documents are available showing these qualifications are met. A general statement is not sufficient.

NRC Recommendation

The staff has found acceptable either of two alternatives to the qualification requirements in the PTC:

(1) Following the requirements of OM-1, Paragraph 1.3.2.1, the licensee may establish the criteria for qualifying the test supervisor and document the qualifications in the test implementation procedure or work package for the setpoint testing. Documentation that the test supervisor meets the qualifications must be available in the plant records. The staff has determined the implementation of the requirement of OM-1, paragraph 1.3.2.1, for test supervisor qualifications is acceptable pursuant to 10 CFR 50.55a (f)(4)(iv).

(2) The licensee may follow the guidance in Code Case N-442 which relaxes the educational requirements specified in PTC 25.3-1976. This alternative necessitates a relief request because the code case is not approved as applicable to Section XI.

Basis for Recommendation

The 1986 and later editions of ASME Section XI reference OM-1 for setpoint testing of relief devices. The staff may approve the use of later editions, or portions thereof, pursuant to 10 CFR 50.55a (f)(4)(iv). Therefore, it is acceptable to follow the requirements of OM-1 which state that the owner is responsible for establishing the qualification of personnel who perform testing and maintenance of safety relief devices.

Responding to inquiry number IN-92-027, the ASME Code Committee, Section XI, stated that, although the test supervisor's qualifications of ASME PTC 25.3-1976, paragraph 3.02, apply when performing set point testing in accordance with Section XI, IWV-3512, the provisions stated in PTC 25.3-1976, paragraph 3.02, are permissive (allow discretion). Therefore, the guidance for test supervisor qualifications in Code Case N-442 would be acceptable for Section XI IST and Section III design capacity verification.

Appendix B to 10 CFR Part 50 specifies the requirements for quality assurance of activities conducted for nuclear power plants. Included are requirements for documenting tests conducted by a test contractor or facility or by plant personnel. These documents would confirm that the test supervisor meets the requirements necessary for ensuring the quality of the tests.

4.3.4 Frequency and Method of Testing Automatic Depressurization Valves in Boiling-Water Reactors

Most boiling-water reactors (BWRs) are equipped with dual-function main steam safety relief valves to protect the reactor vessel from overpressure and to enable the licensee a means to quickly depressurize the primary system. If a small-break loss-of-coolant accident (LOCA) coincides with a failure of the high-pressure injection system, the opening of these valves would depressurize the vessel to enable the low-pressure injection systems (i.e., low-pressure coolant injection and core spray) to inject coolant for core cooling. Licensees have typically identified these valves as Category B/C for both the power-operated function and the self-actuating function.

Automatic depressurization system (ADS) valves are capable of (1) acting as simple mechanical relief valves, (2) being manually operated from a remote location, or (3) responding to an automatic safety system signal independently of reactor pressure. Because of the categorization of these valves as B/C, licensees typically request relief for an

alternative to measuring stroke time for these valves, as these valves do not generally have valve obturator position indication. The alternatives the staff has accepted include the use of acoustic monitors, the indirect measurement of stroke time, and the performance of enhanced maintenance on the valves.

The ADS valves perform dual functions. Many licensees identify the valves as Category B/C in the IST program, although the ASME OM Committee has indicated that it is reviewing this issue to determine the proper category(ies) for these valves (R. Favreau, OM Committee Meeting, September 21, 1993) and that when using OM-1, it was considered as included all of the inservice testing requirements for safety and relief valves (the committee has not yet completed the review, but a few plants have categorized the valves as Category C rather than B/C). If Category B/C, the Category B power-operated function of the valves would be tested in accordance with requirements of Section XI, Paragraph IWV-3400, at least during each refueling outage. The Category C function of the valves would be tested in accordance with requirements of Section XI, paragraph IWV-3510 (or OM-10) and PTC 25.3-1976 or OM-1.

NRC Recommendation

The Code requirements for measuring stroke time govern the monitoring of power-operated valves for degrading conditions. In many plants which identify the ADS valves as Category B/C, position indication is not provided for the ADS valves, making direct stroke time measurement impractical. Many licensees meet the Code requirements for stroke time by using the acoustic monitors downstream of these valves to measure the stroke time. This alternative is acceptable per GL 89-04, Position 6, if a 2-second limiting value is assigned using the guidance for rapidly acting valves. Other acceptable methods include (1) measuring the stroke time at the set pressure test facility, with an exercise in-situ after reinstallation to ensure controls have been properly connected, and (2) performing enhanced maintenance of the ADS and pilot valves, with stroke time measurements of the pilot valves. The staff determined that the test frequencies in OM-10 are acceptable pursuant to 10 CFR 50.55a(f)(4)(iv). Therefore, the licensee may perform testing using the acoustic monitors and the guidance of GL 89-04, Position 6, during refueling outages by preparing a refueling outage justification for extending the test interval. Other proposed alternatives may necessitate NRC approval.

Basis for Recommendation

Testing these power-operated valves as Category B valves may be difficult because they can be exercised only when sufficient reactor steam pressure is available. The NRC discussed concerns for these valves in NUREG-0123, "Standard Technical Specifications for General Electric Boiling Water Reactors (BWR/5)," and NUREG-0626, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near-Term Operating License Applications." In these documents, the staff recommends reducing the number of challenges to the dual function ADS valves in order to reduce their failure rate, because failure in the open position is equivalent to a small break LOCA. Therefore, the period between refueling outages is a reasonable alternate frequency for verifying the Category B function of these valves.

The testing that verifies the Category C function of these valves can typically be performed as specified in the Code, as this testing is performed infrequently and presents no special problems. If the ASME OM Committee determines that these valves are Category C (as opposed to Category B/C or A/C), meeting the Code requirements for Category A or B will be unnecessary.

4.3.5 Jack-and-Lap Process

In Information Notice 91-74, "Changes in Pressurizer Safety Valve Setpoints Before Installation," the NRC stated that the setpoint changes in Dresser pressurizer safety valves could result in part from changes made during a "jack-and-lap" procedure which is performed after setpoint testing and before installation to reduce seat leakage. This procedure may have lacked adequate controls.

Many licensees avoid performing setpoint testing after jack-and-lap maintenance because this testing could lead to leakage. The Code requires that when the licensee has repaired a valve or performed maintenance that could affect its performance, the licensee must demonstrate that the performance parameters are acceptable by testing the valve before returning it to service. The licensee must test pressure relief devices as required by Section XI and OM-1 following replacement, repair, and maintenance. Section XI and OM-1 require that refurbished equipment be tested in accordance with the periodic testing requirements as applicable. OM-1 also requires that, before resuming electric power generation, the licensee shall verify the ability to open and close for each pressure relief valve in the BWR main steam system if this valve has auxiliary actuating devices and has been maintained or refurbished in place, removed for maintenance and testing, or both, and reinstalled. The licensee shall verify this capability by remotely actuating the valve at reduced system pressure. Further set pressure verification is not required (reference Paragraph 3.4.1.1(d) of OM-1).

NRC Recommendation

The staff recommends that, if a licensee chooses to use the jack-and-lap process and not reverify the set pressure of the valves, it must determine if the maintenance activity is of an extent that a setpoint test is required after the valve is reassembled and reinstalled. If the jack-and-lap process is controlled such that the setpoint will not be affected, the licensee may not need to perform a test once again, other than the remote actuation required for BWR main steam safety valves. Because the NRC staff cannot make this determination by evaluating a relief request, relief is neither appropriate nor available for this activity.

Basis for Recommendation

Action in accord with this recommendation necessitates determination of the effect of this activity and evaluation within the quality controls and quality assurance for the process. Controls include limits on the amount of material which is removed, the controls to ensure the settings and adjustments of the valve parts which affect the setpoint are not changed, and the requirements in the maintenance procedure to address any unusual conditions that occur during the maintenance activity. The licensee can also consider industry experience to determine if changes in the methods of performing this activity are necessary as plants accumulate more data.

4.3.6 Safety/Relief Valve Setpoint Adjustments

The common corrective action for valves is to perform analysis, retest, or a repair or replacement. However, the most appropriate action to take may be to adjust the setpoint for

a safety relief valve when the setpoint for a safety relief valve is not within the required range of values. The Section XI terminology for a repair or replacement activity does not include setpoint adjustment; however, Paragraph 1.3.4.1.5(b), "Valves Not Meeting Acceptance Criteria," of OM-1 requires that any valve exceeding its stamped set pressure by 3 percent or greater shall be repaired or replaced, the cause of failure determined and corrected, and the valve verified to have successfully passed a retest before that valve is returned to service.

NRC Recommendation

The staff has determined that setpoint adjustment is an acceptable means of implementing the corrective action requirements of IWV-3514 (1983 Edition) and OM-1. If the out-of-specification condition can be corrected by adjusting the setpoint, a Section XI repair or replacement activity is unwarranted.

Basis for Recommendation

A Section XI repair or replacement activity is defined as a repair by welding, brazing, or metal removal of the pressure-retaining parts of a component or the replacement of pressure-retaining parts. Although setpoint adjustment does not constitute a Section XI repair or replacement activity, it may be the most appropriate action to correct a setpoint drift. In Interpretation XI-1-89-65 for Section XI, the Code committee stated that Section XI, IWV-3514, does not imply that valve set point adjustments are a Section XI repair (IWA-4000). However, the Code committee stated that set point adjustments satisfy the requirements for corrective action specified in IWV-3514. The OM committee also stated in Interpretation 92-2, that in accordance with OM-1, adjustment of the valve setpoint without valve disassembly can satisfy the requirement for corrective action specified in paragraphs 1.3.3.1.5(b) and 1.3.4.1.5(b) if the cause of failure is determined and corrected as required. NOTE: OMc-1994, Part 1, includes "adjustment" as an acceptable action when valves do not comply with their acceptance criteria.

OM-1 requires the "cause" of failure to be determined and corrected. It is possible that a condition can be identified and corrected and the valve setpoint verified to be within the acceptable range such that it may be placed in service. Once the condition that necessitated corrective action has been identified, the licensee may do further analysis into the "root cause" of the particular condition, if necessary. Most corrective action programs are established to take such an approach. An example of the difference between "cause" and "root cause" can be shown for setpoint drift. When the safety valve setpoint has "drifted" above the acceptable limit, adjustments may correct the condition such that the valve can be put back into service. However, the root cause of the setpoint drift may be unknown. The Boiling-Water Reactor Owners' Group researched the root cause of the setpoint drift in boiling-water reactor safety valves, for example, and recommended a change to the valves that may correct the condition and prevent recurrence.

4.3.7 Setpoint As-Found Value

The requirements of OM-1 differ significantly from the requirements of PTC-25.3-1976. OM-1 specifies that the valve must be opened at least twice consecutively and be found within Code tolerance each time. In determining the as-found setpoint, the licensee performs the first lift, compares the result with

the acceptance criteria, and determines the need for additional tests. The first lift is the one that determines the need for corrective action and additional valve testing.

Before completing valve setpoint testing for the as-left conditions, the licensee must complete at least two consecutive openings within the Code tolerance and must not use the average of the values. In Interpretation 92-4, the OM committee stated that paragraph 8.1.1.9, "Number of Tests" (steam service for PWRs), of OM-1-1981 refers to as-left conditions, and that paragraph 8.1.3.8, "Number of Tests" (liquid service), of OM-1-1981 does not refer to as-found conditions. In other words, paragraphs 8.1.1.9 and 8.1.3.8 refer to the as-left set pressure number of tests. NOTE: This interpretation also applies to similar paragraphs of Section 4 of OM-1 for BWRs.

If no adjustment or maintenance is required after the initial as-found test, and the initial lift meets the acceptance criteria, it appears that the number of tests required by OM-1 for the two as-left tests may take credit for the initial test. One additional test with acceptable results would be required. However, the initial test must be used to determine corrective actions, if necessary, and testing of additional valves.

NRC Recommendation

None. This discussion is for clarification of existing requirements.

4.3.8 Vacuum Relief Valves

In OM Interpretation 92-5, as to whether the requirements of OM Part 1, paragraphs 7.1.2.3, 7.2.2.3, 7.3.2.4, and 7.4.2.4 apply to all Class 2 and 3 vacuum relief valves which are required to perform a specific function in shutting down a reactor or in mitigating the consequences of an accident, the Code committee stated that the requirements of Part 1 apply only to pressure relief devices required for overpressure protection.

Paragraph 1.1.2(b) of OM-1 states that the requirements apply only to pressure relief devices required for overpressure protection. The definition of overpressure protection in OM-1 states that "[t]his term is defined in Article 7000 of the applicable Subsection of Section III of the ASME Boiler and Pressure Vessel Code." The definition of overpressure in ASME B&PVC Section III NC-7111 (Class 2) and ND-7111 (Class 3) includes pressure changes that require relief devices that function to relieve vacuum. The definition is as follows:

> **NC/ND-7111:** . . . (2) Changes in differential pressure resulting from thermal imbalances, vapor condensation, and other similar phenomena, capable of causing an internal or external pressure increase of sufficient duration to be compatible with the dynamic response characteristics of the pressure relief devices listed in this Article.

Footnote 2 to NC/ND-7150, "Acceptable Pressure Relief Devices," states the following:

> A pressure relief device is designed to open to prevent a rise of internal fluid pressure in excess of a specified value due to exposure to emergency or upset conditions. It may also be designed to prevent excessive internal vacuum. It may be a pressure relief valve, a non-reclosing pressure relief device, or a vacuum relief valve.

To meet Code requirements, vacuum breakers that are simple check valves are required to be

full-stroke exercised in accordance with IWV-3520 or Paragraph 4.3.2 of OM-10 at the specified frequency, and are required to be tested in accordance with OM-1, if applicable, at the specified frequency to verify the capability to open and close, the set pressure, and the performance of any accessories for sensing pressure and position. The setpoint would be the pressure (vacuum) force that is the point where the valve is required to open to relieve vacuum. If the check valve has no leak tight criteria, leak testing is not required. If the requirements for vacuum breakers are not applicable, only the requirements of OM-10 apply to the check valves.

NRC Recommendation

Paragraph 1.3.4 of OM-1 is not clear as to the frequency for testing vacuum breakers, other than those that function as "primary containment vacuum relief valves." The staff recommends that licensees test Class 2 and 3 vacuum breakers, which are within the scope of OM-1, at the frequency specified in Paragraph 1.3.4.1, "Pressure Relief Valves," of OM-1. The frequency would, therefore, be at least once in each ten-year interval, except for any additional testing of check valves as noted above.

Basis for Recommendation

The test frequency is not clearly stated in OM-1; however, the vacuum breakers which provide an overpressure protection function are considered within the scope of OM-1 by the definition in NC/ND-7111.

4.3.9 Clarifications in OM-1, OMc-1994 Addenda to the 1990 Edition of the OM Code

As licensees began applying the requirements of OM-1, it became clear that clarifications were needed. The OM working group has clarified several issues in the 1994 addenda to the 1990 OM Code. The clarifications discussed below may be used without further NRC approval. Other clarifications identified by licensees may also be used without further NRC approval if it is determined to be clarification only and is documented in the IST program or test procedures, as necessary. The use of other portions of the 1994 Addenda which are more than clarifications would require relief.

NRC Recommendation

The following clarifications may be used by licensees when applying OM-1-1981 or OM-1-1987 (Note: The paragraph numbers do not correspond between revisions of the OM-1 Code and are not cited below.)

(1) Valve Group–valves of the same manufacturer, type, system application, and service media.

(2) Requirements for Testing Additional Valves–additional valves shall be tested in accordance with the following requirements:

   a. For each valve tested for which the as-found set pressure (first test actuation) exceeds the greater of either the ± tolerance limit of the owner established set-pressure acceptance criteria or ± 3% of valve nameplate set pressure, two additional valves shall be tested from that same valve group.

b. If the as-found set pressure of any of the additional valves exceed the criteria noted therin, then all remaining valves of that same valve group shall be tested.

c. The Owner shall evaluate the cause and effect of valves that fail to comply with the set-pressure acceptance criteria or the Owner-established acceptance criteria or other required tests, such as the acceptance of auxiliary actuating devices, or compliance with the Owner's seat tightness criteria. Using this evaluation, the Owner shall determine the need for testing in addition to the minimum tests specified to address any generic concerns which could apply to valves in the same or other valve groups.

(3) Ten-Year Test Interval for Class 2 and 3 Pressure Relief Valves–the 1994 addenda clarifies that the Class 2 PWR main steam safety valves shall be tested in accordance with the test frequency requirements for Class 1 valves in both the initial ten-year interval and subsequent ten-year intervals (i.e., the test frequency is based on a five-year interval).

(4) Seat Tightness Determination–seat tightness is to be determined before determining the set pressure only if practicable. This test need not be performed at the same pressure as the final seat tightness test. This test may be quantitative or qualitative depending on the observed condition (e.g., using acoustic monitors would be qualitative). This test is primarily for gross determination of the as-found seat tightness.

(5) Compressible Fluid Service Other than Steam–air or nitrogen may be substituted at the same temperature without alternative media correlation.

(6) Thermal Equilibrium–Thermal equilibrium need not be verified for liquid service valves tested at ambient temperature using a test medium temperature.

Basis for Recommendation

The earlier editions of Part 1 contained a number of editorial errors that have been corrected by the 1994 Addenda (OMc-1994). A number of clarifications have been made. The definition of valve group previously in a footnote to the testing schedule tables is now in the definitions section. The previous references for addition valve testing were incorrect. The test intervals for Class 2 main steam safety valves were not stated clearly. The purpose of the seat leakage determination was not explained. Air or nitorgen at the same temperature may be used without a correlation factor.

4.3.10 Valve Groups and Number of Valves to be Tested

From questions asked of the OM Part 1 working group members, the participants at the June 1994 meeting in San Jose, California, concluded that fractions of valve numbers resulting from calculating the number of valves to be tested are to be rounded to the next higher whole number for compliance with the requirements of OM-1. For example, a Class 2 valve in a subsequent ten-year interval in a valve group by itself would be tested at least once within any 48 months.

NRC Recommendation

This is for clarification only.

4.4 Miscellaneous Valves

The following issues and NRC recommendations apply to miscellaneous types of valves.

4.4.1 Pressurizer Power-Operated Relief Valve Inservice Testing

Power-operated relief valves (PORVs) were often not purchased as safety-related valves and the function of these valves to provide pressure control for plant transients was not considered safety-related. The valves were not considered overprotection devices as required by ASME Section III, but many have since been used as low-temperature overpressure protection valves.

NRC Recommendation

The staff recommends that licensees be aware of previous NRC guidance that the PORVs be included in the IST program as Category B valves and tested to the requirements of Section XI. Recognizing that the PORVs have shown a high probability of sticking open and are not needed for overpressure protection during power operation, the IWV-3410 provisions for exercising quarterly during power operation is "not practical" and, therefore, exercising would be performed during cold shutdown conditions.

Previously approved NRC guidance (see below) indicates that because the PORVs function during reactor startup and shutdown to protect the reactor vessel and coolant system from low-temperature overpressurization conditions, they should be exercised before system conditions warrant vessel protection, and exercised after the operational readiness of the block valves is ensured, by exercising and stroke timing according to the following test schedule:

(a) Perform full-stroke exercising at each cold shutdown or, as a minimum, once each refueling cycle.

(b) Perform stroke timing at each cold shutdown, or as a minimum, once each refueling cycle.

(c) Perform fail-safe testing at each cold shutdown, or as a minimum, once each refueling cycle.

(d) Include the PORV block valves in the IST program and test them quarterly to ensure protection against a small break LOCA should a PORV fail open.

(e) If the plant frequently enters cold shutdown mode, testing of the PORVs is not required more often than once every 3 months.

Basis for Recommendation

The NRC guidance on the IST requirements for PORVs is included in GL 90-06, "Resolution of Generic Issue 70, `Power-Operated Relief Valve and Block Valve Reliability,' and Generic Issue 94, `Additional Low-Temperature Overpressure Protection for Light-Water Reactors,' Pursuant to 10 CFR 50.54(f)." In IN 89-32, "Surveillance Testing of Low-Temperature Overpressure-Protection Systems," the NRC discussed the stroke times of PORV assumptions made in plant safety analyses for these PORVs, and IST performed for these valves. Stroke times of the valves were unacceptable or were not measured in the direction required for low-temperature overpressure systems to prevent exceeding the limits in Appendix G to

10 CFR Part 50. Compliance with the guidance of GL 90-06 has been coordinated between plants and NRC Project Managers for each plant on a case-by-case basis.

4.4.2 Post-Accident Sampling System Valves

NUREG-0737, "Clarification of TMI Action Plan Requirements," Section II.B.3, details the requirements and capabilities of post-accident sampling systems (PASSs) for sampling both the reactor coolant and the containment atmosphere. The PASS consists of pumps and valves that perform these and possibly other functions. The PASS also includes valves that perform a containment isolation function.

NRC Recommendation

The IST program applies to any PASS valves within the scope of 10 CFR 50.55a and Section XI of the ASME Code. Such valves in the PASS that perform a containment isolation function are required to be included in the IST program as Category A or A/C and be tested to Code requirements except where relief has been granted.

The remaining valves in the PASS would typically be tested as required by the technical specifications or other documents and need not be included in the IST program. However, the staff recommends that if the licensee elects to include these valves in the IST program, a note be included that the testing is beyond the scope of 10 CFR 50.55a.

Basis for Recommendation

Section II.B.3, "Post-Accident Sampling Capability," of NUREG-0737 details the requirements and capabilities for the licensee's PASS, which provides for sampling both the reactor coolant and the containment atmosphere and consists of pumps and valves to perform these functions. The PASS also contains valves that can isolate containment where the system penetrates containment.

4.4.3 Multiple Containment Isolation Valve Leak-Rate Testing

Some plants have containment penetrations with multiple isolation branches from a common header which include several containment isolation valves (CIVs). In many cases it is not practical to perform a seat leakage test on each valve. Licensees typically request relief and propose to test the valves as a group to verify the leak rate is with a limiting value of leakage assigned to the group.

By assigning a limiting value of leakage rate to an individual valve, the licensee can ascertain trends and determine the best time for repair or replacement, as necessary. Many valves seat differently each time they are operated and can exhibit a differing seat leakage rate after each closure, which would challenge the determination of degradation based on the analysis of leakage rate. This problem will be further compounded when valves are tested in groups. In measuring the trends in the leakage rate of the valve group, the licensee would not obtain information on the condition of an individual valve.

Paragraph IWV-3426 of Section XI requires the licensee to assign permissible leakage rates for each valve. The Code includes a formula for calculating a limit that was not otherwise assigned and requires the measured leakage rate be compared to both the permissible value and to the previous measurements to determine if the valve requires corrective action. However, OM-10 requirements for leak testing allow for testing valves in groups, trending leakage rates of the group, and taking corrective actions if the group leakage limit is exceeded.

NRC Recommendation

Valves may be leak tested in groups as allowed by OM-10. If two or more valves on a containment penetration are tested as a group, limiting leakage-rate values must be assigned to the group for the purpose of monitoring the condition of the valve and taking corrective action. If the limiting values are exceeded, the licensee must take actions to determine the leakage path. The licensee for a plant that has not updated to OM-10 need not obtain relief as the staff has determined it is acceptable to leak test valves in groups per Paragraph 4.2.2.3 of OM-10 in accord with 10 CFR 50.55a (f)(4)(iv).

To implement this guidance, the IST program documents (or implementing procedures) must include a discussion of the methodology for establishing leakage limits for valves tested as a group. The licensee would typically establish limits at values sufficient for finding leakage from any valve in the group, based on the diameter of the smallest valve in the group or based on a conservative limit established to another criterion not related to the diameter of the valve. If the licensee chooses to implement this guidance, the licensee must continue to comply with the analysis of leakage rates and corrective action requirements of Paragraphs IWV-3426 and IWV-3427(a) of Section XI or Paragraph 4.2.2.3 of OM-10 to the extent practical for group leakage testing.

Basis for Recommendation

The NRC approved the use of OM-10 with exceptions for CIVs to require the leakage test requirements of paragraph 4.2.2.3 of OM-10 be applied to CIVs (see 57 Federal Register 34666, August 6, 1992).

In accordance with the Code, the licensee can establish acceptance criteria with limits for a group of valves. As noted, the limits can be based on the smallest size valve in the group, or some other method. For example, at the Clinton Power Station, tests were conducted to determine the maximum size of an opening that could result from a particle that is below the system filtration size. The acceptance criteria are based on the results of these tests. A method that ensures detection of leakage within safety analysis limits is acceptable. For a discussion on the approach used at the Clinton Power Station, reference "Modeling Valve Leakage," by Steven R. Bell and Randall Rohrscheib, NUREG/CP-0137, "Proceedings of the Third NRC/ASME Symposium on Valve and Pump Testing."

Once a leakage rate exceeds the acceptance criterion, the leakage pathway would be determined using methods structured for individual valves, perform repairs upon determining the leakage pathway, and retest the valves to ensure all pathways were repaired to ensure that leakage is within acceptable limits after maintenance. This procedure eliminates unnecessary individual valve leakage testing conducted solely to meet 10 CFR 50.55a. The licensee would obtain no additional information by testing individual valves for leakage upon finding little or no leakage during the initial testing of a valve group. If the licensee finds increased group leakage, it could assess the leakage pathway by evaluating individual valves. However, this procedure must comply with the requirements of Appendix J to 10 CFR Part 50 and OM-10 for the direction of the test pressure against the seat of the valve.

4.4.4 Post-Maintenance Testing After Stem Packing Adjustments and Backseating of Valves to Prevent Packing Leakage

Paragraph IWV-3200 of Section XI requires that, upon performing maintenance to a valve in a manner that could affect its performance, the licensee shall, before returning the valve to service, test it to demonstrate that the performance parameters are within acceptable limits. Adjusting stem packing is an example of maintenance that could affect performance. Paragraph 3.4 of OM-10 contains similar requirements. Backseating a valve may affect the performance of the valve.

The licensee may need to adjust the stem packing during power operations when it is impractical to stroke valves that must remain in position for operations to continue. Recent examples include main steam isolation valves and main feedwater isolation valves. If the leakage does not pose a personnel safety hazard if personnel come in contact with the fluid while adjusting packing, licensees often may adjust the packing without removing the valves from service. Alternatively, backseating of motor-operated valves may be used as a means to stop packing leakage without taking a valve out of service. Exercise caution when performing such maintenance, as improper backseating or adjustment of valve stem packing could adversely affect the valve's functional capability.

NRC Recommendation

The staff has determined that, as an interim measure, whenever valve stem packing is adjusted or a valve is backseated to prevent packing leakage and a stroke or leak test in the current plant mode is impractical, the licensee can assess the effect of this adjustment or backseating on the valve's functional capability to open and close and to meet stroke-time and leakage requirements and later verify the stroke time and leakage rate by a confirmatory test when the plant conditions allow testing to be performed.

The staff has determined that it is acceptable for a licensee to perform an engineering evaluation of the impact of adjusting valve stem packing or backseating a valve to demonstrate that the performance parameters are within acceptable limits. If it is necessary to adjust the stem packing or backseat a valve to stop packing leakage and if a required stroke test or leak rate test is not practical in the current plant mode, the licensee must justify by analysis that, among other things, (1) that the packing adjustment is within torque limits specified by the manufacturer for the existing configuration of packing, (2) the backseating does not deform the valve stem, and (3) the performance parameters of the valve are not adversely affected, and a confirmatory test must be performed at the first available opportunity when plant conditions allow testing. Packing adjustments beyond the manufacturer's limits may not be performed without (1) an engineering analysis and (2) input from the manufacturer, unless tests can be performed after adjustments.

Examples of such valves are the main feedwater isolation valve and main steam isolation valve, which remain open to continue power operations. The licensee must evaluate any data available from previous testing with the packing torqued to the limit specified and verify that the valve was leak tight and previously stroked within acceptable limits with the packing adjusted to the higher value, or from previous instances of backseating a valve.

Relief is not appropriate because this action is in accordance with the Code requirements if the licensee can demonstrate that the performance parameters will not be adversely

affected; however, packing adjustments beyond the manufacturer's limits may not be performed without both an engineering analysis that shows performance parameters of the valve are not adversely affected, and approval of the manufacturer, unless tests can be performed after adjustments.

In implementing this guidance, the licensee must perform a partial-stroke test if practical to obtain further assurance that the valve stem is free to move. At the first opportunity when the plant enters an operating mode in which testing is allowed, the licensee must test all valves that have packing adjustments or have been backseated that were made without post-maintenance testing to the extent practical. The maintenance procedure used to adjust the packing must include the limits, and any changes to the limits must be subject to a 10 CFR 50.59 review. The licensee would typically avoid adjusting redundant valves without performing post-maintenance testing. When plant conditions allow, however, the licensee must partially stroke the valve to ensure that the stem is not binding. Backseating procedures are to include precautions to prevent stem deformation.

To implement this guidance, the licensee must evaluate valves individually unless it has established a valve packing program in which designated limits, justified by test data, allow adjustments that do not affect performance parameters. Specific or general relief is not appropriate for this activity. If the licensee cannot justify that the packing adjustment does not adversely affect performance parameters, there would be no basis for relief and the Code requirements must be met. Therefore, the licensee must consider this issue for each valve individually.

Basis for Recommendation

The NRC would not require a licensee to shut down a plant to perform IST unless the licensee has no alternative to ensure that the operational readiness of components is maintained or unless a safety issue exists. The IST requirements do not prohibit or discourage the licensee from making limited adjustments to packing to stop a leak that may be adversely affecting the valve or surrounding components. Therefore, the licensee can perform an analysis of the packing adjustment and, upon demonstrating that the adjustment does not adversely affect the stroke time (or leakage rate) such that it would not exceed its limiting value, can make the adjustment without a post-maintenance stroke time measurement (or leakage test). This guidance applies only to valves that need adjustment during power operation and cannot be fully stroked in the plant operating mode. The guidance does not apply merely as a convenience to the licensee and does not supersede any related guidance associated with GL 89-10.

Responding to Inquiry IN-91-045, the ASME Section XI Boiler and Pressure Vessel Committee stated that Subsection IWV-3200 of Section XI does not require a stroke-time test if it is established that adjustment of packing will not affect the stroke time of a specific valve.

Responding to Inquiry IN-92-031, the Code committee stated that Subsection IWV-3200 does not require a test to verify seat leakage if the owner establishes that an adjustment of packing will not in any way affect the required seat leakage performance of a specific valve.

NRC Information Notice 87-40, "Back Seating Valves Routinely to Prevent Packing

Leakage," gives information related to backseating valves. Both Westinghouse and General Electric had issued guidance on performing backseating to minimize deformation to valve stems. Backseating is not listed in IWV or OM-10 as an example of a maintenance activity. The licensee would have to assess the effect of backseating on valve operation and determine if post-maintenance is required. GL 89-10 test results may indicate whether backseating of a particular valve affects the stroke time of a valve. Any information would need to be included in an evaluation. The assessments would be valve specific.

4.4.5 Leak-Rate Testing Using OM-10 Requirements

Though the leak-rate testing requirements of Paragraphs 4.2.2.3 of OM-10 and IWV-3420 of Section XI differ only slightly, a licensee may use the requirements of OM-10 for monitoring the leak-rates of valves.

NRC Recommendation

Paragraph 4.2.2.3 of OM-10 specifies acceptable requirements for implementing a leakage-monitoring program for valves. The staff has determined that licensees may update their programs to the requirements of Paragraph 4.2.2.3 of OM-10 pursuant to 10 CFR 50.55a (f)(4)(iv) and meeting all the requirements of Paragraphs 4.2.2.1 and 4.2.2.3.

Basis for Recommendation

The leakage-monitoring requirements of OM-10 differ from previous requirements in the following areas:

(1) OM-10 allows leak-rate testing for groups of valves.

(2) OM-10 allows a pressure decay test for determining leakage.

(3) OM-10 changes the permissible Code leakage rate of water from 30D ml/hr to 0.5D gpm or 5 gpm (whichever is less), where D is the nominal valve size (diameter) expressed in inches.

(4) OM-10 eliminated the allowance for leak testing valves (except check valves) in either direction if the function differential pressure is 15 psi or less.

These differences are not relaxations of the intent of the Code to monitor for degrading conditions.

4.4.6 Manual Valves

The staff has received questions about the requirements for including manual valves in the IST programs. The Code includes manual valves that meet the scope requirements of 10 CFR 50.55a. To comply with the Code, exercising requirements for a manual valve must be in accord with applicable IST requirements of IWV or OM-10 if the manual valve is credited in the safety analysis for being capable of being repositioned to shut down the plant, to maintain the plant in a safe shutdown condition, or to mitigate the consequences of an accident. If the manual valve is included in actions in emergency operating procedures, but is not credited in the safety analysis, it does not fall within the scope of the IST program; however, such a valve may be periodically exercised at an appropriate frequency to ensure that it can move freely for reasons other than IST. Applicable inservice tests could include exercising (but not stroke timing), leak testing, and position indication verification, at the frequency specified in the code, as practical. Passive manual valves that have position indication would be subject to position indication verification.

NRC Recommendation

None. This discussion clarifies existing requirements.

4.4.7 Pressure Isolation Valves

Position 4 of GL 89-04 discussed concerns with the adequacy of testing pressure isolation valves (see Appendix A). The leak rate testing specified in a plant's technical specifications (TS) meets the intent of IWV-3420 and paragraph 4.2.2.3 of OM-10. As noted in Position 4, a licensee should ensure that each pressure isolation valve is individually leak tested (or the measured leakage adjusted) in accordance with the differential pressure requirements of the Code. If the TS are not detailed enough to ensure individual valve leak testing, the licensee is responsible to ensure that the test procedures are themselves adequate for individual valve leak testing.

NRC Recommendation

A licensee may consider the leakage testing performed to meet TS requirements to also meet IST requirements if the intent of the code is met (e.g., leakage limits are established, corrective actions taken as required, valves individually leak tested). However, a licensee must ensure that the test differential pressure specified in TS, if applicable, is equivalent to the "function maximum pressure differential," or that the measured leakage is adjusted to the "function maximum pressure differential" in accordance with the formula in the Code (IWV-3423(e) or paragraph 4.2.2.3(b)(4) of OM-10).

Basis for Recommendation

Increasing pressure usually improves the seating of a valve. The code allows that when leak testing of those types of valves in which the service pressure will tend to diminish the overall leakage channel opening, as by pressing the disk into or onto the seat with greater force, the test differential pressure may be lower than the function maximum differential pressure. The resulting leakage is to be adjusted according to the following formula from the Code:

$$\frac{L(adjusted)}{L(test)} = \sqrt[2]{\frac{dP(maximum)}{dP(test)}}$$

where

L = leak and
dP = differential pressure.

While NRC has accepted other aspects of the TS, the licensee must ensure that any testing requirements not specifically detailed in the TS are imposed on the pressure isolation valves to comply with the code leakage testing requirements of the IST program. Generally, the same test will be used to meet both TS and IST requirements. The major difference between TS and IST requirements related to the acceptance criteria specified in some TSs between a nominal leakage limit and as upper limit (if allowed by TS, then this is considered acceptable for acceptance criteria for IST).

If the list of pressure isolation valves is removed from TSs, the leakage testing must be described in detail in the SAR or be identified as in accordance with the requirements of IWV or OM-10.

4.4.8 Containment Isolation Valves Which Have Other Leak-Tight Safety Function(s)

Valves which function as containment isolation valves may have additional safety functions for isolation or functioning of a system such as emergency core cooling system functions, pressure isolation, or train separation to prevent diversion of flow. The leakage testing for Appendix J may not adequately test that additional functions based on the pressure or fluid medium. For such valves, the requirements of both Appendix J and OM-10, paragraph 4.2.2.3, or IWV-3420 apply.

NRC Recommendation

This information is for clarification only to indicate that multiple safety-related isolation functions may require more than one method of testing.

5 SUPPLEMENTAL GUIDANCE ON INSERVICE TESTING OF PUMPS

5.1 General Pump Inservice Testing Issues

5.1.1 Frequency of Inservice Tests — Comparison of the American Society of Mechanical Engineers Code to Technical Specifications

Paragraph (a) of IWP-3400, "Frequency of Inservice Tests," in Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code) specifies the following:

> An inservice test shall be run on each pump nominally every 3 months during normal plant operation. It is recommended that this test frequency be maintained during shutdown periods if this can reasonably be accomplished, although this is not mandatory. If it is not tested during plant shutdown, the pump shall be tested within 1 week after the plant is returned to normal operations.

Paragraph 5.4, "Pumps in Systems Out of Service," in Part 6 of the ASME/ANSI [American National Standards Institute] Operations and Maintenance Standards (OM-6) includes similar requirements:

> For a pump in a system declared inoperable or not required to be operable, the test schedule need not be followed. Within 3 months prior to placing the system in an operable status, the pump shall be tested and the test schedule followed in accordance with the requirements of this Part. Pumps which can only be tested during plant operation shall be tested within 1 week following plant startup.

In Generic Letter (GL) 87-09, the U.S. Nuclear Regulatory Commission (NRC) clarified its position about the 1-week allowance of the Code in the Bases section of Technical Specification 4.0.5 as follows:

> Specification 4.0.5 establishes the requirement that inservice inspection of ASME Code Class 1, 2, and 3 components, and inservice testing of ASME Code Class 1, 2, and 3 pumps and valves shall be performed in accordance with a periodically updated version of Section XI of the ASME Boiler and Pressure Vessel Code and Addenda as required by 10 CFR 50.55a. . . . Under the terms of this specification, the more restrictive requirements of the Technical Specifications take precedence over the ASME Boiler and Pressure Vessel Code and applicable Addenda. The requirements of Specification 4.0.4 to perform surveillance activities before entry into an OPERATIONAL MODE or other specified condition takes precedence over the ASME Boiler and Pressure Vessel Code provision which allows pumps . . . to be tested up to one week after return to normal operation.

Therefore, to comply with GL 87-09 guidance, if the testing schedule is not maintained during plant shutdowns, the affected pump(s) must be tested before entering an operational mode

which requires the pump(s) to be operable. The only exceptions to this guidance are for those plants with specific technical specification allowances that state otherwise.

NRC Recommendation

No new guidance or recommendations are contained in this section. This section discusses previously issued guidance and experience.

5.1.2 Continued Measurement of Parameters Deleted from OM-6

The following parameters required to be measured by Subsection IWP of Section XI were not included in the requirements of OM-6 for the reasons stated (see NUREG/CP-0111, "Proceedings of the Symposium on Inservice Testing of Pumps and Valves," paper entitled "Introduction to ASME/ANSI OMa-1989a Part 6 - Inservice Testing of Pumps in Light-Water Reactor Power Plants - and Technical Differences Between Part 6 and ASME Section XI, Subsection IWP," John J. Zudans, pg. 25-58):

(1) Inlet pressure

This parameter was not included in OM-6 because IWP did not include acceptance criteria. It is included in IWP to help the owner prepare the test and recognize that adequate suction pressure needs to be specified in the test procedure. OM-6 recognized that the owner is responsible to address testing limitations in the procedures."

[NOTE: Inlet pressure values may still be needed for the designs that do not include differential pressure instruments - that is, if a licensee uses the discharge pressure minus the suction pressure to calculate a value for differential pressure].

(2) Differential pressure for positive displacement pumps

Subsection IWP requires differential pressure for both centrifugal and positive displacement (PD) pumps. Since discharge pressure is independent of inlet pressure for PD pumps, the requirement has been changed to require discharge pressure as the sole indicator of pump degradation.

(3) Proper lubricant level or pressure

OM-6 does not require this parameter because the OM committee found that it should be observed as part of regular maintenance practice, but that it has little value for quarterly pump testing.

(4) Bearing temperature

OM-6 does not specify that bearing temperature be measured. [When degrading conditions occur,] [b]earing temperature increases rapidly until the bearing fails. The main reason for deleting this requirement is that it is unlikely that bearing failure would be detected by a yearly test. The parameter indicates pending pump bearing failure only when it is continuously monitored, which does not apply for standby pumps.

NRC Recommendation

The staff has determined that licensees not yet using OM-6 for IST of pumps may (1) eliminate the parameters deleted from the inservice testing (IST) requirements by OM-6 with consideration of the discussion above of the reasons why these parameters were deleted, and (2) include them in a maintenance program, as applicable, pursuant to Section 50.55a (f)(4)(iv) of Title 10 of the Code of Federal Regulations (10 CFR 50.55a (f)(4)(iv)). Relief requests need not be submitted to delete the measurement of these parameters which are no longer required to be monitored. There are no specific related requirements for using this recommendation; however, discharge pressure for positive displacement pumps must be monitored with the specified limits of OM-6. If this recommendation is used, the documents for the IST program must discuss the implementation.

Basis for Recommendation

The staff reviewed the OM Committee's basis for deleting these parameters and agrees with its determination as stated above. Eliminating the requirements for monitoring certain parameters which have not proven to yield useful data is consistent with the intent of the IST requirements and is, therefore, not detrimental to the continued safe operation of the plants.

5.2 Use of Variable Reference Values for Flow Rate and Differential Pressure During Pump Testing

Some designs do not allow for testing at a single reference point or a set of reference points. In these cases it may be necessary to plot pump curves to use as the basis for variable reference points.

NRC Recommendation

The NRC accepts the use of pump curves for reference values of flow rate and differential pressure if the licensee clearly demonstrates in a relief request the impracticality of establishing a fixed set of reference values. To obtain approval for a proposed method of evaluating these pump parameters to detect hydraulic degradation and determine pump operability, the licensee must demonstrate that the acceptance criteria are equivalent to the Code requirements in Table IWP-3100-2 (or Table 3b of OM-6) for allowable ranges using reference values.

To use this test method, the licensee must plot a valid pump characteristic curve from empirical data or obtain one from the pump manufacturer and verify it with measurements taken when the pump was known to be in good operating condition. The following is an example of an acceptable test plan.

> Measure pump flow rate with the pump operating as found. Plot a point for this flow rate on the pump characteristic curve. Measure the pump differential pressure with the pump operating as found and compare this differential pressure to the differential pressure obtained from the pump curve for the measured flow rate. The pump is operating in the acceptable range if the measured differential pressure is from 0.93 — 1.02 times the value from the pump curve, and is in the alert range if the measured differential pressure is from 0.90 — 0.93 or 1.02 — 1.03 times the value from the pump curve. The pump is operating in the required action range if the measured differential pressure is less than 0.90 or greater than 1.03 times the

value from the pump curve at the tested flow rate.

Since pump vibration readings may vary widely with changes in pump flow rate and differential pressure, the licensee must propose a method of evaluating pump vibration measurements taken with the pump operating in possible as-found conditions to ensure that a degraded pump would be declared inoperable and repaired.

The licensee must perform the following elements in preparing pump curves for the relief request for IST of pumps:

(1) Prepare pump curves, or validate the manufacturer's pump curves, when the pumps are known to be operating acceptably.

(2) When measuring the reference points for plotting or validating the curve, use instruments at least as accurate (accuracy and range) as required by the Code.

(3) Construct each curve with a minimum of five points, though fewer points may be acceptable for a narrow range.

(4) Construct the curve with only those points beyond the "flat" portion (low flow rates) of the curves in a range which includes or is as close as practicable to design basis flow rates.

(5) Establish acceptance criteria for the pumps that do not conflict with the operability criteria for flow rate and differential pressure in the technical specifications or the facility safety analysis report.

(6) If vibration levels vary significantly over the range of pump conditions, prepare a method for assigning appropriate vibration acceptance criteria for regions of the pump curve.

(7) When the reference curve may have been affected by repair, replacement, or routine service, plot a new reference curve or revalidate the previous curve by conducting an inservice test.

This guidance requires relief because the Code does not allow for testing using pump curves. If the licensee implements this guidance, it must demonstrate the impracticality of achieving reference conditions for IST. A relief request must include a description of the methodology to be used in evaluating these pumps.

Basis for Recommendation

Where it is not practical to return to the same flow configuration for each subsequent inservice pump test, it is necessary for the licensee to establish a method for evaluating the operational readiness of pumps in variable flow systems. This may be the case for service water or component cooling water systems and other systems where temperature or flow is controlled at a variety of locations. During quarterly pump testing, the licensee may not be able to manually control each of these local stations and duplicate the overall system reference conditions, as required by the Code.

Using the manufacturer's pump-specific curves for flow and differential pressure, the licensee may be able to evaluate the pump in as-found system conditions. In implementing this guidance, the licensee would confirm these values by performing in-situ testing. Another method would be to plot pump curves over the

range of conditions expected during the system's normal operation. It is also important to develop a method of evaluating pump vibration measurements taken with the pump operating over the range of possible as-found conditions, since this is a variable pump parameter. By evaluating these measurements of pump vibration, the licensee will ensure that a pump which is severly degraded, either hydraulically or mechanically, is declared inoperable and repaired. Appendix C includes an example of an acceptable relief request demonstrating the use of a pump curve.

In Interpretation 92-6, the OM committee stated that reference values and acceptance band curves over a small range of expected flow, for IST of a pump where system resistance cannot be varied, do not meet the requirements of OM Part 6. The committee also stated that OM Part 6 specifies a maximum value for the alert and required action ranges in Table 3a.

5.3 Allowable Variance from Reference Points and Fixed-Resistance Systems

Several licensees recently requested relief from the Code requirements for fixed reference points. Certain designs do not allow for the licensee to set the flow at an exact value because of limitations in the instruments and controls for maintaining steady flow. The characteristics of piping systems in other designs do not allow for flow to be adjusted to exact values. The Code does not allow for variance from a fixed reference value, stating only that "[t]he resistance of the system shall be varied until either the measured differential pressure or the measured flow rate equals the corresponding reference value." Licensees have requested relief to establish a range of values similar to using a pump curve, but with a very narrow band. For example, one licensee proposed to use a reference curve with the tolerance around the selected value to be ± 2 percent. Plant implementing procedures may instruct operators to set the flow to 1500 gpm [94.6 L/s]. When this step is performed, the operator would attempt to set the flow as close as possible to 1500 gpm [94.6 L/s] and maintain it steadily at approximately 1500 gpm [94.6 L/s].

NRC Recommendation

The staff has determined that, if the design does not allow for establishing and maintaining flow at an exact value, achieving a steady flow rate or differential pressure at approximately the set value does not require relief for establishing pump curves. The allowed tolerance for setting the fixed parameter must be established for each case individually including the accuracy of the instrument and the precision of its display. This will necessitate verification of the effect of precision on accuracy as considered in the design of the instrument gauge. A total tolerance of ± 2 percent of the reference value is allowed without approval from the NRC. For a tolerance greater than ± 2 percent (greater than ± 2 percent may be necessary depending on the precision of the instrument), a corresponding adjustment to acceptance criteria may be made to compensate for the uncertainty, or an evaluation would be performed and documented justifying a greater tolerance. In using this guidance, the variance and the method for establishing the variance must be documented in the IST program documents or implementing procedures.

In 10 CFR 50.55a(f)(4)(iv), the NRC allows for the licensee to use later editions of the Code which have been incorporated into 10 CFR 50.55a(b). The staff determined that the use of Paragraph 5.2(c) of OM-6 for systems in which resistance cannot be varied (fixed-resistance systems) is acceptable

pursuant to 10 CFR 50.55a(f)(4)(iv). No related requirements apply other than the requirement to compare the flow and pressure to limits of Table IWP-3100-2, or OM-6 Table 3b if using OM-6 limits.

Basis for Recommendation

Section XI does not address the possibility that a flow rate or differential pressure may not be controllable to an exact value. When the Code specifies that the system resistance be varied until either the flow or differential pressure equals the corresponding reference value, it does not intend that the "set value" have an acceptable range as stated in Table IWP-3100-2 (OM-6, Table 3b). The acceptance criteria are only applied to the parameter being determined after the resistance is varied. Licensees recognize that the reference value for certain pumps can only be achieved within a specified tolerance. Licensees may set the repeatable parameter as close as possible to the reference value during each test rather than treating any variance in the value with a pump curve. If, upon establishing trends in data, the licensee determines that the parameter varies such that the readings are outside the accuracy of the instrument, it may need to establish pump curves and request relief for the applicable pumps (see Section 5.2).

The basis for allowing a variance of ± 2 percent from the reference value is paragraph IWP-4150 of Section XI which specifies the requirements for instrument fluctuations. IWP-4150 allows symmetrical damping devices or averaging techniques to reduce instrument fluctuations to within 2 percent of the observed reading for values specified in the implementing procedures. Greater variances must be justified and acceptance criteria adjustments made as necessary.

If an analog gauge is used, the precision is determined by the increments in the scale and thus could be the limiting factor. Readings would be acceptable to a degree of precision no greater than one-half the smallest increment. For example, a gauge that has a full-scale range of 0 - 12,000 gpm [0 - 757.1 L/s] has increments of 200 gpm [0 - 12.6 L/s]. The standard reading between increments would be no more than 100 gpm [6.3 L/s]. If the indication is between 6000 gpm and 6200 gpm [378.5 and 391.2 L/s], the operator could "read" the gauge at only three values: 6000 gpm, 6100 gpm, or 6200 gpm, [378.5, 385.0, or 391.2 L/s] depending on whether the indication is in the middle or closer to the line for either 6000 gpm or 6200 gpm [378.5 or 391.2 L/s]. A reading of 6050 gpm [381.7 L/s] would not be acceptable for an increment of 200 gpm [12.6 L/s].

Paragraph 5.2(c) of OM-6 specifies that, if the pump is in a system for which the resistance cannot be varied, the "flow rate and pressure shall be determined and compared to their respective reference values." For these pumps, both the pressure and flowrate are subject to the acceptance criteria provided in Table IWP-3100-2 (OM-6, Table 3b).

5.4 Monitoring Pump Vibration in Accord with OM-6

The NRC has received relief requests from licensees requesting approval to use the requirements of OM-6 for monitoring pump vibration. The OMa-1988 edition of OM-6 did not include the figure that accompanies Table 3 in the OMb-1989 addenda. Table 3 in the 1989 edition is referenced as "Fig. 1" in footnote 2 of Table 3a.

NRC Recommendation

OM-6 allows for monitoring pump vibration in units of either pump displacement or pump velocity and includes acceptance criteria for both units of measurement. The staff has determined that if the licensee uses OM-6 for monitoring vibration in the IST program, the program must include all of the requirements for such monitoring. Licensees may update their programs in accordance with this position without further relief if they meet all related requirements for monitoring vibration in paragraphs 4.6.1, 4.6.4, 5.2, and 6.1 of OM-6, pursuant to 10 CFR 50.55a (f)(4)(iv).

In following this guidance, the frequency response range of the instrumentation must be as specified in paragraph 4.6.1.6 of OM-6 for both low-speed and high-speed pumps unless the licensee demonstrates that the information gained at the low frequency response does not apply for the bearing design of the pumps. Although the instruments in low frequency response ranges were only recently made commercially available and may not be widely used, the unavailability of instruments is not sufficient as the sole justification for either obtaining relief from the frequency response range requirements of OM-6, or obtaining approval of an alternative from the requirements.

Basis for Recommendation

By using units of velocity rather than displacement in measuring vibration in pumps that operate above 600 revolutions per minute (rpm), the licensee could more rapidly detect wear in the anti-friction bearing and other types of pump degradation and thus could effect repairs in a more timely manner.

Pump bearing degradation results in increased vibration at frequencies 5 to 100 times the rotational speed of the pump. These high-frequency bearing vibrations may not significantly increase the measured displacement of pump vibration and could go undetected. However, the high frequency vibration would significantly increase the measured velocity of pump vibration which could indicate the need for corrective action before the bearing fails. Because pump bearings vibrate at high frequencies, the measured vibration velocity indicates the mechanical condition of the pumps and reveals pump bearing degradation much more accurately than does measured vibration displacement.

Advantages of measuring vibration velocity in lieu of displacement for monitoring mechanical condition of pumps, with the exception of low-speed pumps, are widely acknowledged in the industry. Many nuclear licensees measure pump vibration velocity to detect pump degradation and obtain advanced warning of incipient pump bearing failure. Upon obtaining this advanced warning, the licensee can plan and prepare for maintenance during scheduled outages instead of suffering losses resulting from unplanned outages to repair failed critical equipment.

OM-6 includes a set of allowable ranges for inservice pump vibration velocity and for measured pump vibration displacement. These ranges are based on an evaluation of empirical data and various acceptance criteria for pump vibration velocity established by U.S. industries, academia, international industry, and foreign agencies. The OM-6 working group considered the data and proposed the ranges of OM-6. The ASME Code, Winter 1988 Addenda to the 1986 edition, and the 1989 edition, reference OM-6 in its entirety. Effective September 9, 1992, the NRC approved OM-6 in 10 CFR 50.55a(b).

The OM committee changed the frequency response range requirements from one-half to

one-third of the minimum pump shaft rotational speed in order to encompass all noise contributors that could indicate degradation. Instruments with a frequency response range which meets these requirements for slow-speed pumps may be commercially available but not widely used. The unavailability of instruments, alone, is not adequate justification for obtaining relief or approval of an alternative, but may be a major element of the justification. Additionally, frequencies less than running speed may not be indicative of problems for certain types of bearings; however, subharmonic frequencies may be indicative of rotor rub, seal rub. loose seals, and coupling damage. The type of bearings and the other subharmonic concerns would typically be discussed in the justification for relief.

Section XI, prior to the 1988 Addenda, required that vibration be 'read' in peak-to-peak. This could be interpreted to mean that it is acceptable to measure root-mean-square (rms), convert it to peak-to-peak, and read it as peak-to-peak. OM-6 removed this ambiquity and requires vibration to be measured in peak or peak-to-peak. Newer digital equipment now measures directly in peak. The NRC mandated ten-year update of the ISI and IST programs reflects the need for licensees to incorporate new technologies which have been incorporated into the codes and standards. However, there is continuing debate with the OM Committee on whether the use of rms measurements is acceptable for determining the operational readiness of pumps. The OM Committee recently responsed to an inquiry (File OMI 94-2) which explains that the intent of the OM Code (and OM-6) is to allow vibration to be measured in rms and mathematically converted to peak readings. Readers are cautioned that the code vibration acceptance criteria are in peak or peak-to-peak units and that the use of rms, without a mathematical conversion, is not acceptable. To comply with the requirements, licensees that use rms values for recording data must adjust the limits of OM-6, or convert the data to peak values.

Several plants have requested an alternative to the acceptance criteria of OM-6 for smooth-running pumps, and the NRC has approved such requests. However, licensees with such approval must continue to assess the vibration data and monitor increases that may be indicative of a change. Recently, at the Catawba plant, a pump with very low vibration experienced an increase in vibration levels over three successive tests, though levels were below the criteria for smooth-running pumps. Upon investigating the cause of the increase, the licensee determined that the bearing had degraded and required replacement. The O&M Committee is assessing whether changes to the OM Code to address acceptance criteria for smooth-running pumps are warranted.

5.5 Pump Flow Rate and Differential Pressure Instruments

The NRC received relief requests to continue using instruments that do not meet either the range or accuracy requirements of the Code. The Code requires each analog instrument to have a full-scale range 3 times the reference value or less, and each digital instrument to be such that the reference values do not exceed 70 percent of the calibrated range of the instrument. OM-10 requires an accuracy of ± 2 percent of full-scale for analog instruments, ± 2 percent of total loop accuracy for a combination of instruments, or ± 2 percent of reading over the calibrated range for digital instruments.

5.5.1 Range and Accuracy of Analog Instruments

NRC Recommendation

When the range of a permanently installed analog instrument is greater than 3 times the reference value but the accuracy of the instrument is more conservative than the Code, the staff will grant relief when the combination of the range and accuracy yields a reading at least equivalent to the reading achieved from instruments that meet the Code requirements (i.e., up to ± 6 percent). The use of a test gauge in lieu of a permanent instrument is acceptable if the reading is at least equivalent to the Code. When using temporary instruments, the staff recommends that the licensee include in the IST records an instrument number for tracing each instrument and a calibration data sheet for verifying that the instruments are accurately calibrated. The licensee need not obtain relief if the temporary instruments meet the range and accuracy requirements of the Code. If relief is requested, the licensee would typically describe the effect on each group of applicable pumps and would typically discuss adjustment of acceptance limits to account for the inaccuracies.

Basis for Recommendation

Because the IST requirements originally specified an instrument range of 4 times the reference values or less, the permanent instruments in many early licensed plants do not meet the current requirements of the Code for an instrument range of 3 times the reference values or less. The NRC does not generally consider installation or replacement of instruments an undue burden, and compliance with the instrument requirements in later editions of the Code is not a backfit (see response to Question Group 105 in Appendix A). However, the use of any available instruments that meet the intent of the Code requirements for the actual reading would yield an acceptable level of quality and safety for testing.

This position applies to the early licensed plants but not for the purchase of replacement instruments that can be procured to meet the current requirements of the Code. In Interpretation XI-1-89-55, for Section XI, the ASME Code committee stated that Section XI, IWP-4110, does not allow the acceptable instrument accuracy (Table IWP-4110-1) to be based on the maximum full-scale range allowed; therefore, for new installation of instruments, the accuracy and range requirements must be met (though, like-for-like instrumentation for existing installations is not prohibited).

When the licensee submits a relief request, each group of affected pumps could be addressed separately if the instruments are permanently installed. A general relief request may be acceptable for temporary instrumentation. However, the NRC may not approve relief if the readings will not be equivalent to the Code requirements unless the licensee can demonstrate that the variance is not sufficient for the degradation to be overlooked or replacing the instrument is excessively burdensome without a compensating increase in the level of quality and safety. If the instruments do not meet the intent of the Code requirements, the NRC may require the licensee to adjust acceptance limits to account for the inaccuracies, or the instruments may need to be replaced.

5.5.2 Range and Accuracy of Digital Instruments

NRC Recommendation

Subsection IWP of Section XI does not include requirements for digital instruments used to monitor the flow rate and differential pressure of pumps. Thus, it is recommended that the requirements in OM-6 for digital instruments apply when using such instruments for IST. If the requirements cannot be met, relief could be requested. OM-6 requires digital instruments to be accurate within ± 2 percent over the calibrated range, which could also be stated as ± 2 percent of reading. The Code requires that licensee shall select digital instruments such that the reference value does not exceed 70 percent of the calibrated range of the instrument. However, if the requirements in OM-6 are met, the licensee need not request relief from IWP because the requirements of OM-6 for digital instruments result in greater accuracy than the requirements in IWP.

Basis for Recommendation

The accuracy of digital instruments is generally based on a percentage of the reading displayed. The ranges of most digital instruments can be varied, and thus differ from the ranges for analog instruments. The OM committee recognized these differences, as indicated in the requirements of OM-6. OM-6 states the requirements for digital instrumentation. The licensees have posed questions about the definition of a digital instrument. For instance, if an analog instrument supplies data to a digital display, the instrument would be considered digital, though the Code committee could provide a more detailed definition.

5.5.3 Use of Tank or Bay Level to Calculate Differential Pressure

The NRC has received relief requests to use a tank or bay level to calculate differential pressure when inlet pressure or differential pressure direct measurement is not available.

NRC Recommendation

When inlet pressure gauges are not installed in the inlet of a vertical line shaft pump, it is impractical to directly measure inlet pressure for use in determining differential pressure for the pump. The staff has determined that, if the licensee uses a bay level to calculate the suction (inlet) pressure as described in IWP-4240 or paragraph 4.6.2.2 of OM-6, the calculation must be included in the implementing procedure. The licensee must verify that the reading scale for measuring the level and the calculational method yield an accuracy within ± 2 percent. If direct measurements are impractical for other types of pumps with suction from a tank, the licensee must apply similar controls. The Code allows the licensee to determine differential pressure by obtaining the information from a differential pressure gauge or differential pressure transmitter, or by determining the difference between the pressure at a point in the inlet pipe and the pressure at a point in the discharge pipe (IWP-4240 and paragraph 4.6.2.2 of OM-6). Therefore, the licensee may implement a calculational method without obtaining relief because the ASME Code allows for the determination of differential pressure from the discharge pressure and the pressure in the pump inlet. To implement this guidance, the method of determining the inlet pressure using a calculational method must meet quality assurance requirements and be included in a procedure.

Basis for Recommendation

The method is in accordance with a determination of differential pressure allowed by the Code. Though the inlet pressure is not directly measured, it is "measured" for the purpose of determining the pressure at a point in the inlet. By including the calculation in implementing procedures, the licensee can determine the differential pressure in a manner that is consistent and repeatable from test to test. This method will yield the information needed for monitoring the hydraulic condition of the applicable pumps without the need to install suction (inlet) pressure gauges which may not be practical, depending on the design limitations in the inlet of the pump.

5.5.4 Accuracy of the Flow Rate Instrument Loop

As clarified in interpretations to OM-6 and Subsection IWP of Section XI, the accuracy requirements of analog instruments measuring process flow apply only to the calibration of the instruments. In determining accuracy, the licensee is not specifically required to consider attributes such as orifice plate tolerances, tap locations, and process temperatures. However, factors associated with these attributes which could affect the measurements include the effects of wear, the effects of accumulation of dirt or grease on an annubar flow coefficient, and the reversed installation of a one-direction orifice plate.

NRC Recommendation

The Code requirements for accuracy ensure that the instrument loop accuracy is adequate for monitoring pumps for degrading conditions. The accuracy for analog instruments specified in Section XI IWP and OM-6 applies only to the calibration of the instruments. The staff recommends that, when test results indicate that conditions in the pump or the test circuit have changed, licensees consider corrective action for other attributes that could affect the overall loop accuracy of the measurements.

Basis for Recommendation

In Inquiries IN 91-3 (paragraph 4.6.1.1 of OM-6) and IN 91-037 (Table IWP-4110-1 of Section XI), the Code committees stated that the requirements for the final indication of flow rate on an analog instrument to be within 2 percent of full scale of actual process flow rate applies only to the calibration of the instrument and does not take into account attributes such as orifice plate tolerances, tap locations, and process temperature.

5.6 Operability Limits of Pumps

Although IWP-3210 discusses the expansion of the ranges for pump acceptance criteria, OM-6 does not include such a provision. The OM-6 Working Group stated that it could not endorse the IWP philosophy in letting the owner specify any acceptance criteria deemed appropriate when the limits of the applicable table could not be met. OM-6 requires the acceptance criteria to be met. There are provisions for the Owner to review the test results and, if justified, establish new reference values (see paragraph 4.5 of OM-6). Operability limits of pumps must always meet, or be consistent with, licensing basis assumptions in a plant's safety analysis. Reference GL 91-18 for NRC inspection guidance on operabilitly of components (also see Section 7 of this document).

NRC Recommendation

The staff has determined that licensees with programs established to comply with Subsection IWP may continue to follow IWP-3210 as allowed until the program is updated with the values and acceptance criteria from

the later edition, or portions thereof. When Subsection IWP-3210 is used, the Code requires that the expanded ranges be documented in the record of tests, also stating the basis for finding that the pump performance does not demonstrate degrading conditions. Licensees must obtain relief if expanded ranges are needed for plants using OM-6. The request for relief must include the licensee's basis for the expanded ranges and the basis for finding that the pump performance does not demonstrate degrading conditions. The basis for acceptable pump performance, in either case, would pertain to the pump and not the system, though pump performance must meet system requirements to remain in an analyzed condition.

Basis for Recommendation

In Section XI Interpretation XI-1-79-19, the Code committee clarified the intent of the allowance in IWP-3210 by stating that IWP-3210 refers to Table IWP-3100-2 which specifies three ranges: Acceptable Range, Alert Range, and Required Action Range. The limits within each of these ranges refer to the pump and not to the system, that is, the ranges are for the pump test data. If these ranges cannot be met, the Owner can, for example, specify new range limits for differential pressure from a range of 0.93 — 1.02 to a range of 0.89 — 1.03. Using the less conservative ranges, the Code requires the owner to show that the overall pump performance has not degraded from its intended function. Establishing limits that are more conservative than the Code limits may be necessary to ensure that design limits are met.

5.7 Use of OM-6 Table 3b Ranges for Hydraulic Parameters

OM-6 contains new limits for test parameters and no longer includes the upper limits for the "alert range." The OM committee also increased the "required action range" to 1.10 times the reference value.

NRC Recommendation

The staff has assessed the use of the new limits and determined that an acceptable level of quality and safety is maintained with these new limits, and the new limits are acceptable pursuant to 10 CFR 50.55a (f)(4)(iv) using the ranges of Table 3b in OM-6 for the IST of pumps, or groups of pumps, in an IST program. The requirements of Paragraph 6.0, "Analyses and Evaluation," are considered related requirements. OM-6 and the requirements for monitoring vibration in accordance with OM-6 (see Section 5.4) are recommended to be used with the implementation of expanded ranges, though are not imposed. The use of this guidance must be documented in the IST program.

Also note that OM-6, Table 6100-1 has a tighter acceptance band for vertical line shaft pumps. Refer to Section 5.9.

Basis for Recommendation

The OM committee eliminated the high "alert" limits and increased the high "required action" limits because hydraulic performance of pumps does not improve. The required action upper limits ensure that problems with instruments will not be overlooked. According to J. Zudan's paper published in NUREG/CP-0111, the centrifugal pump hydraulic acceptance criteria was relaxed in OM-6 because the vibration requirements specified in OM-6 give

a better indication of mechanical condition of the pumps. Therefore, the increased limits for hydraulic condition are recommended to be used in concert with the improved monitoring of the mechanical condition, though the vibration monitoring is not imposed as a specific related requirement. The expanded limits are considered acceptable for assessing degradation; however, it is not acceptable to establish limits that allow degradation below the limits assumed in the safety analyses for the function of the pumps.

5.8 Duration of Tests

IWP-3500, "Duration of Tests," requires that, before measuring specified parameters, the licensee run each pump for at least 5 minutes under conditions as stable as the system permits. Paragraph 5.6, "Duration of Tests," of OM-6 requires only 2 minutes of run time with stable pump conditions before obtaining test data.

NRC Recommendation

The staff has determined that the licensee may follow the requirements of Paragraph 5.6 OM-6 for the duration of tests if it determines the shorter duration represents stable operation pursuant to 10 CFR 50.55a (f)(4)(iv). If a licensee elects to use this guidance, the use must be documented in the IST program. No related requirements apply. The NRC recommends not operating a pump on minimum recirculation (see NRC Bulletin 88-04, "Potential Safety-Related Pump Loss," and Position 9, "Pump Testing Using Minimum-Flow Return Line With or Without Flow Measuring Devices," of GL 89-04).

Basis for Recommendation

The OM committee stated that a 2-minute run time is adequate after the pump operation becomes stable. The staff agrees, particularly for pumps tested using a minimum flow recirculation line.

5.9 Vertical Line Shaft Pumps

The OM Task Group on Pumps has recently proposed to define "vertical line shaft pumps" as "a vertically suspended pump, where the pump driver and pumping element are connected by a line shaft within an enclosing column which contains the pump bearings, making pump bearing vibration measurements impracticable." OM-6, Table 6100-1, has tighter acceptance criteria for such pumps (0.93 versus 0.90). NUREG/CP-0111 includes a basis for this change, stating that the "low" alert range for flow rate measurements of vertical line shaft pumps and positive displacement pumps was changed from (0.90 to 0.94)Q_r to (0.93 to 0.95)Q_r, respectively, based on the fact that "inherent deficiencies in vibration testing" such that "degradation will be identified sooner through changes in hydraulic parameters." Further, the "low" required action values for flow rate measurements of vertical line shaft pumps were change from 0.90 Q_r to 0.93 Q_r, and the "low" alert range for differential pressure measurements of vertical line shaft pumps was changed from (0.90 to 0.93)P_r to (0.93 to 0.95)P_r. Additionally, the location specified in paragraph 4.6.4(b) of OM-6 for the vibration measurements is stated as the upper motor bearing housing.

NRC Information Notice 94-45, "Potential Common-Mode Failure Mechanism for Large Vertical Pumps," discuss inadequacies with the vibrtion monitoring of vertical line shaft pumps. An informative paper entitled "Inservice Testing of Vertical Pumps," by Robert E. Cornman, Jr., and Kurt E. Schumann, is included in NUREG/CP-0137, "Proceedings of the Third NRC/ASME Symposium on Valve and Pump Testing."

OM-6, Table 6100-1, has tigher acceptance criteria for flow and differential pressure than were included in earlier editions of Section XI for vertical line shaft pumps (.93 versus .90). This change was explained in J. Zudan's paper in NUREG/CP-0111 which states that the "low" alert range for flow rate measurements of vertical line shaft pumps and positive displacement pumps was changed from (0.90 to 0.94)Q_r to (0.93 to 0.95)Q_r, respectively, based on the fact that "inherent deficiencies in vibration testing" such that "degradation will be identified sooner through changes in hydraulic parameters." Further, the "low" required action values for flow rate measurements of vertical line shaft pumps were change from 0.90 Q_r to 0.93 Q_r, and the "low" alert range for differential pressure measurements of vertical line shaft pumps was changed from (0.90 to 0.93)P_r to (0.93 to 0.95)P_r.

NRC Recommendation

The discussion is for information only with no recommended action.

5.10 Adjustments for Instrument Inaccuracies

Another issue of interest to the NRC and to the industry concerns instrument inaccuracies. For example, technical specifications or the safety analysis report require a pump to produce 1000 gpm at 500 psid (design), but the IST reference values are 1000 gpm (fixed) and 550 psid. The low end of the acceptable range for differential pressure from OM-6 (0.90) would be 495 psid, although conservatively set at 500 psid. If this test is also to prove operability of the pump in addition to meeting IST requirements, and the 2 percent instrument inaccuracies were taken into account for flow and differential, there is the possibility that the pump is putting out less than the required values. In this example, the instrument accuracies would be taken into account if they have not been incorporated when the design numbers were developed.

When pump test procedures are developed, limits in the safety analysis cannot be ignored. The requirements for inservice testing are written generally. If specific plant limits are more conservative, to ensure compliance with design basis assumptions, such limits must be clearly indicated as the "operability" limits and used for acceptance criteria of IST as well. For example, see Section 5.2, item (5) of the elements listed for using pump curves. When obtaining values using instrumentation that meets the accuracy requirements specified for the purpose of data, such as for IST, the value as read would be used. If a licensee is attempting to perform a critical test, more accurate instrumentation may be necessary; however, the value recorded would be the value read if the accuracy of the instrumentation met the specified accuracy. Only when instruments are used that cannot meet the specified accuracy for a test would an adjustment be necessary to meet the Code. Design analyses most likely do not account for instrument accuracy readings; however, when the pump selection is made, the designer generally selects from a catalog of available sizes and chooses one with margin above the analyses numbers. The "comprehensive pump testing" approach recently approved for incorporation into the OM Code specifies an instrument accuracy of 0.5 percent for differential pressure, but continues to specify 2 percent for flow rate instruments.

6 REVISED STANDARD TECHNICAL SPECIFICATIONS

6.1 Introduction

Section 4 of the technical specifications (TS) for many licensed operating power reactors includes a general surveillance requirement for the inservice testing of pumps and valves. Several licensees have requested revisions to technical specifications to remove unique surveillance requirements for pumps and valves and to add the general surveillance requirement for IST. TS 4.0.5 states, in part, the following:

> 4.0.5 Surveillance Requirements for inservice inspection and testing of ASME [American Society of Mechanical Engineers] Code Class 1, 2, and 3 components shall be applicable as follows:
>
> a. Inservice inspection of ASME Code Class 1, 2, and 3 components and inservice testing of ASME Code Class 1, 2, and 3 pumps and valves shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50, Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50, Section 50.55a(g)(6)(i).
>
> NOTE: Effective September 8, 1992, the requirements for inservice testing were moved from paragraph (g) to paragraph (f) in Section 50.55a of Title 10 of the Code of Federal Regulations (10 CFR 50.55a).

The requirements of TS 4.0.5 prohibit licensees from implementing alternative testing methods described in IST program relief requests before receiving U.S. Nuclear Regulatory Commission (NRC) approval.

The Bases section of Technical Specification 4.0.5 states, in part, the following:

> This specification ensures that inservice inspection of ASME Code Class 1, 2, and 3 components and inservice testing of ASME Code Class 1, 2, and 3 pumps and valves will be performed in accordance with a periodically updated version of Section XI of the ASME Boiler and Pressure Vessel Code and Addenda as required by 10 CFR 50.55a. Relief from any of the above requirements has been provided in writing by the Commission and is not a part of these Technical Specifications.

6.2 History

The industry's codes and standards approved for use by the Commission are as stated in 10 CFR 50.55a. Before March 15, 1976, the regulations contained no requirements for IST of pumps and valves. The ASME Boiler and Pressure Vessel Code (the Code) first included Subsections IWP and IWV to Section XI in the Summer 1973 Addenda. The rules effective March 15, 1976 (41 Federal Register 6256, published February 12, 1976), required that an operating license

for a utilization facility be subject to the conditions specified in 10 CFR 50.55a(g), which included new requirements for the IST of pumps and valves. The regulations provided for alternatives to the requirements if compliance would result in hardship without a compensating increase in the level of quality and safety, or if the proposed alternatives would give an acceptable level of quality and safety. The regulations also provided for relief from Code requirements if a licensee determined that conformance was impractical for its facility. The regulations continue to include these provisions.

After publishing the rules that took effect March 15, 1976, the NRC issued letters to licensees informing them of the rule change and recommending that they propose technical specification changes with the following standard statement:

> Inservice testing of ASME Code Class 1, Class 2, and Class 3 pumps and valves shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the NRC pursuant to 10 CFR 50, Section 50.55a(g)(6)(i).

In letters of November 1976, the NRC further discussed the regulation, which required updates of the inservice inspection programs at 40-month intervals and the IST programs at 20-month intervals. The NRC suggested that licensees submit requests for relief from ASME Code requirements as far in advance as possible of the start of any 20-month period for testing pumps and valves but at least 90 days before that period. The NRC stressed the need to incorporate 10 CFR 50.55a(g) by reference in technical specifications (1) to avoid duplication of requirements, (2) to alleviate the need for technical specification changes whenever a testing program is updated, and (3) to simplify the process for obtaining relief from impractical ASME Code requirements.

The NRC discussed relief requests as follows in the letters to licensees:

> Generally, the licensee will know well in advance of the beginning of any inspection period, whether or not a particular ASME Code requirement will be impractical for his facility. Thus, the licensee should request relief from ASME Code requirements as far as possible in advance of, but not less than 90 days before, the start of the inspection period. Early submittals are particularly important for the first 40-month inservice and 20-month pump and valve testing period [NOTE: This [testing period] was later changed to 120-month intervals for both inservice inspection and IST.] because they will enable the NRC staff to evaluate the information received from all licensees and determine which ASME Code requirements may be generally impractical for various classes of plants. Early submittals will thereby facilitate earlier feedback to licensees regarding the acceptability of their requests.
>
> The NRC Staff recognizes that it will not be possible in all cases for a licensee to determine in advance

that any particular ASME Code requirement will be impractical for his facility. In cases where, during the process of inservice testing, certain requirements are found to be impractical due to unforeseen circumstances, the licensee may request relief at that time. These occurrences are not expected to be many and are expected to result in only minor changes to an inservice testing program.

All relief from ASME Code requirements that are determined to be impractical for a facility will be granted in the form of a letter within the provisions of §50.55a(g)(6)(i). This written relief should be incorporated into the document describing the inservice inspection and testing program retained by the licensee. . . the written relief itself will not become an explicit part of the facility license . . .

The NRC approved a change to TS 4.0.5 to simply refer to the regulations. The administrative section of the revised standard technical specifications includes the following requirements for IST program:

5.7.2.12 Inservice Testing Program

This program provides controls for inservice testing of ASME Code Class 1, 2, and 3 components including applicable supports. The program shall include the following:

a. Provisions that inservice testing of ASME Code Class 1, 2, and 3 pumps, valves, and snubbers shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a;

b. Testing frequencies specified in Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as follows:

ASME Code and applicable Addenda terminology for inservice testing activities	Required Frequencies for performing in-service testing activities
Weekly	At least once per 7 days
Monthly	At least once per 31 days
Quarterly or every 3 months	At least once per 92 days
Semiannually or every 6 months	At least once per 184 days
Every 9 months	At least once per 276 days
Yearly or annually	At least once per 366 days
Biennially or every 2 years	At least once per 731 days

c. The provisions of SR [surveillance requirement] 3.0.2 are applicable to the above required Frequencies for performing inservice testing activities;

d. The provisions of SR 3.0.3 are applicable to inservice testing activities; and

e. Nothing in the ASME Boiler and Pressure Vessel Code shall be construed to supersede the requirements of any TS.

NOTE: The 25% extension allowed in TS 3.0.2 facilitates surveillance scheduling and considers plant operating conditions that may not be suitable for conducting the surveillance (e.g., transient conditions or other ongoing surveillance or maintenance activities). According to the bases for TS 3.0.2 in the revised standard technical specifications, the 25% extension is not

intended to be used repeatedly merely as an operational convenience to extend surveillance intervals beyond those specified. GL 87-09 and GL 89-14 recommended TS changes related to the extension for technical specifications which have not been updated to the revised standard technical specifications.

6.3 Discussion

In the 1976 letters to licensees, the NRC staff recognized that situations would arise which would put the licensee in a condition that is not in strict compliance with the TS 4.0.5 requirement to comply with ASME Section XI "except where specific written relief has been granted." Therefore, if TS 4.0.5 was interpreted literally, it results in a period of noncompliance for situations where a test cannot be performed in accord with the code requirements due to impractical conditions. For example, the TS could be interpreted to require a shutdown because a pump or valve that would otherwise require IST and that was the subject of a relief request must be considered inoperable until the NRC grants relief from the requirements of ASME Section XI. However, the operability of the equipment should be assessed according to the guidance in GL 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability." Depending on the results of the operability determination, the conflict could result in the licensee exceeding a limiting condition for operation when the component can meet its functional requirements.

The revised standard technical specifications reflect the position that the licensee must establish and implement the program in accord with 10 CFR 50.55a. For preparing an updated IST program, the regulations allow a licensee up to 12 months after the beginning of the updated interval to obtain NRC approval of those new Code requirements which cannot be met and to request relief. The licensee has the burden to demonstrate the impracticality of meeting the code requirements. The regulations state that the impracticality of the code requirements be demonstrated to the satisfaction of the Commission no later than 12 months from the interval start date. If during the interval, a licensee finds an impractical requirement, the licensee must submit a relief requestafter finding the need for relief. To comply with the regulations, the licensee must obtain NRC approval pursuant to 10 CFR 50.55a(f)(6)(i) before eliminating the test from the IST program.

NRC Recommendation

The staff recommends that licensees revise their TS to incorporate the revised standard technical specifications for IST programs. With the revised standard technical specifications incorporated into its TS, upon finding a Code requirement impractical because of limitations in the design (including prohibitive dose rates), construction, or system configuration, the licensee would prepare the determination describing the impractical conditions and the applicable code requirements that cannot be met. The licensee follows the requirements in 10 CFR 50.55a(f)(5)(iii) and (f)(5)(iv) if within the initial interval or if within the first 12 months of a new interval. If an impractical requirement is identified during subsequent intervals and not within the first 12 months, the licensee must meet the requirements of 10 CFR 50.55a(f)(5)(iii) and notify the Commission and submit the

information supporting the determination of impracticality, and obtain NRC's approval pursuant to (f)(6)(i), prior to the time that the next test or inspection is required. Licensees should follow the guidance in GL 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," November 7, 1991, for determining actions to assess the operability of equipment when an ASME Code noncompliance is identified. The licensee should indicate in the submittal of the impracticality determination the date by when NRC approval is needed to ensure compliance with the regulations.

For 120-month updated programs, it is recommended that relief requests be submitted prior to the interval start date to allow a period for NRC review 12 months after the interval start date (i.e., submit the updated program 3 to 6 months prior to the start date, or earlier).

Upon determining an impractical requirement, the licensee may follow the requirements of 10 CFR 50.55a(f)(5)(iii). Note that the specification does not allow the licensee to implement alternative testing under paragraphs 50.55a (a)(3)(i) and (ii) until authorized by the Director of the Office of Nuclear Reactor Regulation. The technical specification change will ensure that there is no inconsistency for the 12 months following the beginning of a new interval.

Basis for Recommendation

When a Code requirement is practical but an alternate method is requested pursuant to 10 CFR 50.55a(a)(3), approval from the NRC is required before implementing the alternative method of testing (1) proposed to achieve levels of quality and safety equivalent to those of the Code method or (2) proposed to avoid an undue hardship without yielding a compensating increase in the level of quality and safety.

7 IDENTIFICATION OF CODE NONCOMPLIANCE

7.1 Nonconforming Conditions

Generic Letter 91-18 gives guidance on the resolution of degraded and nonconforming conditions. The licensee would follow the guidance in GL 91-18 after finding a degraded or nonconforming condition such as finding a component that should be in the IST program. As related to IST, GL 91-18 defines a "code noncompliance" as either a missed surveillance test or the identification of a component that must be added to the IST program, and either of these represent a nonconforming condition. That is, the "qualification" of the system, subsystem, or component (SSC) is being called into question. A nonconforming condition that deals with the qualification of a component must be dealt with at a level of quality and safety commensurate with the safety function of the component. To resolve the qualification issue, the licensee may prepare a "justification for continued operation," while corrective action is being taken. Corrective action may include processing a request for exigent code relief or preparing a cold shutdown or refueling outage justification.

The "operability" of the component is a separate issue. If a licensee determines that, because of a nonconforming condition, a component is inoperable, the requirements of technical specification limiting conditions for operation must be met. At that time, a licensee may determine that testing is not in the best interest of safety and seek enforcement discretion from the NRC.

7.2 Design Bases Reviews

To continue to follow the GL 91-18 guidance for nonconforming conditions while in the process of performing a design bases review, the licensee may write a "justification for continued operation" for the design bases review that would describe: (1) the process for performing the programmatic review, (2) the actions to be taken when a component or test that was not previously in the IST program is identified, (3) the schedule for performing the testing once the need has been identified. This design bases review process description/ justification for continued operability would not be applicable to nonconformances identified outside such a process. An example of a letter prepared by a licensee for such a review is given in Appendix F; however, while the example was written at the completion of the IST program scope review and gives the schedule for performing the testing, it is recommended that the document be developed prior to or at the beginning of the review.

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APPENDIX A

POSITIONS, QUESTIONS, RESPONSES, AND CURRENT CONSIDERATIONS REGARDING GENERIC LETTER 89-04

Staff Positions In Generic Letter 89-04

1 Full Flow Testing of Check Valves

2 Alternative to Full Flow Testing of Check Valves

3 Back Flow Testing of Check Valves

4 Pressure Isolation Valves

5 Limiting Values of Full-Stroke Times for Power-Operated Valves

6 Stroke Time Measurements for Rapid-Acting Valves

7 Testing Individual Scram Valves for Control Rods in Boiling Water Reactors

8 Starting Points for Time Periods in Technical Specification Action Statements

9 Pump Testing Using Minimum-Flow Return Lines With or Without Flow Measuring Devices

10 Testing Containment Isolation Valves

11 Scope of Inservice Testing Programs

NRC STAFF POSITION 1, "FULL FLOW TESTING OF CHECK VALVES"

Section XI of the ASME Code requires check valves to be exercised to the positions in which they perform their safety functions. A check valve's full-stroke to the open position may be verified by passing the maximum required accident condition flow through the valve. This is considered by the staff as an acceptable full-stroke. Any flow rate less than this will be considered a partial-stroke exercise. A valid full-stroke exercise by flow requires that the flow through the valve be known. Knowledge of only the total flow through multiple parallel lines does not provide verification of flow rates through the individual valves and is not a valid full-stroke exercise.

Full flow testing of a check valve as described above may be impractical to perform for certain valves. It may be possible to qualify other techniques to confirm that the valve is exercised to the position required to perform its safety function. To substantiate the acceptability of any alternative technique for meeting the ASME Code requirements, licensees must as a minimum address and document the following items in the IST program:

(1) The impracticality of performing a full flow test,

(2) A description of the alternative technique used and a summary of the procedures being followed,

(3) A description of the method and results of the program to qualify the alternative technique for meeting the ASME Code,

(4) A description of the instrumentation used and the maintenance and calibration of the instrumentation,

(5) A description of the basis used to verify that the baseline data has been generated when the valve is known to be in good working order, such as recent inspection and maintenance of the valve internal [components], and

(6) A description of the basis for the acceptance criteria for the alternative testing and a description of corrective actions to be taken if the acceptance criteria are not met.

An acceptable alternative to this full-stroke exercising requirement is stated in position 2 below.

Questions and Answers for Position 1

Question Group 1

Questions

Item 1 of Attachment 1 to the generic letter requests that flow through a check valve be known for a valid full-stroke exercise test. Does this mean a direct flow indication and a recorded flow rate is [sic] the only acceptable method for the test? For example, BWR minimum flow lines are not instrumented with flow indicators.

Is direct flow rate instrumentation required for verification of full-stroke capability for all check valves? For example, the diesel cooling water check valves?

Verifying full flow through small check valves in auxiliary systems or gas systems is typically impractical. As an alternate, will the NRC accept a qualitative evaluation of system response or performance in the place of flow measurements?

For check valves where design accident flow is not specified, what guidance can you give for full-flow testing?

Response

Any quantitative measure that has acceptance criteria that demonstrate the required flow through the check valve may be used to satisfy the full-stroke requirement. An indirect measure of flow may be acceptable. For example, a change in tank level over a specified period could be used. In another case, the acceptance criterion could be based on a change in flow rate of an instrumented line when flow is admitted from a non-instrumented line containing the check valve being tested. In any event, some form of quantitative criteria should be established to demonstrate full-stroke capability.

Question Group 2

Questions

Why isn't knowledge of total flow through multiple parallel lines acceptable, when the total flow through each path was known when it was established?

Regarding full flow testing of check valves, why is knowledge of total flow through parallel flow lines unacceptable? This seems to challenge conservative Technical Specification requirements for flow balancing.

Response

The objective of inservice testing is to evaluate and investigate the possibility of degradation of components and to take corrective action before the components fail. Verification of total header flow rate might not identify a problem, developing or occurring, with an individual check valve in one of the parallel flow paths. With respect to the balancing of flow, the Technical Specification requirement is based on the flow from one loop being lost through a break. Consequently, that flow path is restricted or throttled to minimize significant diversion of flow. The Technical Specification requirement was not intended to verify individual check valve operability. The licensee is expected to justify the use of a test method that does not verify full stroke of individual check valves.

Current Considerations

In a safety evaluation of January 24, 1992 (Docket 50-334), the NRC informed the Duquesne Light Company of the results of an evaluation of flow through parallel lines and stated a flow test through parallel lines without individual flow measurement may not be sufficient to indicate that the check valves in the lines are full-stroke exercised. (See Section 4.1.2).

Question Group 3

Questions

Can check valves with external operators and position indicators be tested only with these devices and never exercised with flow or disassembled?

Is it the intent of the NRC to require full-stroke flow testing of all check valves or is it acceptable to perform manual exercising and

partial stroke testing of check valves as permitted by IWV-3522(b)?

Position 1 implies that the only method acceptable to the NRC for full stroke exercising is a full flow test. No mention is made of check valves with external features which can be used for full stroke exercising. Do the 6 criteria presented have to be addressed in the IST program to justify using an external operator?

Response

The ASME Code in IWV-3522(b) allows full stroke testing of check valves either with flow or with a mechanical exerciser. Full flow testing is preferable where practical, but Position 1 of Generic Letter 89-04 was not intended to imply that the ASME Code provisions for mechanical exercising were not acceptable. Such mechanical exercising is clearly acceptable and is certainly preferable to valve disassembly as a means of ensuring valve operability. If an external operator is used to exercise a check valve, the provisions of IWV-3522(b) must be met, but the six criteria in Position 1 of the generic letter need not be addressed.

Current Considerations

Paragraph 4.3.2.4(b) of OM-10 addresses the use of mechanical exercisers for check valves. (See Section 4.1).

Question Group 4

Questions

What is considered the maximum required accident condition flow?

In reference to Items 1 and 2 of Attachment 1, please clarify the term "maximum required accident condition flow."

Response

The phrase "maximum required accident condition flow" is intended to mean at least the largest flow rate for which credit is taken in a safety analysis for this component in any flow configuration. The safety analyses are those contained in the plant's final safety analysis report (FSAR), or equivalent, but are not limited to the accident and transient analyses.

Question Group 5

Question

Is it the intent of the stated position of Attachment 1 that a satisfactory test of a valve in the open direction requires only measurement of full accident flow through the valve and not the measurement of differential pressure (with associated acceptance criteria) as per IWV-3522(b)?

Response

The ASME Code does not require the measurement of valve differential pressure when exercising check valves with flow. It should be recognized, however, that such a measurement might provide useful information for evaluating the condition of the valve.

Current Considerations

Certain test methods for verifying the full-stroke of check valves necessarily involve measurement of both the flow and

differential pressure across a valve. (See Section 4.1).

Question Group 6

Question

For check valves which are never required to open fully (i.e., thermal expansion or siphon breakers), verification of design (safety) function is the testing required for forward flow. Is this correct?

Response

In addition to verifying its safety function performance, quantifiable acceptance criteria should be developed for the testing of these components. For example, a pressure decay test with specified acceptance criteria would be considered a reasonable test.

Current Considerations

Verifying that the system is full is also an acceptable means for verifying that the keep-fill check valves are capable of opening to provide flow when necessary. (See Section 4.1.1).

Question Group 7

Questions

In reference to Item 1 of Attachment 1, for non-parallel full flow test, does the flow obtained need to be documented quantitatively, or can it be qualitative (i.e., greater than _____ gallons per minute)?

What is an acceptable flow condition when, for example, the safety analysis requires 250 gallons per minute (gpm) flow but 600 gpm can be delivered? Would passing greater than, or equal to, 250 gpm be a valid full flow test, or would 600 gpm need to be delivered?

Response

The full flow test is intended to demonstrate that the necessary flow rate can be achieved and to detect any degradation of the check valve. Therefore, acceptance criteria for the test should involve more than the achievement of flow above a minimum rate. The acceptance criteria should also include the allowable variation of test results. To enable that test results to be compared, the initial parameters for the test should be standardized to the maximum extent feasible. The acceptance criteria for the full flow test and the bases for those criteria should be documented and available for review by NRC inspectors.

Question Group 8

Question

In reference to Item 1.3 of Attachment 1, please clarify what the NRC would expect a "qualification program" to include (i.e., how extensive).

Response

Position 1 of Generic Letter 89-04 indicates that, where full flow testing is impractical, it might be possible to qualify other techniques to confirm that the check valve is exercised to the position required to perform its safety function. One of the stated conditions for this approach is that the licensee should describe the test method and results of the program to qualify the alternate technique for meeting the ASME Code. The language of Position 1 in this regard was chosen to allow the licensees flexibility in qualifying alternatives to full flow testing. In general, the licensee should demonstrate that the alternate test is quantifiable and repeatable. The alternate test should also meet the intent of the ASME Code. This qualification of the

alternate test should be documented by the licensee and available for review by NRC inspectors. The Nuclear Industry Check Valve Group (NIC) is said to be investigating the qualification of various testing techniques, such as ultrasonics and radiography for check valves. The results of those and other industry efforts might be of value to the individual licensee in providing for the use of alternatives to full flow testing.

Current Considerations for Position 1

The guidance established for Position 1 remains valid for inservice testing. However, with the progress made in developing and using nonintrusive testing techniques, the staff recommends that licensees investigate and employ these techniques where practical. The criteria listed in Position 1 could be applied to the nonintrusive techniques. Further guidance and requirements for the use of nonintrusive techniques are being incorporated into the OM codes and standards by the OM-22 Working Group on check valves. (See Section 4.1).

NRC STAFF POSITION 2
ALTERNATIVE TO FULL-FLOW TESTING OF CHECK VALVES

The most common method to full-stroke exercise a check valve open (where disk position is not observable) is to pass the maximum required accident flow through the valve. However, for some check valves, licensees cannot practically establish or verify sufficient flow to full-stroke exercise the valves open. Some examples of such valves are, in PWRs, the containment spray header check valves and combined LPSI [low-pressure safety injection] and safety injection accumulator header check valves and, in BWRs, the HPCI or RCIC check valves in the pump suction from the suppression pool. In most commercial facilities, establishing design accident flow through these valves for testing could result in damage to major plant equipment.

The NRC staff position is that valve disassembly and inspection can be used as a positive means of determining that a valve's disk will full-stroke exercise open or of verifying closure capability, as permitted by IWV-3522. If possible, partial valve stroking quarterly or during cold shutdowns, or after reassembly must be performed.

The staff has established the following positions regarding testing check valves by disassembly:

(a) During valve testing by disassembly, the valve internals should be visually inspected for worn or corroded parts, and the valve disk should be manually exercised.

(b) Due to the scope of this testing, the personnel hazards involved and system operating restrictions, valve disassembly and inspection may be performed during reactor refueling outages. Since this frequency differs from the Code required frequency, this deviation must be specifically noted in the IST program.

(c) Where the licensee determines that it is burdensome to disassemble and inspect all applicable valves each refueling outage, a sample disassembly and inspection plan for groups of identical valves in similar applications may be employed. The NRC guidelines for this plan are explained below:

The sample disassembly and inspection program involves grouping similar valves and testing one valve in each group during each refueling outage. The sampling technique requires that each valve in the group be the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions including valve orientation. Additionally, at each disassembly the licensee must verify that the disassembled valve is capable of full-stroking and that the internals of the valve are structurally sound (no loose or corroded parts). Also, if the disassembly is to verify the full-stroke capability of the valve, the disk should be manually exercised.

A different valve of each group is required to be disassembled, inspected, and manually full-stroke exercised at each successive refueling outage, until

the entire group has been tested. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage. Once this is completed, the sequence of disassembly must be repeated unless extension of the interval can be justified.

Extending the valve sample disassembly and inspection interval from disassembly of one valve in the group every refueling outage or expanding the group size would increase the time between testing of any particular valve in the group. With four valves in a group and an 18-month reactor cycle, each valve would be disassembled and inspected every six years. If the fuel cycle is increased to 24 months, each valve in a four-valve sample group would be disassembled and inspected only once every 8 years.

Extension of the valve disassembly/inspection interval from that allowed by the Code (quarterly or cold shutdown frequency) to longer than once every 6 years is a substantial change which may not be justified by the valve failure rate data for all valve groupings. When disassembly/ inspection data for a valve group show a greater than 25% failure rate, the licensee should determine whether the group size should be decreased or whether more valves from the group should be disassembled during every refueling outage.

Extension of the valve disassembly/inspection interval to one valve every other refueling outage or expansion of the group size above four valves should only be considered in cases of extreme hardship where the extension is supported by actual in-plant data from previous testing. In order to support extension of the valve disassembly/inspection intervals to longer than once every 6 years, licensees should develop the following information:

(a) Disassemble and inspect each valve in the valve grouping and document in detail the condition of each valve and the valve's capability to be full-stroked.

(b) A review of industry experience, for example, as documented in NPRDS, regarding the same type of valve used in similar service.

(c) A review of the installation of each valve addressing the "EPRI Applications Guidelines for Check Valves in Nuclear Power Plants" for problematic locations.

Questions and Answers for Position 2

Question Group 9

Question

Does the Generic Letter Attachment 1, item 2c use of "orientation" refer to physical orientation (e.g., horizontal or vertical) or plant orientation?

Response

Orientation, as used in Generic Letter 89-04, refers to the physical orientation (horizontal or vertical) as well as the physical relationship to major components. For example, a check valve at the discharge of a pump has a different orientation than one at the pump suction.

Question Group 10

Questions

When manually exercising per position 2c, is this done per Code or just a physical stroke checking for binding?

When valves are disassembled and manually exercised in lieu of full-flow testing, is adherence to the quantitative aspects and acceptance criteria of IWV-3522(b) required?

Response

The staff believes the requirement in IWV-3522 (b) of the ASME Code to measure the force or torque while manually exercising check valves only applies to manual exercising from outside the valve where the observation of the valve internals cannot be made. This measurement permits a quantitative evaluation of the performance of the valve in that changes in the measured force or torque may be indicative of degradation of the valve internals. While the valve is in a partially disassembled condition the valve internals should be inspected and the condition of the moving parts evaluated. This inspection and evaluation should include verification by hand that the valve disk is free to move, but measurement of force or torque is not required. Following reassembly, a partial flow test is expected to be performed.

Current Considerations

Paragraphs 4.3.2.4(b) and (c) of OM-10 clearly divide the disassembly and inspection from manual exerciser use. (See OM-10).

Question Group 11

Questions

Does the utility have the option of either inspection through disassembly or performing functional testing to satisfy IST requirements? Can either be used regardless of the previous testing mode?

Response

Disassembly, together with inspection, to verify full stroke capability of check valves is an option only where full stroke exercising cannot practically be performed by flow or by the other positive means allowed by IWV-3522. Additionally, partial stroke exercise testing with flow is expected to be performed after the disassembly and inspection is completed but before returning the valve to service. If the previous test was performed using flow, the licensee is expected to document the justification for any change from that test method. Also, for the case where plant conditions prevent full stroke testing with flow, the licensee should periodically evaluate whether plant conditions have been altered in such a way that full stroke testing using flow is possible. If so, the licensee should revise the test procedures to provide for such testing.

Current Considerations

OM-10 allows for disassembly and inspection as an alternative to tests. (See Paragraph 4.3.2.4(c) of OM-10).

Question Group 12

Question

In light of the stated position of requiring check valve internal inspection at least once every six years, is it permissible to schedule the inspections for the total group of valves on a

six year frequency vs. each refuel outage? This is especially important where plant preparations for inspection of multiple valves are essentially equal to those for a single valve and they represent a considerable cost in terms of monetary outlay as well as schedule and availability impacts.

Response

Position 2 of Generic Letter 89-04 takes advantage of the benefits that can be obtained through sampling techniques. The NRC staff, however, recognizes that the position may have a significant impact on outage time. For example, some plants have combined injection header check valves that are physically located in a position relative to the reactor coolant system (RCS) loops such that their disassembly would require draining the RCS to a level that would necessitate core offload. In order to alter the inspection frequency as suggested by this question, licensees should use the criteria in Position 2 to justify and to document the proposed disassembly schedule. The justification should address the significance of the loss of benefits of sampling in light of the condition, service history, and application of the valves. For additional discussion of this issue, see the response to Question 19.

Question Group 13

Questions

Does disassembly/inspection require certified visual testing personnel, or can detailed inspection procedures be performed by maintenance personnel without certified inspectors?

Do personnel performing the visual inspections addressed on Position 2 have to be VT-3 certified, ANSI 45.2.6 (i.e., Mechanical Inspector) certified, or may engineering personnel competent in check valve technique requirements perform this visual inspection?

Response

The personnel performing the disassembly/inspection must be qualified to evaluate the condition of the valve and to assess its continued operability. The licensee is responsible for the development and implementation of a program to ensure that IST personnel are appropriately trained and qualified for performing the valve disassembly/inspections. Generic Letter 89-04 alone does not impose any requirements for visual testing certifications (such as VT-3) beyond those currently in the ASME Code. Nevertheless, licensees must implement the provisions of ANSI/ASME N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants," according to their commitments based on the implementation section of Regulatory Guide 1.58. The NRC staff encourages those licensees that have not formally committed to following Regulatory Guide 1.58 to review the ANSI standard and regulatory guide for guidance in developing a program for the qualification of inservice testing personnel.

Question Group 14

Question

If a check valve within a sample group is disassembled/inspected in a non-refueling outage, does the next valve need to be inspected at the next refueling outage, or can it still be scheduled for its original refueling outage?

Response

This question is difficult to answer without more detailed information. In general, in order to alter the disassembly/inspection schedule as suggested by the question, the licensee should justify and document the proposed change. The justification should address the effect of the proposed disassembly/ inspection schedule on the sampling program. The justification should rely on the maintenance history and known valve condition from previous inspections rather than subjective qualitative judgement. Position 2 in Generic Letter 89-04 indicates the criteria that need to be addressed.

Current Considerations

If it is practical to disassemble and inspect the selected valves at a frequency not determined by refueling outages, the licensee may establish a schedule for these valves that does not conform to a refueling outage schedule. However, because disassembly and inspection is a maintenance activity and not a "surveillance," entry into an LCO to perform the activity may not be acceptable (See Section 3.1.2).

Question Group 15

Question

Is it the intent of Position 2 of the Generic Letter 89-04 that during valve testing by disassembly, that the valve be completely disassembled and each internal valve part removed, if possible, and 100% of the part visually inspected, or may only the valve bonnet be removed and the valve internals inspected in place without the removal of the internal valve parts unless evidence of discrepant conditions are found which then would require further inspection and probable removal of the part? Note: Inspection of the valve internal parts without removal of the part would be by direct visual inspection, use of mirrors, or by remote inspection equipment such as boroscope fiberoptics.

Response

When performing check valve disassembly and inspection to satisfy the requirements of the ASME Code for inservice testing, disassembly is required only as far as necessary to assess the condition of the valve and to allow manual exercising of the disk. (It must be recognized, however, that the Code requirements for inservice inspection are different from those associated with inservice testing.) If a partial stroke exercise with flow can be performed, this testing is expected to be performed after the disassembly and inspection are completed but before returning the valve to service.

Disassembly and inspection of a check valve is not considered a "test" as implied by the question. Disassembly is not a true substitute for an operability test using flow, but is allowed as an alternative to a flow test where that test is not practical. Disassembly and inspection does, however, provide a valuable means of determining the internal condition of the valve. A recent example of the value of disassembly and inspection involved the identification of broke bolting material in Anchor Darling check valves at two nuclear power plants. This occurrence is discussed in NRC Information Notice 88-85, dated October 14, 1988.

The NRC staff is encouraging the development and use of alternate techniques to evaluate the position of check valve disks. The Electric Power Research Institute (EPRI) and the Institute of Nuclear Power Operations (INPO) are recommending an inspection periodically for check valves that are subjected to potentially harsh service conditions. The NRC staff encourages these activities as well. The industry group NIC is also investigating

methods to demonstrate the operability of check valves.

Current Considerations

Refer to NRC Information Notice 89-62, "Malfunction of Borg-Warner Pressure Seal Bonnet Check Valves Caused by Vertical Misalignment of Disk," for an example of a valve disk installation problem.

Question Group 16

Questions

Even though the check valve flow testing can be performed as required by ASME Section XI, may the valve test be performed by disassembly as permitted by Position 2 in Generic Letter 89-04 when it is considered by the utility that testing by disassembly will provide the same or greater assurance that the valve will function properly? (Note: If possible, partial valve stroking quarterly, or at cold shutdown, or after re-assembly would be performed.) If the answer is yes, (a) can the test frequency, sample, etc., as described in Generic Letter 89-04 Position 2 be used in lieu of ASME Section XI requirement-even if the Section XI test could be performed, i.e., at cold shutdown; (b) must a relief request be processed or may this "test by disassembly" be noted in the valve IST program submittal to the NRC; and (c) must a relief request be processed or may the frequency sample, etc., be noted in the valve IST program submittal to the NRC?

Response

The various methods aimed at evaluating the operability of check valves are not equally acceptable to the NRC staff. At the outset, the ASME Code requires a full stroke exercise using flow (or a mechanical exerciser) to be performed quarterly. Where full stroke exercising cannot be performed quarterly, the Code allows the performance of this test during cold shutdowns. Full stroke exercising during refueling outages may be an acceptable alternative if the test cannot be performed at cold shutdown, but this approach would require submission of a relief request. For those cases where full stroke exercising cannot be performed quarterly, during cold shutdown, or during refueling outages, disassembly and inspection in conformance with Position 2 of Generic letter 89-04 is allowed as an alternative. If the provisions of Position 2 are followed, a relief request need not be submitted for NRC review but this deviation from the ASME Code should be documented. (See also the response to Question 15).

Current Considerations

A relief request is no longer required for deferral of testing to refueling outages. However, if testing can be practically performed, but specific situations occur that could cause delays or other problems during refueling outages making a test burdensome, the licensee may request relief from performing disassembly and inspection during that one refueling outage. (See Section 3.1.1).

Question Group 17

Question

May the valve testing by disassembly/visual inspection identified in Position 2 of Generic Letter 89-04 be applied to reverse flow testing of check valves?

Response

Position 2 of Generic Letter 89-04 addresses the use of disassembly and inspection as an alternative to forward flow testing of check valves. The use of disassembly and inspection to verify closure capability (i.e., back flow) may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. As the generic letter does not address this use, however, the submission and approval of a relief request before implementation is required. Disassembly and inspection is not acceptable for demonstration of leak-tight integrity.

Current Considerations

In Position 2, the NRC stated that disassembly and inspection could be acceptable for closure verification. The response to Question 17 caused confusion as to whether relief is required, or the approval granted in GL 89-04 is acceptable for using Position 2 in verifying closure. The staff determined that Position 2 is acceptable for closure verification when no other means is practical. If the check valve includes a bonnet-hung disk, the staff recommends that the procedures include enhanced requirements for maintenance and quality control to ensure that the disk is properly oriented when it is reinstalled. Nonintrusive methods such as radiography or acoustics may be used as an alternate method to verify closure. (See Section 4.1).

Question Group 18

Question

We are only able to perform a partial flow test of the accumulator discharge check valves due to limitations based on system configuration. Do we have to supplement this test with disassembly of the check valves?

Response

The safety injection accumulator discharge check valves are typically very difficult to exercise with flow to the position required to perform their safety function. If a partial flow exercise is all that can be performed, then some other technique, as discussed in Position 1 of Generic Letter 89-04, might be developed to periodically verify the capability of these valves to move to their safety function position. If this is not feasible, the licensee is expected to follow the provisions for the disassembly alternative contained in Position 2 of the generic letter.

Current Considerations

Tests performed involving nonintrusive techniques and tests that measure flow and differential pressure may be acceptable at less than full-flow. (See Section 4.1.2).

Question Group 19

Question

Regarding disassembly of check valves, please define "extreme hardship" when speaking with regard to extension of disassembly interval.

Response

The existence of "extreme hardship" that would allow extension of the disassembly schedule in Position 2 of Generic Letter 89-04 is dependent on the particular circumstances at the plant. To determine whether extreme hardship exists, the licensee should conduct a detailed evaluation of the various competing factors. First, the licensee should determine the effect on plant safety that would result from the proposed schedule extension. The maintenance history of the component and other information relevant to its reliability

should be reviewed to determine whether the decrease in assurance of plant safety resulting from the schedule extension is justified. A need to offload the reactor core, such as when testing the combined injection header check valves at some plants, or to operate at mid-level of the reactor coolant loops may be considered. The radiation exposure that would result from the disassembly and inspection is a factor to be considered under the ALARA (As Low As Reasonably Achievable) principle, but it should be judged in combination with all of the other factors.

Current Considerations

A one-time extension may also be acceptable if unique or unanticipated activities during an outage prevent the plant staff from disassembling and inspecting the valves. For example, if outage activities preclude draining the refueling water storage tank (RWST), which is necessary to disassemble a check valve, a one-time extension may be warranted. Such extensions may be documented under the provisions of GL 89-04 and further NRC approval is not required. (See Position 2 above regarding extension of the interval).

Question Group 20

Questions

Position 2 goes into the scheduling of disassembly/inspection in a very detailed manner. Are other scheduling schemes acceptable as long as they have each valve disassembled/inspected within 6 years? Would approval of an alternate schedule have to be in the form of an SER [safety evaluation report] or acceptance of details provided in a confirmation letter (existing schedule for disassembly/ inspection agreed upon in IST program review with NRC, but SER never issued)?

Response

As stated in Position 2 of Generic Letter 89-04, the burden is on the licensee to demonstrate the extreme hardship necessary to comply with the identified sample disassembly/inspection schedule. The staff considers the sampling aspect of the position to provide assurance of the continued operability of the valves that are not inspected during any given outage. Therefore, the licensee should justify through the provisions listed in Position 2, any deviation from the stated scheduled. That justification should be provided in the IST program submitted to the NRC staff, but need not be included in the confirmation letter. Where the provisions of Position 2 for an alternate disassembly schedule are followed, it is acceptable to implement the alternative and an SER will not be issued. The NRC staff, however, may review the alternative and its justification during plant inspections.

Current Considerations for Position 2

The staff has determined that the use of Position 2 is acceptable for verifying the capability of valves both to open and to close. The response to Question 17 contradicted the statements in Position 2. Paragraph 4.3.2.4(c) of OM-10 allows that "[a]s an alternative to the testing [exercising in accordance with paragraph 4.3.2.4 (a) and (b)], disassembly every refueling outage to verify operability of check valves may be used." (See Section 4.1 for discussion on check valves).

In evaluating the use of disassembly and inspection versus nonintrusive testing, a licensee has many factors to consider.

Through participation in the Nuclear Industry Check Valve Users' Group (NIC), the industry has seen the benefits in costs savings and personnel exposure. Because the NRC through Position 2, and the O&M Committee through OM-10, have indicated that disassembly and inspection is an acceptable alternative when full flow cannot be measured or attained, licensees do have the option. However, operations and maintenance costs should be adequate incentive for licensees to implement nonintrusive testing where such costs savings can be realized.

The NRC recently distributed a report to all PWRs which compiled a utility survey conducted by Oak Ridge National Laboratory (ORNL/NRC/LTR-94/04, "Utility Survey PWR Safety Injection Accumulatory Tank Discharge Check Valve Testing," February 17, 1994). The report indicates the benefits of performing nonintrusive testing of these valves.

NRC STAFF POSITION 3, "BACK FLOW TESTING OF CHECK VALVES"

Position 3

Section XI requires that Category C check valves (valves that are self actuated in response to a system characteristic) performing a safety function in the closed position to prevent reversed flow be tested in a manner that proves that the disk travels to the seat promptly on cessation or reversal of flow. In addition, for category A/C check valves (valves that have a specified leak rate limit and are self actuated in response to a system characteristic), seat leakage must be limited to a specific maximum amount in the closed position for fulfillment of their function. Verification that a Category C valve is in the closed position can be done by visual observation, by an electrical signal initiated by a position-indicating device, by observation of appropriate pressure indication in the system, by leak testing, or by other positive means.

Examples of ASME Code Class check valves that perform a safety function in the closed position that are frequently not back flow tested are:

(a) main feedwater header check valves

(b) pump discharge check valves on parallel pumps

(c) keep full check valves

(d) check valves in steam supply lines to turbine driven AFW pumps

(e) main steam non-return valves

(f) CVCS volume control tank outlet check valves

Questions and Answers for Position 3

Question Group 21

Question

With reference to generic letter item 3, if a leak test is performed to verify Category C check valve seat position, would any leak rate be acceptable so long as the system meets its minimum requirements to perform its safety function?

Response

When performing a test to verify closure capability of a check valve that does not have a defined seat leakage limit, the achievement of the necessary system flow rate through the intended flow path might be an adequate demonstration of the closure capability of a check valve. For example, when verifying the closure capability of the check valves on the discharge of parallel pumps, achievement of the required safety flow rate from one running pump with the idle pump's discharge check valve providing the barrier for recirculation flow would be considered an acceptable test configuration. In addition, the licensee should evaluate the consequences of the back flow through the check valve. This evaluation should consider the loss of water from that system and connecting systems, the effect that the leakage might have on components and piping downstream of the valve, and any increase in radiological exposure resulting from the leakage.

Current Considerations

A plant's safety analysis may include a leakage limit for a particular valve, or only require that the valve closes to inhibit gross leakage. When a valve has a safety-related function to close to prevent diversion of flow between trains of a system, there may be a leakage limit based on the total system requirements. The Code does not specifically require that these valves be Category A. The basis for assigning valves to categories should be available for inspection.

Question Group 22

Questions

Are the items listed in Attachment 1, number 3a, d, e, f, specific to PWR's? The nomenclature is not familiar to BWRs.

Section 3 of Generic Letter 89-04 deals with back flow testing of check valves. It has a list of several valves that NRC states provide a safety function. Some of these valves do not appear to provide a safety function and we would like to hear the NRC's reason for classifying these valves as safety related.

Response

All of the listed systems do not necessarily apply to each plant. A licensee should evaluate at least the listed systems to determine if they apply to its facility and should make any necessary modifications to its IST program. In regard to a particular question, items 3d, e, and f are specific to pressurized water reactors (PWRs) while 3a (feedwater header check valves) may be applicable to both boiling water reactors (BWRs) and PWRs. One example provided in Position 3 to the generic letter is the volume control tank outlet check valve in the chemical and volume control system. This check valve may serve an important safety function at some PWR plants to separate the non-safety grade water source from the safety grade source.

Question Group 23

Question

In regard to Attachment [1], Position 3, how is individual seat leakage determined for 10 CFR 50, Appendix J, Type C, tested valves? Tech Specs specify only penetration totals.

Response

IWV-3426 of Section XI of the ASME Code requires that a permissible leak rate be specified by the plant owner (licensee) for a specific valve. If leak rates are not specified by the licensee, permissible leak rates are provided in IWV-3426. It should be noted that Section XI provides no criteria or guidance for licensees on the method to establish or to specify the permissible leak rate of a particular valve. Apparently, the Code recognizes that leak behavior of a valve varies according to the type of valve, the vendor, the valve size, the service conditions, the safety-related functions, and other factors, and that there is no simple leak rate rule that may be applicable to all valves.

In general, the leak rate limits should be set within certain bounds. If the leak limits are too low, unnecessary repairs or adjustments to the valve can result. If too high, failure of the tests required by Appendix J to 10 CFR Part 50 could occur, leading to concerns for leak-tight integrity of the containment. Appropriate permissible leak rates can only be developed and refined by analyzing and trending the leak rate data of specific valves or leak rate data from similar valves at other plants. Therefore, the NRC staff is not in a position to specify leak rates. The licensee should document its

methods for establishing the initial permissible leak rates and procedures for improving the leak rate limits.

Current Considerations

Refer to Section 4.4.3, "Multiple Containment Isolation Valve Leak-Rate Testing" herein.

Question Group 24

Questions

In regard to Attachment 1, Position 3, does this backseat check require a full-stroke exercise and is it performed at the Code specified frequency regardless of normal plant positions?

In reference to Item 3 of Attachment 1, does a valid back-flow test on a check valve first require the valve to be exercised to the open position then back tested, or is it valid to merely perform the back flow test?

Response

If a particular valve performs a safety function only in the closed position, demonstration of a full-stroke open before verification of closure capability is not required by the ASME Code. This closure verification is required to be performed at the frequency specified by the Code. If (1) the valve performs a safety function in the closed position, (2) the normal position for the valve is closed, and (3) this position can be verified during normal plant operation, then quarterly documentation of this verification satisfies the Code requirements. If a valve performs a safety function in both the open and closed positions, however, the Code requires that the valve be exercised to the open position and then be verified to close.

Current Considerations

If the verification of closure is practical more frequently, such as quarterly, the verification can be performed without opening the valve, and the valves can then be exercised open on an extended frequency such as at each cold shutdown or refueling outage. Plant conditions during post-maintenance testing may prevent the licensee from partially or fully stroking a valve open after reassembling it. If the disk was stroked or removed, a leak test may verify that the valve can close properly. A post-maintenance open stroke exercise may be performed to restore a valve to service with the verification of closure performed when plant conditions allow. (See Section 4.1.3; also see Paragraph 4.3.2.2(a) of OM-10).

Question Group 25

Question

Previous to this, it was permissible to verify closure of stop-check valves simply by operation of the stem (shaft). Is this acceptable instead of reverse flow testing?

Response

Verification of closure capability of stop check valves by using the handwheel meets the ASME Code requirements. This, however, is not the preferred method of test. The NRC staff considers reverse flow testing to be a more reliable indication of valve operability.

Modified Response

This response was modified in Revision 1 to the minutes, September 26, 1991, as follows:

(a) If the stop-check valves do not perform a safety-related function in

the closed position, valve closure is only necessary to ensure repeatable opening stroke time testing. Valves may be closed by using a handwheel or a hand switch.

(b) If the use of a handwheel or a hand switch to close a valve achieves the safety-related function of the system, then exercising the valve by this method meets the ASME Code requirements of IWV-3522.

(c) If a prompt closure of these valves on cessation or reversal of flow is required to accomplish a safety-related function closure must be verified by reverse flow testing or such other positive means as acoustic monitoring or radiography.

(d) These valves should be disassembled for verifying valve closure when no other means of verification is possible. However, disassembly provides limited information on valve capability to seat promptly on cessation or reversal of flow. Furthermore, if the method involves extensive disassembly, a post-reassembly test would be necessary per IWV-3200 because disassembly and inspection can increase the probability of human error when the valve is reassembled. The licensee should investigate the use of nonintrusive testing techniques and should implement them if they are demonstrated to be effective to assess closure capability, degradation, and incipient failure. The infrequent disassembly and inspection of the valves are appropriate to assess overall check valve condition, while reverse flow testing and nonintrusive testing provide an assessment of continued operational readiness.

This guidance expands on the response provided in the meeting minutes. The staff's response contained in the meeting minutes did not address instances in which verification of prompt closure was required to ensure that a safety-related function would be accomplished.

If the valve can be stroked open and then verified to seat promptly on cessation or reversal of flow only at an extended interval, the use of a hand wheel or hand switch on a quarterly frequency may be part of the program in concert with the other testing, if practical.

Question Group 26

Question

Regarding back flow testing of check valves, what is the position of the generic letter in the phrase "verify by other means"?

Response

The majority of the wording in the sentence in which this particular phrase appears was taken directly from IWV-3522 of Section XI of the ASME Code. The NRC staff included the phrase "by other positive means" to be consistent with the wording of the Code. When Generic Letter 89-04 was written, the staff did not have in mind any particular techniques that it would consider acceptable.

Current Considerations

Paragraph 4.3.2.4 of OM-10 allows for other positive methods of verification. Recent examples from inservice testing programs include verifying that a parallel centrifugal pump does not spin in reverse to verify closure

of a pump discharge check valve, monitoring an upstream pressure indicator, monitoring a tank level, measuring the flow rate of a redundant train, and opening an upstream vent and drain valve.

Current Considerations for Position 3

Licensees may refer to NRC Information Notice 91-56, "Potential Radioactive Leakage to Tank Vented to Atmosphere," for information on the categories assigned to valves which function to close. These valves may also function to prevent leakage above an assumed limit to prevent the plant from exceeding the limits in 10 CFR Part 100. Position 4.1.1 herein discusses backflow testing of check valves in series.

The staff has received relief requests for backflow testing in which licensees interpret the requirements such that a forward flow test is required before the verification of closure (i.e., perform the forward flow test before the backflow test). However, if plant conditions make a forward flow test impractical quarterly, or during cold shutdown outages, the licensee may practically verify closure without testing the forward flow. When leak-tightness is not required, backflow testing can be performed by several methods including verifying of system parameters. Paragraph 4.3.2.4 of OM-10 allows that other positive means may be used for verification. Recent examples of acceptable backflow tests include verifying that a parallel pump does not rotate backwards when the other pump is tested to verify that the pump discharge check valve is closed, monitoring pressure upstream, performing system hydrostatic or pressure tests, performing radiography, using nonintrusive methods, and performing leak tests (even if a leakage limit does not apply). These various methods meet the "other positive means" of the Code.

NRC STAFF POSITION 4, "PRESSURE ISOLATION VALVES"

Position 4

a. General

Pressure isolation valves (PIVs) are defined as two normally closed valves in series that isolate the reactor coolant system (RCS) from an attached low-pressure system. PIVs are located at all RCS low-pressure system interfaces. The 10 CFR 50.2 contains the definition of the RCPB. PIVs are within the reactor coolant pressure boundary (RCPB).

The following summary is based upon the staff's review of responses to Generic Letter 87-06, Periodic Verification of Leak Tight Integrity of Pressure Isolation Valves. All plants licensed since 1979 have a full list of PIVs in the plant Technical Specifications (TS) along with leak test requirements and limiting conditions for operation (LCOs). The plants licensed prior to 1979 fall into several categories. Some pre-1979 plants have a full list of PIVs along with leak test requirements and LCOs in the plant TS. Some pre-1979 plants have only Event V PIVs (see below) in the plant TS. Some pre-1979 plants have no TS requirements regarding PIVs.

All PIVs listed in plant TS should be listed in the IST program as Category A or A/C valves. The TS requirements should be referenced in the IST program.

b. Event V PIVs

Event V PIVs are defined as two check valves in series at a low-pressure/RCS interface whose failure may result in a LOCA that by-passes containment. Event V refers to the scenario described for this event in the WASH-1400 study.

On April 20, 1981, the NRC issued an Order to 32 PWRs and 2 BWRs which required that these licensees conduct leak rate testing of their PIVs, based on plant-specific NRC supplied lists of PIVs, and required licensees to modify their TS accordingly. These orders are known as the "Event V Orders" and the valves listed therein are the "Event V" PIVs. The Event V PIVs are a subset of PIVs.

Based upon the results of recent inspections, it has been determined that the following implementation problem still exists with respect to testing of PIVs. The staff has determined that in some cases the procedures are inadequate to assure that these valves are individually leak tested and evaluated against the leakage limits specified in the TS; in other cases, the procedures were adequate but were not being followed. Specifically, some check valves were tested in series as opposed to individually and some check valves were not tested when required.

Licensees should review their testing procedures to ensure the Event V PIVs are individually leak rate tested.

Questions and Answers for Position 4

Question Group 27

Questions

Is it the intent of Generic Letter 89-04 that the only Reactor Coolant System Pressure Isolation Valves (PIVs) to be included in the IST program are those listed in the Technical Specifications and those which are Event V PIVs?

For plants licensed prior to 1979 which do not list all RCS Pressure Isolation Valves in their Technical Specifications, is it the intent of Position 4 of Generic Letter 89-04 that only PIVs listed in the Technical Specifications and PIVs which are "Event V" be included in the IST Program?

Does the NRC anticipate requiring (in the future) that all RCS PIVs be included in the IST program?

Response

The position in Generic Letter 89-04 represents only a limited area of the staff's concerns regarding PIVs. The generic letter position only applies to those PIVs listed in individual plant Technical Specifications. However, the staff recognizes that the PIVs in the Technical Specifications for many plants, particularly older plants, are a subset of the PIVs in the plant. In view of this fact and other concerns regarding PIVs, the staff has recently undertaken a program to reevaluate various aspects of PIVs, including testing. Sample inspections are underway as part of this NRC program.

Current Considerations

The staff recommends that valves defined as pressure isolation valves other than those in TS are at least verified closed in accordance with the inservice testing program, and ensure that the testing described in response to GL 87-06 is maintained or justified. (See Section 4.1.1).

Question Group 28

Questions

What, if anything, is being done with the licensee responses to Generic Letter 87-06? The generic letter references PIVs in Section 4; however, it appears that there are no changes required due to Generic Letter 87-06. Is this true?

Response

The responses to Generic Letter 87-06 are being used as input for the resolution of Generic Issue 105, "Interfacing Systems LOCAs at Light Water Reactors," under investigation by the NRC Office of Nuclear Regulatory Research. No further licensee action is required at this time with respect to Generic Letter 87-06.

Current Considerations

The results of studies of interfacing system loss of coolant accidents (LOCA) are provided in NUREG/CR-5124, "Interfacing Systems LOCA: Boiling Water Reactors," and NUREG/CR-5102, "Interfacing Systems LOCA: Pressurized Water Reactors."

Current Considerations for Position 4

Those plants licensed with all PIVs listed in the TS have a specified leakage limit for each PIV. In responding to GL 87-06, many of the licensees for plants having TS for only Event V PIVs described the PIVs and testing applied to each set of valves, indicating that the Event V valves were the only PIVs which were leak tested. In recent program submittals, licensees stated that the designations for certain PIVs have been changed from those listed in GL 87-06 to designate other valves in the same lines as PIVs. The designations are established by the licensee; however, since two valves are required for reactor coolant pressure boundary applications, the requirements of 10 CFR 50, Appendix A, General Design Criterion 15 and Criterion 32 apply for whichever valves are designated reactor coolant pressure boundary valves (see Section 4.1.1; NOTE: Not all reactor coolant pressure boundary valves are PIVs).

NRC STAFF POSITION 5, "LIMITING VALUES OF FULL-STROKE TIMES FOR POWER-OPERATED VALVES"

Position 5

The Code intent with respect to measuring the full-stroke times of power operated valves is to verify operability and to detect valve degradation. Measurement of full stroke times for air operating valves fulfills this intent. However, reviews of operating experience have identified several problems with motor operated valves (MOVs) including limitations with stroke time as a measure of operational readiness of the MOV. As a result, the industry has made extensive efforts to improve the knowledge and understanding of operational characteristics of motor operated valves. This effort has been conducted by industry groups (NUMARC, INPO, NMAC, EPRI), individual licensees, equipment vendors, and national standards groups.

We believe the information and knowledge developed by these groups should be reviewed and utilized. Some of the information publicly available includes an INPO white paper titled, "Motor-Operated Valve Performance Update," issued October 4, 1988. This document identifies MOV problem areas and provides the key elements for a comprehensive MOV program. Another document is the "Technical Repair Guidelines for the Limitorque Model SMB-000 Valve Actuator," issued by the Nuclear Maintenance Application Center (NMAC) in January 1989. This guide addresses several areas such as setting torque and limit switches, preventive maintenance, actuator failure modes, failure analysis to determine root cause and corrective action, and preoperational and post-maintenance testing.

NRC staff concerns regarding MOV operability led to the issuance of Bulletin 85-03 and Bulletin 85-03, Supplement 1. Expansion of this bulletin in the form of a generic letter is being considered by the NRC.

In spite of the limitations of stroke time testing of MOVs, IWV-3413(a) of the ASME Code requires that the licensee specify the limiting value of full-stroke time of each power operated valve. The corrective actions of IWV-3417(b) must be followed when these limiting values are exceeded. The Code does not provide any requirements or guidelines for establishing these limits nor does it identify the relationship that should exist between these limits and any limits identified for the relevant valves in the plant TS or safety analysis.

The purpose of the limiting value of full-stroke time is to establish a value for taking corrective action on a degraded valve before the valve reaches the point where there is a high probability of failure to perform its safety function if called upon. The NRC has, therefore, established the guidelines described below regarding limiting values of full-stroke time for power operated valves.

> The limiting value of full-stroke time should based on the valve reference or average stroke time of a valve when it is known to be in good condition and operating properly. The limiting value should be a

reasonable deviation from this reference stroke time based on the valve size, valve type, and actuator type. The deviation should not be so restrictive that it results in a valve being declared inoperable due to reasonable stroke time variations. However, the deviation used to establish the limit should be such that corrective action would be taken for a valve that may not perform its intended function.

When the TS or safety analysis limit for a valve is less than the value established using the above guidelines, the TS or safety analysis limit should be used as the limiting value of full-stroke time.
When the TS or safety analysis limit for a valve is greater than the value established using the above guidelines, the limiting value of full-stroke time should be based on the above guidelines instead of the TS or safety analysis limit.

Questions and Answers for Position 5

Question Group 29

Question

Attachment 1, Position 5 in part states: "The deviation should not be so restrictive that it results in a valve being declared inoperable due to reasonable stroke time variations. However, the deviation used to establish the limit should be such that corrective action would be taken for a valve that may not perform its intended function." Given that MOVs operated by AC induction motors fail if slowed by more than approximately 10%, a valve normally stroking in 15 seconds will fail to operate by a change of 1.5 seconds. By comparison, a reasonable deviation from normal stroke time of 15 seconds caused by error in measurement might be 2 seconds. The fact that the reasonable deviation for this 15 second valve is larger than the possible actual deviation before failure makes the two quoted goals of Attachment 1, Position 5, mutually exclusive. Request resolution.

Response

The staff agrees that stroke times for AC motor-operated valves probably will not change appreciably before failure, especially for MOVs that have relatively short stroke times. If the ASME Code-identified testing does not provide useful information for evaluating the continued operability of these valves, then the licensee should propose an alternative to the Code requirements that does provide such information. The Code requires the licensee to establish limiting values of full stroke time for all power-operated valves and also requires measurement of stroke time to an accuracy of within 10 percent for this particular case. The Code does not prohibit the measurement of stroke time more accurately or the setting of the limiting value at less than 25 percent above the normal stroke time. The NRC and industry recognize that the Code-specific criteria are not sufficient for assuring operability of AC motor-operated valves. In light of this recognition, the staff issued Bulletin 85-03 to require that licensees establish programs to ensure that operator switches for MOVs in certain important plant systems are selected, set, and maintained properly. As a result, in part, of the responses to that bulletin, the scope of the effort has been expanded in Generic Letter 89-10 to include many other MOVs important to plant safety. NRC staff actions such as these will be need to compensate for weaknesses in the IST provisions of the ASME Code until an adequate IST standard is available.

Question Group 30

Questions

In regard to Attachment 1, Position 5, what is considered a reasonable deviation from the reference stroke time?

In regard to Attachment 1, Position 5, can the deviation be different for valves with different functions and/or actuators?

What is meant by "reasonably limiting value of full-stroke time?"

What methods are considered acceptable for establishing the limiting value for full stroke times for power operated valves as given in Position 5 of Generic Letter 89-04?

In reference to Item 5 of Attachment 1, is there any generic guidance on what is acceptable to the NRC on this item?

What is "reasonable" value for deviating from the reference stroke time established for valve testing?

Response

The NRC staff has attempted to provide the general philosophy for establishing the limiting stroke time. The establishment of specific values for the limiting stroke time is dependent on a variety of parameters relevant to the particular valve and the conditions at the plant. The parameters include operating characteristics, operating environments, actuator types, and valve stroke times. In that the test should confirm the operability of the component and not the system, the limiting value is not to be considered a function of the valve's safety significance. As the limiting value is specific to the valve, the staff is not in a position to provide values for limiting stroke times. The licensee needs to use its best judgement in assigning these values. The justification for the assigned values is expected to be documented and available to the plant site for review by NRC personnel. One aspect of the staff review will be a comparison of the limiting stroke time to the technical specification value.

Current Considerations

Paragraph 4.2.1.8 of OM-10 includes the requirements for using reference values for stroke time acceptance criteria. Paragraph 4.2.1.4 of OM-10 includes the requirements for establishing a limiting value for valve stroke time. Any multipliers other than those listed in Paragraph 4.2.1.8 would require relief for each valve, or group of valves. Refer to Section 4.2.7 herein.

Question Group 31

Questions

In regard to Attachment 1, Position 5 (paragraphs 2, 3 and 5), why are Tech Specs or Safety Analysis limiting criteria not acceptable for valve operability if maintenance is triggered by component evaluation?

With respect to the application of stricter acceptance criteria for valve stroke times, apparently the NRC has some idea as to the philosophy and limits that would be acceptable. This information should be shared with licensees.

Define the "limiting value of full-stroke time." Is this number the operability number for the valve even if the Tech Spec stroke time is much higher?

Response

The Technical Specifications provide assurance that important plant systems are capable of performing their safety functions in a timely manner during selected plant accidents. The provisions of Section XI of the ASME Code are intended to ensure the continued operability of particular plant components. The distinct bases for these two documents lead to criteria that may differ significantly. Nevertheless, the Technical Specifications and ASME Code are both needed to provide confidence that the nuclear power plant can be operated safely. Therefore, the more restrictive criteria of the two documents must be followed even though this might result in a component or system being declared inoperable. The response to questions on position 8 of Generic Letter 89-04 also address the relationship of the ASME Code to the Technical Specifications.

Current Considerations

The TS and SAR limits are useful for performing analysis of data when a valve has indicated degraded performance and been declared inoperable. In accordance with Code requirements (paragraph 4.2.1.9 of OM-10), the data may be analyzed to verify that the new stroke time represents acceptable valve operation. (See Section 4.2.7).

Question Group 32

Question

Is it required to measure stroke times of valves that are not provided with remote position indication?

Response

The ASME Code requires the measurement of stroke time for all power-operated valves regardless of whether they have remote position indication. The staff has endorsed this requirement. Without specifics, the staff is not in a position to comment on alternate techniques that may be found acceptable.

Current Considerations

Section 4.2.9 includes a discussion of alternatives that might be acceptable.

Question Group 33

Question

When considering comparison of power-operated (stroke time) valves according to valve type, valve actuators, valve size, etc., we find there is no consistency when using this comparison. However each valve consistently tests well. We are currently looking at a quantitative method of establishing maximum allowable stroke times. Is this an acceptable method?

Response

If we understand the intent of the opening sentence of the question, we agree that criteria for setting the limiting value of full-stroke time may vary for each valve type, stroke time, size, etc. The use of a quantitative multiplier on a reference time may be an acceptable method for setting these values. However, as discussed in some of the responses above, the licensee should document the justification for its quantitative methods of establishing maximum allowable stroke times. This justification should be available at the plant site for review by NRC personnel.

Current Considerations

This approach may be in accordance with paragraph 4.2.1.8 of OM-10. If it is not in accordance with the multipliers in paragraph

4.2.1.8, such an approach would necessitate separate relief on each valve when the testing is conducted per OM-10.

Question Group 34

Question

When the stroke time of a power operated valve exceeds its [limiting value for] stroke time, as established in accordance with Position 5 of the Generic Letter 89-04, but is still within its plant Technical Specification or FSAR [final safety analysis report] stroke time limit, can performing an evaluation which determines if the valve may remain operable be used to satisfy Position 5 in lieu of making it mandatory that the valve be declared inoperable?

Response

The limiting value of full stroke time is required to be established for all power-operated valves. The limiting value should be that point at which the licensee seriously questions the continued operability of the valve. It is expected to be a value determined to be reasonable for the individual valve based on that valve's characteristics and past performance, but not to exceed any safety analysis requirements. The value should not be based solely on the system requirements or values specified in safety analyses for system performance. When the identified limiting value is exceeded, the licensee shall declare the component inoperable and shall enter any applicable Technical Specification limiting condition for operation (LCO). Following the declaration that the valve is inoperable, the licensee may perform an analysis to identify the root cause of the problem with the valve. If this analysis clearly demonstrates that the valve remains capable of performing its safety function, the analysis might constitute the corrective action required by the Code. The analysis should be documented.

Current Considerations

Paragraph 4.2.1.9, "Corrective Action," of OM-10 provides the requirements related to this response.

Question Group 35

Question

If the limiting value of full stroke time is less than the "alert limit" identified in the Code, does the trending still have to be done?

Response

If the limiting value of full stroke time is exceeded, then the licensee shall declare the valve inoperable and shall perform corrective action. Where the limiting value is less than the 25 percent or 50 percent "alert limits" for trending as specified in the ASME Code, trending as envisioned by the Code becomes a moot point. The licensee could identify a reduced percentage alert limit for this valve to provide early warning of problems with this valve, but this is not required either by the Code or by Generic Letter 89-04.

Current Considerations

OM-10 includes reference values for stroke-time measurement requirements (refer to Section 4.2.7 of the guidelines). These requirements do not include alert values.

Question Group 36

Question

In reference to Item 5 of Attachment 1, is Item 5 in fact a rewrite of the stroke time criteria that are to be applied in accordance with OM-10?

Response

The information in Position 5 of Generic Letter 89-04 was not intended simply to be a rewrite of the information in ASME Standard OM-10. This position has evolved over the years and is considered reasonable by the staff for establishing limiting values of full stroke time for power-operated valves. As such, the position represents a clarification of existing ASME Code requirements. For its part, ASME Standard OM-10 does not provide guidance for the establishment of the limiting value of full stroke time. This standard, however, does require that a valve be declared inoperable immediately upon discovering that it fails to exhibit the required change of obturator position or exceeds the limiting value of full stroke time.

Question Group 37

Question

Since establishing maximum stroke time limits may in some cases at first prove too restrictive, is it acceptable for corrective action to be an engineering evaluation which increases the time limit (based on more detailed analysis)?

Response

The Commission regulations in 10 CFR 50.59 allow licensees to perform engineering evaluations of plant structures, systems, and components. If the stroke time limit is exceeded, the valve must be declared inoperable and any applicable Technical Specification limiting condition for operation entered. At that point, an engineering analysis may be performed to verify that the valve is capable of performing its safety function. This analysis should include more than a determination that the new value is less than the FSAR or Technical Specification limit. For example, a root cause investigation should be performed to determine the reasons for the stroke time increase.

Current Considerations

Paragraph 4.1.2.9, "Corrective Action," of OM-10 includes the requirements for analyzing test data.

Question Group 38

Questions

We have been informed that we could omit the valve stroke time limits from our IST Submittal. Where can we find guidance on what is really required in a submittal (minimum scope)?

Do specific valve stroke time requirements (or limits) need to be specified in the IST plan, or is specification in implementing procedures sufficient? If procedures are sufficient, can existing limits referenced in the plan be removed in a future revision? If plan specification is required, is this limited to Technical Specification and safety analysis stroke time limits, or must owner specified stroke time limits that are required also be in the plan?

Response

The specific limiting values of full stroke time for each power operated valve as determined according to Position 5 of Generic Letter 89-04 are not required to be identified in the IST

program. These limiting values, however, should be provided in a document such as the individual test procedure or a general procedure that identifies the criteria for establishing these values. The concern for the specification of limiting values is the result of weaknesses that the NRC staff has found while reviewing IST procedures.

As a general rule, IST programs should contain sufficient information to indicate what parameters are being measured, how tests are being performed, and the bases for the acceptability of any departures from the ASME Code. For example, the program should indicate forward flow testing or back flow testing, or both, for check valves.

Current Considerations

In Section 2, the staff describes the content of the IST program. Recognizing that reference values of stroke-times may be changed, the licensee may consider including these values in test implementing procedures, but need not include them in the IST program document. The IST program document may specify the type of valve and valve actuator for the licensee to consider in determining which criteria apply. (See Section 2).

Current Considerations for Position 5

For using reference values in performing stroke time tests, refer to Section 4.2.7.

NRC STAFF POSITION 6, "STROKE TIME MEASUREMENTS FOR RAPID-ACTING VALVES"

Position 6

The Code requires the following for power operated valves with stroke times 10 seconds or less: (a) Limiting values of full-stroke times shall be specified [IWV-3413(a)], (b) Valve stroke times shall be measured to (at least) the nearest second [IWV-3413(b)] and (c) If the stroke time increased by 50% or more from the previous test, then the test frequency shall be increased to once each month until corrective action is taken [IWV-3417(a)]. Paragraph IWV-3417(b) specifies corrective actions that must be taken.

With reference to (c) above, measuring changes in stroke times from a reference value as opposed to measuring changes from the previous test is an acceptable (and possibly better) alternative to the staff. However, since this is different from the Code requirement, this deviation should be documented in the IST program.

Most plants have many power operated valves that are capable of stroking in 2 seconds or less such as small solenoid operated valves. Licensees encounter difficulty in applying the Code 50% increase of stroke time corrective action requirements for these valves. 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. These differences are compounded by rounding the results as allowed by the Code. Thus, the results may not be representative of actual valve degradation.

The following discussion illustrates the problem that may exist when complying with the Code requirements for many of these rapid-acting valves.

A valve may have a stroke time of 1.49 seconds during one test and a stroke time during the following test of 1.51 seconds. If stroke times are rounded to the nearest second as allowed by the Code, the difference between these tests would exceed the 50% criteria and would require an increased frequency of testing until corrective action is taken. This can result from a stroke time difference of 0.02 seconds, which is usually not indicative of significant valve degradation.

Power operated valves with normal stroke times of 2 seconds or less are referred to by the staff as "rapid-acting valves." Relief may be granted from the requirements of Section XI, Paragraph IWV-3417(a) for these valves provided the licensee assigns a maximum limiting value of full-stroke time of 2 seconds to these valves and, upon exceeding this limit, declares the valve inoperable and takes corrective action in accordance with IWV-3417(b).

An acceptable alternative to the Code stroke timing requirements is the above stated rapid-acting valve position. Since this represents a deviation from the Code requirements, it should be specifically documented in the IST program.

Questions and Answers for Position 6

Question Group 39

Question

With reference to the Generic Letter item 6, paragraph 4, where does the two-seconds come from and what is the bases for the two-second only criteria, could this be a minimum of 3 or 4 seconds?

Response

The two-second criterion is based on the staff's consideration of the response time of personnel and equipment and the difficulties involved in applying the ASME Code requirements in this situation. Any alternative to Position 6 of Generic Letter 89-04 or the ASME Code requirements may be submitted, along with a sound basis, for staff review through a relief request. As relief requests containing alternatives to the Code requirements are expected to address the fundamental purpose of inservice testing, see the summaries of the opening presentations for a discussion of this subject.

Current Considerations

Paragraph 4.2.1.8(e) of OM-10 includes the 2-second limiting value as described in Section 4.2.2 of the guidelines.

Question Group 40

Questions

Generic Letter 89-04 states that previous analysis (IWV-3417(a)) can be replaced with a conservative "reference value" comparison. Generic Letter 89-04 states this should be documented in the IST program. Should this change be made by relief request or by a text change to the program body?

Generic letter position on power operated valve stroke times of greater than ten seconds is to place the valve in increased frequency if stroke time is greater than 25% of the base line stroke time.

Response

When the staff prepared the discussion in Position 6 of Generic Letter 89-04, the objective of the first paragraph was to set the stage for the discussion on "rapid acting" valves, and it was not intended to address all aspects of stroke time for power-operated valves. Nevertheless, the staff believes that the use of a reference value stroke time as a base line for comparison of routine test values is a better method of evaluating change in valve performance than that specified ASME Code IWV-3400. Therefore, if a licensee wishes to use reference values rather than previous test values for comparing stroke times for valves with normal stroke times equal to or less than ten seconds, the generic letter provides the vehicle for this deviation from the Code and a relief request need not be submitted. As the generic letter does not address valves with normal stroke times greater than ten seconds, a licensee must submit a relief request for staff review and approval before using reference values as a base line for stroke times for these values.

Question Group 41

Questions

Can an MOV or power-operated valve have a dual classification under "rapid acting" and "less than 10 seconds?" For example, we have valves that stroke closed in less than 2 seconds

and open in less than ten seconds. Therefore, is the classification and the previous test (or reference test) percentage based on opening time or closing time?

Response

If the valve performs a safety function in both positions, and the stroke time in one direction is less than two seconds, then for that stroke direction, the licensee may use either the acceptance criteria of ASME Code or the staff's position for rapid acting valves.. Where the stroke time for the valve in the other direction is greater than two seconds, the acceptance criteria for that stroke time range, as identified in the Code, should be followed when testing the valve in the greater-than-two-second direction. Similarly, the alternative concerning measurements of changes in stroke time allowed by Generic Letter 89-04 may be used for the stroke direction that has a stroke time of less than ten seconds. [NOTE: Although both MOVs and power-operated valves are mentioned, the question is more applicable to air-operated valves. Normally, MOVs do not have widely different stroke times for the open and close directions.]

Current Considerations for Position 6

Paragraph 4.2.1.8(e) of OM-10 includes the 2-second limiting value for stroke time measurement. Sections 4.2.2 and 4.2.3 relate to rapid-acting valves.

NRC STAFF POSITION 7, "TESTING INDIVIDUAL SCRAM VALVES FOR CONTROL RODS IN BOILING WATER REACTORS"

Position 7

BWRs are equipped with bottom-entry hydraulically driven control rod drive mechanisms with high-pressure water providing the hydraulic power. Each control rod is operated by a hydraulic control unit (HCU), which consists of valves and an accumulator. The HCU is supplied charging and cooling water from the control rod drive pumps, and the control rod operating cylinder exhausts to the scram discharge volume. Various valves in the control rod drive system perform an active function in scramming the control rods to rapidly shut down the reactor.

The NRC has determined that those ASME Code Class valves that must change position to provide the scram function should be included in the IST program and be tested in accordance with the requirements of Section XI except where relief has been granted in a previously issued Safety Evaluation Report or as discussed below.

The control rod drive system valves that perform an active safety function in scramming the reactor are the scram discharge volume vent and drain valves, the scram inlet and outlet valves, the scram discharge header check valves, the charging water header check valves, and the cooling water header check valves. With the exception of the scram discharge volume vent and drain valves, exercising the other valves quarterly during power operations could result in the rapid insertion of one or more control rods more frequently than desired.

Licensees should test these control rod drive system valves at the Code-specified frequency if they can be practically tested at that frequency.

However, for those control rod drive system valves where testing could result in the rapid insertion of one or more control rods, the rod scram test frequency identified in the facility TS may be used as the valve testing frequency to minimize rapid reactivity transients and wear of the control rod drive mechanisms. This alternate test frequency should be clearly stated and documented in the IST program.

Industry experience has shown that normal control rod motion may verify the cooling water header check valve moving to its safety function position. This can be demonstrated because rod motion may not occur if this check valve were to fail in the open position. If this test method is used at the Code required frequency, the licensee should clearly explain in the IST program that this is how these valves are being verified to close quarterly.

Closure verification of the charging water header check valves requires that the control rod drive pumps be stopped to depressurize the charging water header. This test should not be performed during power operation because stopping the pumps results in loss of cooling water to all control rod drive mechanisms and seal damage could result. Additionally, this test cannot be performed during each cold shutdown because the control rod drive pumps supply seal water to the reactor recirculation pumps and one of the

recirculation pumps is usually kept running. Therefore, the HCU accumulator pressure decay test as identified in the facility TS may be used as the charging water header check valve alternate testing frequency for the reasons stated above. If this test is not addressed in the licensee's TS this closure verification should be performed at least during each refueling outage, and this alternate test frequency should be specifically documented in the IST program.

The scram inlet and outlet valves are power-operated valves that full-stroke in milliseconds and are not equipped with indication for both positions; therefore, measuring their full-stroke time as required by the Code may be impractical. Verifying that the associated control rod meets the scram insertion time limits defined in the plant TS can be an acceptable alternate method of detecting degradation of these valves. Also, trending the stroke times of these valves may be impractical and unnecessary since they are indirectly stroke timed, and no meaningful correlation between the scram time and valve stroke time may be obtained, and furthermore, conservative limits are placed on the control rod scram insertion times. If the above test is used to verify the operability of scram inlet and outlet valves, it should be specifically documented in the IST program.

Questions and Answers for Position 7

No questions.

Current Considerations for Position 7

At many plants, certain of the valves described in Position 7 are non-Code class valves. The IST program typically designates the Code class of each of the valves included in the program, and those not in a Code class system. Most licensees have used the guidance in Position 7 with no variation. (See Section 2.2).

NRC STAFF POSITION 8, "STARTING POINTS FOR TIME PERIODS IN TECHNICAL SPECIFICATION ACTION STATEMENTS"

Position 8

ASME Section XI, IWP-3220, states "All test data shall be analyzed within 96 hours after completion of a test". IWP-3230(c) states, in part, "If the deviations fall within the 'Required Action Range' of Table IWP-3100-2, the pump shall be declared inoperative ..."

In many cases pumps or valves covered by ASME, Section XI, Subsections IWP and IWV, are also in systems covered by TS and, if declared inoperable, would result in the plant entering an ACTION statement. These ACTION statements generally have a time period after which, if the equipment is still inoperable, the plant is required to undergo some specific action such as commence plant shutdown.

The potential exists for a conflict between the aforementioned data analysis interval versus the TS ACTION statement time period. Section XI, IWP-6000 requires the reference values, limits, and acceptance criteria to be included in the test plans or records of tests. With this information available, the shift individual(s) responsible for conducting the test (i.e., shift supervisor, reactor operator) should be able to make a timely determination as to whether or not the data meets the requirements.

When the data is determined to be within the Required Action Range of Table IWP-3100-2 the pump is inoperable and the TS ACTION statement time starts. The provisions in IWP-3230(d) to recalibrate the instruments involved and rerun the test to show the pump is still capable of fulfilling its function are an alternative to replacement or repair, not an additional action that can be taken before declaring the pump inoperable.

The above position, which has been stated in terms of pump testing, is equally valid for valve testing.

In summary, it is the staff's position that as soon as the data is recognized as being within the Required Action Range for pumps or exceeding the limiting value of full-stroke time for valves, the associated component must be declared inoperable and the TS ACTION time must be started.

If a test is under way (regardless of whether test data have been taken) and it is obvious that a gauge is malfunctioning, the test may be halted and the instruments should be promptly recalibrated. One example might be a wildly fluctuating gauge. It should be noted, however, that, in many situations where anomalous data are indicated, it may not be clear that the problem lies with the gauge. In these cases, the licensee should attribute the problem to pump performance. The licensee would then declare the pump inoperable and evaluate the condition of the pump during the time allotted by the applicable Technical Specification.

Questions and Answers for Position 8

Question Group 42

Questions

10 CFR 50.55a(g) states that IST programs comply with Section XI. Section XI states for valves that "If the condition is not, or cannot be, corrected within 24 hours, the valve shall be declared inoperative." This is in direct disagreement with the Generic Letter which states that the LCO must be declared immediately. How do you justify this disagreement with the Code?

Generic Letter 89-04 implies that the 24 hour time period for declaring valves operable versus inoperable does not apply. Can the utility continue to use the 24 hours before declaring a valve inoperable?

Position 8 specifically states that licensees cannot use the 24-hour grace period for declaring a valve inoperable (IWV-3417(b)) and must make such declaration immediately upon recognition of exceeding a stroke time limit. Position 5 states that the intent of developing more restrictive stroke time limits is to identify a valve problem "before the valve reaches the point where there is a high probability of failure to perform if its safety function is called upon." Per Position 5, exceeding the more restrictive limit does not imply that the valve is inoperable but that the probability of failure is increased. With this philosophy, the 24-hour grace period is even more reasonable.

This question is in reference to Item 8 of Attachment 1: "Starting point for time period in Technical Specifications ACTION statement." This item eliminates the 24-hour clock for valves which exceed Section XI limits. In most cases, the Technical Specifications limits are higher than the Section XI limit. This item needs discussion.

Response

The Standard Technical Specifications in Section 4.0.5 specifically state that the more restrictive requirements of the Technical Specifications take precedence over the ASME Code. For example, the Technical Specification definition of OPERABLE does not grant a grace period before a device that is not capable of performing its specified function is declared inoperable. That definition takes precedence over the ASME Code, which allows up to 24 hours before declaring inoperable a valve that (1) is incapable of exhibiting the required change of disk position or (2) has exceeded its limiting value of full stroke time. Therefore, if a valve is tested and the data indicate that it is inoperable as defined by the required action range, then that valve must be declared inoperable at that time and not 24 hours later. This elimination of the 24-hour grace period before declaring a valve inoperable is consistent with the requirements of ASME Standard OM-10.

Question Group 43

Question

When a piece of equipment enters the required action range, why must the Tech Specs action statement be entered without some time to reflect on why it has entered the required action range? A reasonable approach would be to establish a limited reflection time, for example the existing shift, to review how the test was conducted and review previous tests to see what the problem is. In declaring equipment inoperable when it really may not be upon review of how the test was conducted, generates needless paperwork and impacts INPO availability statistics (i.e., HPCI, RCIC, RHR).

Response

For some time, the NRC staff has been concerned with the unrestricted grace period for declaring a component inoperable allowed by the ASME Code. One example of this grace period is the 24-hour delay allowed by IWV-3417 of Section XI following a failure of a valve to exhibit the required change of disk position. The staff's concern in this area has been expressed to individual licensees on many occasions. In order to provide guidance that is consistent with the Standard Technical Specifications and that can be applied generically, the staff developed Position 8 of Generic Letter 89-04 which states that the unrestricted grace period in the ASME Code is unacceptable. Once a component is declared inoperable, the action statement in the Technical Specifications would provide time for evaluation of the situation, including performing the test, before change is required in plant operating mode. A licensee may propose alternatives to the NRC staff's position. For example, a valve stroke time that is less than the limiting stroke time could be established as an alert time. If the alert time is exceeded and the limiting time is not, the licensee would initiate a 24-hour period for evaluating the condition of the valve before declaring it inoperable.

Question Group 44

Question

Address the conflicts between the background of the generic letter which states "The intent of testing is to detect degradation affecting operation and assess whether adequate margins are maintained" and Position 8 regarding the starting point for Technical Specification ACTION statements. This will require declaring components inoperable which are capable of fulfilling their safety function (i.e., operable).

Response

The staff does not see a conflict between the statement in the background and Position 8 of Generic Letter 89-04. Testing is intended to detect degradation of a component and to provide assurance that adequate margins are maintained. Where testing indicates that a component has undergone such degradation that its operability is in question (e.g., the limiting value of full stroke time for a valve has been exceeded), Position 8 of the generic letter requires that the component be declared inoperable.

Question Group 45

Question

Referring to paragraph 8, after testing a pump and declaring it inoperable, is it acceptable to replace the process instruments with test instruments which are more accurate then retest, rather than recalibrating process instruments?

Response

Accuracy of the instrumentation is an important consideration in the performance of a test. In addition, the test must be performed in a manner that allows the test results to be compared for trends. This consistent performance of a test is sometimes referred to as "repeatability." Where instruments with different characteristics (such as with respect to range and accuracy) are used for each test, the ability to monitor the results for trends may be lost. Therefore, the staff prefers that the same set of instruments be used in performing tests on a particular component. This can be

accomplished most readily by use of properly calibrated process instruments installed in the system. The installation of test instrumentation that are more accurate than the process instruments is allowed by the ASME Code. For the example cited by the question, after declaring the pump inoperable because of the test results from process instruments, the operability of the pump may be verified by more accurate test equipment. Because the same instruments should be used for tests to monitor the results for trends, the licensee should recalibrate the process instruments for their continued use or should establish a procedure to use the more accurate test instruments from that point forward.

Current Considerations

Paragraph 4.5 of OM-10 discusses establishment of new reference values as may be necessary when using different instruments. Paragraph 6.1, "Acceptance Criteria," of OM-6 allows that "[w]hen a test shows deviations outside of the acceptable range . . . the instruments involved may be recalibrated and the test rerun." (See Section 5.6).

Question Group 46

Questions

In reference to Item 8 of Attachment 1, it states that the provisions to recalibrate in IWP-3230(d)
can only be done after the component is declared inoperable. What if, during a pump test, before test data is taken, it is clearly observed that a gauge is malfunctioning. Do I need to declare the pump inoperable, or can I stop testing and recalibrate?

If it is obvious that a test has been run incorrectly (i.e., a recorded parameter is out of the range of the device being tested), do we still enter the action statement before re-running the test?

Response

If a test is under way (regardless of whether test data have been taken) and it is obvious that a gauge is malfunctioning, the test may be halted and the instruments should be promptly recalibrated. One example might be a wildly fluctuating gauge. It should be noted, however, that, in many situations where anomalous data are indicated, it may not be clear that the problem lies with the gauge. In these cases, the licensee should attribute the problem to pump performance. The licensee would then declare the pump inoperable and evaluate the condition of the pump during the time allotted by the applicable Technical Specification.

Current Considerations

Section 3.1.2 and Section 6 discuss further information. After issuing GL 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," the NRC held workshops for regional offices and industry representatives and gave guidance on nonconforming conditions that apply to IST requirements.

NRC STAFF POSITION 9, "PUMP TESTING USING MINIMUM-FLOW RETURN LINES WITH OR WITHOUT FLOW MEASURING DEVICES"

Position 9

An inservice pump test requires that the pump parameters shown in Table IWP-3100-1 be measured and evaluated to determine pump condition and detect degradation. Pump differential pressure and flow rate are two parameters that are measured and evaluated together to determine pump hydraulic performance.

Certain safety-related systems are designed such that the minimum-flow return lines are the only flow paths that can be utilized for quarterly pump testing. Furthermore, some of these systems, do not have any flow path that can be utilized for pump testing during any plant operating mode except the minimum-flow return lines. In these cases, pumping through the path designed for fulfilling the intended system safety function could result in damage to plant equipment. Minimum-flow lines are not designed for pump testing purposes and few have installed flow measuring devices.

In cases where flow can only be established through a non-instrumented minimum-flow path during quarterly pump testing and a path exists at cold shutdowns or refueling outages to perform a test of the pump under full or substantial flow conditions, the staff has determined that the increased interval is an acceptable alternative to the Code requirements provided that pump differential pressure, flow rate, and bearing vibration measurements are taken during this testing and that quarterly testing also measuring at least pump differential pressure and vibration is continued. Data from both of these testing frequencies should be trended as required by IWP-6000. Since the above position is a deviation from the Code-required testing, it should be documented in the IST program.

In cases where only the minimum-flow return line is available for pump testing, regardless of the test interval, the staff's position is that flow instrumentation which meets the requirements of IWP-4110 and 4120 must be installed in the mini-flow return line. Installation of this instrumentation is necessary to provide flow rate measurements during pump testing so this data can be evaluated with the measured pump differential pressure to monitor for pump hydraulic degradation.

NRC Bulletin 88-04, dated May 5, 1988, advised licensees of the potential for pump damage while running pumps in the minimum-flow condition. The above guidelines for meeting the Code or performing alternative testing is not intended to supercede the thrust of this Bulletin. Licensees should ensure that if pumps are tested in the low flow condition, the flow is sufficient to prevent damage to the pump.

Questions and Answers on Position 9

Question Group 47

Question

With reference to the Generic Letter item 9, in cases where only the minimum flow return line is the available path, would the generic letter be revised to consider reducing the 5-minute time required for stabilizing the pump as required by IWP-3500(a) to a lesser time such as 2 or 3 minutes in order to minimize the possibility of pump damage occurring during the pump's operational test?

Response

The staff does not intend to revise Generic Letter 89-04 to change any current positions or to address additional issues. If there is a problem concerning compliance with the ASME Code, requests for relief from the Code may be submitted.

Current Considerations

Paragraph 5.6, "Duration of Tests," of OM-6 specifies the minimum run time as 2 minutes. Refer to Section 5.8 of the guidelines.

Question Group 48

Question

If mini-flow recirculation lines are instrumented for flow, are quarterly tests alone, which measure flow, differential pressure, and vibration, acceptable?

Response

Mini-flow recirculation line tests are not prohibited by Section XI of the ASME Code. The staff, however, believes that a mini-flow test can be detrimental to a pump and is not a desirable test configuration. These tests produce data of marginal value and provide little confidence in the continued operability of the pump. The staff would prefer a more comprehensive test performed at some reduced frequency rather than relying only on the mini-flow test that is performed quarterly. This particular issue may be a topic of another generic letter addressing inservice testing in the future.

Current Considerations

Paragraph 3.2, "Bypass Loops," of OM-6 allows that "[a] bypass test loop may be used, provided the bypass is designed to recognize the pump manufacturer's operating conditions for minimum flow operation."

Question Group 49

Question

Many mini-recirculation lines have no means to adjust flow to a reference value prior to taking data. Thus, this recirculation flow is relatively fixed. Since Table IWP 3100-2 limits are placed in differential pressure, what criteria should be used to place limits on flow? Even with a fixed-flow system, measured flow will demonstrate some variation test-to-test due to instrument repeatability, operator interpolation of needle position on meter face, etc. Table IWP 3100-2 limits do not seem appropriate for flow in this case. To allow both flow and differential pressure to vary within 13% ranges does not appear to meet the intent of Section IWP.

Response

In most cases, mini-flow recirculation lines do not have flow adjustment capability. The ASME Code recognizes this in IWP-3110, which permits the use of one or more fixed sets of reference values for pump testing. The

Code identifies acceptance criteria for both differential pressure and flow rate in Table IWP-3100-2. It is not permissible for both parameters to vary during a test. With one parameter set at a reference value, the other parameter is compared to the acceptance criteria.

Current Considerations

Refer to Section 5.3 of the guidelines. Paragraph 5.2(c) of OM-6 allows that "[w]here system resistance cannot be varied, flow rate and pressure shall be determined and compared to their respective reference values."

Question Group 50

Questions

It is more desirable to test pumps at substantial flow conditions than on mini-recirculation lines. Should entire trains of safety systems be declared inoperable and 72 hour action statements entered solely to realign these systems for inservice testing? Does the obtaining of "better" pump data justify the increased risk to the public during the time the system cannot perform its safety function?

Response

As stated in the question, it is more desirable to test pumps with substantial flow than in mini-flow recirculation configurations. The NRC staff, however, does not agree with the questioner that the performance of inservice testing results in increased risk to the public. Inservice testing is intended to provide assurance of the continued operability of pumps and valves. To provide this assurance, it is considered acceptable for a Technical Specification action statement to be entered on infrequent occasions in order to test a component. Where a system must be taken out of service to perform a test, it is likely that, in the event of a plant emergency, the system could be realigned for operation in short order. Where one train of a safety system will be disabled for an extended period or both trains of the system must be made inoperable to perform a test, the licensee should propose a testing schedule that provides for verification of component operability with testing performed during periods (e.g., refueling outages) when availability of the system is not essential to plant safety.

Current Considerations

Refer to Section 3.1.2.

Current Considerations for Position 9

The OM committee has prepared changes to the OM Code to include a "comprehensive pump test" for testing at full or substantial flow conditions to monitor Code parameters. The changes were in the 1994 Addenda to the OM Code.

When testing using the guidance in Position 9, if a pump is in the alert or required action range, it is recommended that efforts be made to take corrective actions during the outage and repeat the test post-maintenance. When corrective actions cannot be taken during the outage (e.g., a pump rebuild is needed, but parts are not available), or when maintenance must be performed during power operations (e.g., to clean mussel buildup from the pump internal cavity), it is recommended that testing to the extent practical during power operations be conducted following corrective actions and prior to returning the pump to service. Additionally, it is recommended that an evaluation of the results be performed and compared to historical results of both the

quarterly testing on minimum recirculation and the full- or substantial-flow testing performed during outages to further ensure that the pump rebuild was adequate. To meet Position 9 guidance, the full-flow testing would be conducted at the first available opportunity.

NRC STAFF POSITION 10, "TESTING CONTAINMENT ISOLATION VALVES"

Position 10

All containment isolation valves (CIVs) that are included in the Appendix J, program should be included in the IST program as Category A or A/C valves. The staff has determined that the leak test procedures and requirements for containment isolation valves specified in 10 CFR 50, Appendix J are equivalent to the requirements of IWV-3421 through 3425. However, the licensee must comply with the Analysis of Leakage Rates and Corrective Action requirements of Paragraph IWV-3426 and 3427(a).

IWV-3427(b) specifies additional requirements on increased test frequencies for valve sizes of six inches and larger and repairs or replacement over the requirements of IWV-3427(a). Based on input from many utilities and staff review of testing data at some plants, the usefulness of IWV-3427(b) does not justify the burden of complying with this requirement. Since this position represents a deviation from the Code requirements, it should be documented in the IST program.

Questions and Answers for Position 10

Question Group 51

Questions

In regard to Attachment 1, Position 10, why can't valves other than containment isolation valves (CIVs) that are 6 inches or larger be exempt from the needless requirement of IWV-3427(b)?

Does the exemption from IWV-3427(b) pertain to pressure isolation valves (PIVs) as well as Appendix J valves?

Do PIVs have relief from IWV-3427(b)? Item 10 on Attachment 1 only discusses CIVs.

Response

The relief from IWV-3427(b) of the ASME Code granted through Generic Letter 89-04 only applies to CIVs under containment leak rate testing. This position was written in response to numerous relief requests concerning CIVs from licensees that cited difficulties in trending leak rate data. We were not aware of similar difficulties with PIVs during reactor coolant system leak testing. The relief from the explicit requirements of IWV-3427(b) should not be taken as an indication that the NRC staff is disregarding the value of trending CIV leak testing data. Until more information is available on appropriate leak rate limits and on reasonable scatter of data, however, Position 10 will remain in effect for CIVs. The NRC staff anticipates developing a more comprehensive position of the subject in a future generic communication to licensees.

Current Considerations

Alternatively, the licensee may conduct leak-rate IST in accordance with OM-10, which does not include the IWV-3427(b) requirement. Refer to Section 4.4.5.

Current Considerations for Position 10

In revising 10 CFR 50.55a(b), the NRC incorporated, by reference, the 1989 edition of Section XI, and created an exception to the requirements for containment isolation valves in paragraph 4.2.2.2 of OM-10. Until this exception is deleted from the regulation, leakage rates for containment isolation valves are required to be monitored in accordance with IWV, Position 10, or paragraph 4.2.2.3 of OM-10. Recently, the OM committee created a task force to respond to the staff's concerns and a paper was presented to the OM Subcommittee on Performance Testing in Baltimore, Maryland, September 1993. (See Section 4.4.5).

NRC STAFF POSITION 11, "SCOPE OF INSERVICE TESTING PROGRAMS"

Position 11

The 10 CFR 50.55a requires that inservice testing be performed on certain ASME Code Class 1, 2, and 3 pumps and valves. Section XI Subsections IWP-1100 and IWV-1100 defines the scope of pumps and valves to be tested in terms of plant shutdowns and accident mitigation. The plant's FSAR (or equivalent) provides definitions of the necessary equipment to meet these functions. The staff has noted during past IST program reviews and inspections that licensees do not always include the necessary equipment in their IST programs. Licensees should review their IST programs to ensure adequate scope. Examples that are frequently erroneously omitted from IST programs are as follows:

(a) BWR scram system valves

(b) control room chilled water system pumps and valves

(c) accumulator motor operated isolation valves, or accumulator vent valves

(d) auxiliary pressurizer spray system valves

(e) boric acid transfer pumps

(f) valves in emergency boration flow path

(g) control valves that have a required fail-safe position

(h) valves in mini-flow lines

It should be recognized that the above examples of pumps and valves do not meet the IWP and IWV scope statement requirements for all plants.

The intent of 10 CFR 50 Appendix A, GDC-1, and Appendix B, Criterion XI, is that all components, such as pumps and valves, necessary for safe operation are to be tested to demonstrate that they will perform satisfactorily in service. Therefore, while 10 CFR 50.55a delineates the testing requirements for ASME Code Class 1, 2, and 3 pumps and valves, the testing of pumps and valves is not to be limited to only those covered by 10 CFR 50.55a.

Questions and Answers for Position 11

Question Group 52

Question

IWV-1200 specifically exempts control valves from testing. Why are these valves included in the list of examples in IST program scope as part of Attachment 1?

Response

IWV-1200 of the ASME Code does not exempt valves that have a required safety function from the provisions of Section XI. Code interpretation XI-1-83-59 states that it is a requirement of Section XI that flow control valves that have one or more defined safety-related functional requirements be classified Category A or B, as applicable, and tested in accordance with the requirements of Subsection IWV. This philosophy applies to all control valves that have one or more defined safety-related functional requirements.

Current Considerations

On October 8, 1985, the ASME Code committee revised interpretation XI-1-83-59R with the reply stating "[i]t is the Owner's responsibility to categorize valves as required by IWV-1400 and in accordance with the criteria IWV-2200." Refer to Section 4.2.9.

Question Group 53

Questions

Please clarify the last three lines of Generic Letter item 11 of Attachment 1.

The scope statement of Position 11 is much too vague. The position with respect to program scope must be clarified and explained to provide further guidance and should also address the backfit issue. In addition, in the past, it has been the practice of adding additional components to the scope of IST Programs via the authority of 10 CFR 50.55a(g)(ii). How will this be addressed in the future?

Do safety-related components outside of Class 1, 2, and 3 need to be tested in accordance with the Code and be included in the IST program, or is it the intent to have some form of testing to demonstrate operability?

In reference to Item 11 of Attachment 1, please clarify the intent of the last sentence of this item: "Therefore, while 10 CFR 50.55a delineates the testing requirements for ASME Code Class 1, 2, and 3 pumps and valves, the testing of pumps and valves is not to be limited to only those covered by 10 CFR 50.55a."

How will the NRC review pump and valve testing not included in the scope of the IST program? Will the ASME Code requirements be applied to these components?

Response

Criterion 1 in Appendix A to 10 CFR Part 50 requires, among other things, that components important to safety be tested to quality standards commensurate with the importance of the safety functions to be performed. Appendix B to Part 50 describes the quality assurance program, which includes testing, for safety-related components. Paragraph (g) of 10 CFR 50.55a requires the use of Section XI of the ASME Code for inservice testing of components covered by the Code. For other components important to safety, the licensee also has the burden of demonstrating their continued operability. The list provided in Position 11 contains examples of components that have been shown by our experience to be frequently omitted from a routine testing program. The licensee should review the safety significance of these identified components to ensure that the inservice testing is adequate to demonstrate their continued operability. NRC inspectors will evaluate the adequacy of such testing. The Code-required IST program is a reasonable vehicle to provide a periodic demonstration of the operability of pumps and valves not covered by the Code. If non-Code components are included in the ASME Code IST program (or some other licensee-developed inservice testing program) and certain Code provisions cannot be met, the Commission regulations (10 CFR 50.55a) do not require a "request for relief" to be submitted to the staff. Nevertheless, documentation that provides assurance of the continued operability of the non-Code components through the performed tests should be available at the plant site.

Current Considerations

Refer to Section 2.2.

Question Group 54

Questions

The Diesel Generator air start system direction that was in the initial draft of Generic Letter 89-04 has now been dropped. Can we remove the testing from our program?

In Position 11, why were the emergency diesel generator support system components deleted from the list in the final version of the letter?

Response

Typically, the Emergency Diesel Generator air start system is not Code Class 1, 2, or 3 and, therefore 10 CFR 50.55a does not require the testing of these components to be performed under the provisions of the ASME Code. Emergency Diesel Generator air start, cooling water, and fuel oil transfer systems, however, are considered safety related. As such, Appendices A and B to Part 50 require that they undergo component testing.

Current Considerations

Refer to Sections 2.2 and 3.4.

Question Group 55

Question

Are the items listed in Attachment 1 number 11c, d, and e specific to PWRs?

Response

The listed items were not intended to apply to every plant. Each licensee should review the list and determine those items applicable to its facility. In response to the specific question, items 11c, d, and e do not apply to BWRs.

Current Considerations for Position 11

Refer to Section 2.2.

OTHER QUESTIONS SUBMITTED DURING GENERIC LETTER 89-04 MEETINGS

Schedule for Implementing the Generic Letter

Question Group 56

Questions

The scope of the Generic Letter is broad and requires more than the allotted 6 months for response. What guidance can be given for extension of the response date?

How much is expected to be done at the end of 6 months?

What is the schedule requirement for implementing additional or revised testing arising from the activities related to the generic letter? Keep in mind that the results of reviews and evaluations must be available prior to revising and implementing the related procedures.

Do the requirements to conform to the stated positions of the generic letter within 6 months of the date of the letter mean that all procedures have to be revised and approved within this 6 month period, or is it acceptable to have procedures in the process of being revised within the 6 month period?

Due to outage schedules and constraints, are there any provisions for not completing all equipment modifications within 18 months of the date of confirmatory letter, or the first scheduled refueling outage following the confirmation letter?

How are extensions of the October 3, 1989 deadline viewed; what factors are considered on such requests?

Do utilities have to contact their Project Managers to schedule immediately a meeting to resolve any requested relief requests outside the generic letter (prior to required test frequency) to obtain approval and avoid violation after submittal, or will there be a grace period?

Response

With regard to plants not listed in Table 1 or 2 of Generic Letter 89-04, the intent has been that, by the end of six months, (1) the IST program would be revised to incorporate all the requirements of the generic letter, (2) the procedures would be written and implemented, (3) the confirmation letter and any necessary additional relief requests would be submitted to the NRC, and (4) a schedule would be provided for any plant modifications necessary to comply with the requirements. It has been additionally intended that any necessary equipment modifications be completed within 18 months of the date of the confirmation letter or the first scheduled refueling outage following the confirmation, whichever occurs later.

We have received several comments stating that this schedule may not be achievable. For example, one licensee noted that acceptance criteria need to be developed before procedures can be prepared and implemented. Following preparation of the procedures, several weeks were said to be needed to provide the necessary training to plant personnel on various shifts. Another licensee indicated that the resources necessary to implement the generic letter had to be determined to justify to management the need for contractor assistance. Even where licensee management accepts the justification for

contractor assistance, it was said that few highly qualified contractors in the area of inservice testing are available. With respect to equipment modifications, one licensee hypothesized a situation where a refueling outage began soon after the confirmation letter and the next refueling outage would be a month or two beyond the 18-month limit.

Several reasons that the NRC staff does not consider sufficient to justify not meeting the schedule in the generic letter were also given by meeting attendees. These insufficient reasons include (1) the lack of activity relative to Generic Letter 89-04 until the NRC meetings took place and (2) the lack of a designated individual responsible for IST at the plant when the generic letter was issued. If any particular plant anticipates a problem in meeting the schedule, this should have been discussed with the NRC Project Manager. In determining the necessary schedule extensions, licensees should have limited the request for schedule relief to the smallest set of revisions to the IST program and procedures, and modifications to equipment. The information submitted to the NRC by the licensee to justify a delay in meeting the schedule established in Generic Letter 89-04 should have contained at least (1) a description of the actions to be completed by October 3, 1989, including an interim schedule of accomplishments by system and component, (2) a description of the action for which an extension in the schedule is being requested with the specific proposed schedules for the program, procedures, and any necessary equipment modifications, and (3) a discussion of the specific reasons for the need to extend the schedule, including the hierarchy of the proposed schedule extensions as established by their importance and dependence on the completion of other actions.

Question Group 57

Questions

Does the NRC expect the licensee to take any specific action prior to receipt of the SER?

Is it the intent to have all implementing procedures of changes required by Attachment 1 be completed within 6 months? Does this apply to Table 1 and Table 2 plants?

Response

The positions in Generic Letter 89-04 address both program and procedural issues. Positions 4, 5, and 8 are related to procedures and would not be covered by a review of the IST program. The remainder of these positions are related to both the IST program and the procedures. For Table 1 plants, we believe that it would be reasonable for the generic letter provisions to be implemented within six months of issuance of the SER. The precise schedule, however, will be specified in the SER. The schedule for Table 1 plants is keyed to the SER because the licensee needs an opportunity to review the SER before having to commit to an implementation schedule. Nevertheless, the staff encourages Table 1 plants to begin verifying that plant procedures are consistent with the generic letter before receipt of their SER. Table 2 licensees should verify that plant procedures are consistent with the generic letter positions within six months of issuance of Generic Letter 89-04.

Confirmation Letter

Question Group 58

Questions

With our confirmation letter will be a couple of relief requests. How will they be handled? Can we assume relief is granted? Do we have to wait for your SER?

What is the level of information expected in the response to the generic letter? How detailed must it be?

Is "relief" required for items per Generic Letter 89-04 which differ from the ASME Code?

Response

A confirmation letter from a particular licensee may contain several forms of information, depending on the IST program. The confirmation letter should address the extent to which the licensee's program and procedures meet the positions attached to Generic Letter 89-04. It is anticipated that most licensees will have to modify their IST programs as a result of the generic letter. The revised program should accompany the confirmation letter. In cases where a generic letter position that approves an alternative to the ASME Code is being followed, a relief request is not required, but the deviation from the Code should be documented in the IST program along with its method of approval (i.e., through the relevant generic letter position). As a suggestion, licensees may reserve the use of the term "relief request" for those cases where specific staff review and approval are needed before implementation.

If a licensee cannot meet one of the generic letter positions, an alternate test method may be performed, providing the provisions of Paragraph B of the generic letter are met. This Paragraph B approach for generic letter positions does not require a relief request but the justification should be retained in the IST program. In that the generic letter does not supersede the regulations in any way, the option still exists to submit requests for relief from the Code for program-related positions in the generic letter. For plants not listed on Table 1 or 2 (i.e., plants that will be submitting a confirmation letter), any requests outside the scope of the generic letter that were submitted before April 3, 1989 are approved by the issuance of the Generic Letter. If a relief request is submitted after April 3 or a relief request submitted before April 3 is modified, the requested relief may not be implemented until receipt of staff approval. The date by which these relief request approvals are needed should be specified in the confirmation letter so that their review may be prioritized.

Verification of Generic Letter Implementation

Question Group 59

Questions

When and how is guidance going to be provided to the Regional offices on inspection and enforcement of the issues stated in the Generic Letter?

Regarding the approval of the IST Program scope and related relief requests, it appears that NRC is not planning to perform detailed review and is merely stating that their responsibility re. 10 CFR 50.55a is satisfied by the generic letter supplemented by plant site inspections. This eliminates the pre-approval discussions done previously; however little guidance is provided to give licensees's confidence that the subjective opinions of the various inspectors can be anticipated before the fact. It would help if there were some mechanism whereby a utility could receive an

official opinion/ determination with respect to program scope and relief request queries in a timely manner.

With respect to inspections, will there be an inspection module developed, or is this to be an "ad hoc" type of inspection?

To what extent is the NRC planning to make their guidance uniform policy for all inspections? It is very important that uniform policy be applied at all facilities, regardless of the composition of inspecting teams.

Many alternatives that are given seem vague and subject to interpretation. Who decides adequacy and what are the ramification of differences between licensees and the NRC?

What guidance will Region/NRR auditors use in accessing IST Programs for Table 1 or 2 plants? Will they use the SER or the generic letter?

Response

The NRC staff has been performing activities to provide assurance that application of the generic letter by the inspectors will be consistent. For example, a meeting to discuss the generic letter was held in Rockville, Maryland, in April 1989, and each NRC Region office was represented. A temporary instruction (TI) will be written by NRC/NRR, providing guidance to the regional inspectors on prioritized inspection activities for IST and the Generic Letter 89-04. It is intended that the TI will be completed in six to eight months. Periodic NRR/Region counterpart meetings will be held to ensure consistency on the IST subject matter. Additionally, the inspection teams are expected to be made up of NRC/NRR, NRC Region, and contractor personnel, thereby providing for consistent communication. These inspections will assist the staff in verifying the adequacy of the IST program rather than verifying adequacy by the traditional staff review. It is intended that the inspectors will rely on the generic letter, the temporary instruction, and the particular SER for Table 1 and 2 plants. These inspections will not be performed on an ad hoc basis. Although only relief requests will receive NRC review before their implementation, licensees may direct questions concerning interpretation of requirements on the IST program and procedures to the NRC staff through their Project Manager.

Question Group 60

Questions

If the SER does not constitute NRC concurrence that the generic letter requirements (at least those that are routinely addressed in the program submittal) are met, then how will issuance of SERs to Table 1 or Table 2 plants constitute NRC approval of the IST program?

Will all SERs issued in the near future, or recently issued, incorporate all the issues in the generic letter?

Response

It is recognized that the positions in Generic Letter 89-04 go beyond the areas covered by past SERs on inservice testing. Positions 4, 5, and 8 deal with procedural matters that are not reflected in the IST programs and SERs. Therefore, it cannot be expected that an SER would constitute concurrence that all of the generic letter positions have been met. The SERs for Table 1 and 2 plants explicitly contain approval only for relief requests. These SERs can be considered as providing

IST program approval only in that the practice has been to perform a thorough review and identify problem areas that need resolution.

Updates and Revisions of the IST Program

Question Group 61

Questions

If relief requests exist that do what one, or any, of the positions state, should these requests be retracted with the confirmation/resubmittal?

Do "changes to the program" include administrative changes such as referencing different procedures, or just intent of program?

In instances when a licensee modifies their IST program beyond that currently submitted to the NRC, [as discussed in] Paragraph D of the generic letter, and reviews the modification against the positions found in Attachment 1, is it required that the IST program modifications be submitted to the NRC?

Our plant is on Table 1. We have revised the program to identify Generic Letter 89-04 as a reference and made some minor changes consistent with the letter. Do we need to resubmit the program?

Are all future revisions to the IST program required to be submitted to the Commission? Section D of the generic letter is silent on this subject.

Does the generic letter mean that program submittals are no longer required? Under what circumstances are submittals still required?

Should we provide changes to the NRC as soon as made even if numerous "trivial" or "typo" changes are being issued? What about the "complete and accurate" requirement in 10 CFR 50.9?

Should updated plans document specific relief requests that were approved on a prior date?

Since programs are revised frequently and in a piece-meal fashion, does the NRC expect each change to be submitted as soon as it's made, or is once per year, once per two years, etc. adequate?

Response

The NRC staff should have the current IST program being implemented at each plant even if this means that a licensee sends multiple submittals to the NRC each year. The most up-to-date version of an IST program will not be used for the purpose of the staff performing complete program reviews as has been done in the past. Rather, it is needed to prepare for IST inspections and to assist in the review of relief requests. The staff would prefer to have a complete program rather than individual changed pages. The identification in the program of the mechanism for approval of specific relief requests would be particularly helpful. That is, the program should indicate whether the approval is (1) through a position in Generic Letter 89-04, (2) by virtue of the relief request being outside the scope of the positions in the Generic Letter and submitted before April 3, 1989, (3) through the mechanism described in Paragraph B in the generic letter, or (4) obtained using a relief request that will need staff approval by a specific date. Currently-approved relief requests that follow a generic letter position should not be retracted but the source of approval (i.e., the generic letter) should be identified in the IST program. Non-technical and minor typographical changes may be held until the licensee has collected several such changes. This is considered to meet the intent of 10 CFR 50.9 for complete and accurate

information. For plants not listed in Table 1 or 2, revisions to the IST program should be sent when the confirmation letter is submitted.

Current Considerations

The program documents submitted to the NRC are used to prepare for IST inspections and to review relief requests. The program document need not be submitted more often than necessary to reflect major changes, but it is expected that licensees make changes to the document periodically, and once per cycle, or once every other cycle, a complete, up-to-date, copy should be submitted to the NRC. The IST program document that is used by the NRC for situations that arise at facilities should be reasonably up to date. If the licensee keeps the IST program document up to date, it would not be a substantial administrative cost to copy it once every two to three years and submit it to the NRC so that the copy used by the staff reflects changes in the pump and valve lists. Unless a licensee makes changes to the IST program, there is no need to submit a copy more often.

Question Group 62

Questions

If valves are added to or removed from the system, does the change to the program require resubmittal? Can components be deleted without prior NRC approval?

Response

Neither the Commission regulations in 10 CFR 50.55a(g), in general, nor Generic Letter 89-04, in particular, require the licensee to obtain NRC approval on each test on every component in the IST program. As long as the program is consistent with the regulations, the ASME Code, and the Generic Letter, relief is not required. To amplify, deletions from or additions to the IST program do not necessarily require NRC approval. The burden is on the licensee to verify that their IST program is complete and all components that require IST are included and tested to the extent practical. If a particular component is deleted from the IST program, documentation of the reason in an appropriate place is recommended.

Question Group 63

Questions

Please clarify the intent of the last sentence of [Section D]: "The modified program should comply with the disposition of relief requests in any applicable SER based on a previously submitted IST program." The sentence quoted above seems to apply to Table 1 or Table 2 plants only. Also, the sentence seems to allow the use of an extension of a previously granted relief request.

Response

Section D of the Generic Letter 89-04 applies to all plants. Previously approved relief requests remain valid. However, if a relief request has been denied in an SER, the SER usually provides information on the reason the relief request was denied and recommendations on appropriate actions for the licensee. The last sentence of Section D is indicating that these recommended actions should be followed.

Question Group 64

Questions

It is clear that if an NRC position is covered by Attachment 1, then the licensee must either comply with or follow the alternate provisions contained in Section B of the generic letter. But for program changes not covered by Attachment 1, [Section D] states that the provisions of 10 CFR 50.55a(g) should be followed. This infers that a relief must be submitted. Further, in accordance with the plant Technical Specifications, relief must be granted prior to implementation.

Response

It is correct that, where an IST program change is proposed that is outside the scope of the positions in the Generic Letter and does not meet the Section XI requirements, the licensee must submit a relief request to the NRC for review. The program change may not be implemented prior to staff approval.

Question Group 65

Questions

For plants with SERs, can changes to NRC reviewed and approved programs be made without additional submittals to the NRC? What if changes are in accordance with the generic letter?

Response

As described in the response to Question 61, licensees need to send any changes to their IST program to the NRC. If these changes are in conformance with Generic Letter 89-04, NRC review and approval are not necessary. The IST programs submitted to the NRC as a result of program changes should indicate the reasons for the changes and the relief requests, if any, that require staff review.

Relief Requests

Question Group 66

Questions

If a relief request issued for one unit has been approved, can, or will the turnaround time for approval of the same relief request on a second unit (for a two unit plant) be reduced?

For future relief requests outside the scope of Attachment 1, what is the perceived ability of the NRC regarding turnaround time?

Response

New relief requests will be evaluated on a priority basis. Therefore, the licensee should specify the date by which the relief is needed, and where possible, should provide additional information to assist in this review, such as "this relief request is identical to relief request number X in the Unit 1 IST program." The staff recognizes that, on occasion, there will be a need for rapid NRC response. The staff will make every available effort to be responsive to such needs.

Question Group 67

Questions

If revised relief request submittals are not considered approved, then do we continue working to the presently approved request?

Response

The approved relief request is controlling until the licensee receives approval of a revised relief request. As we have indicated above, if plant operations and ASME Code

requirements dictate relief request approval by a certain date, the licensee should indicate that date in the submittal containing the relief request.

Current Considerations

For discussion on updates to the IST program for the 120-month revision, see Section 3.3.3.

Question Group 68

Question

Does a relief request that is grandfathered but no longer required still need approval?

Response

By grandfathered relief request, we assume that the question is referring to a relief request not covered by the positions in Generic Letter 89-04 but submitted before April 3, 1989. Withdrawal of relief requests, regardless of the prior approval status, is permitted without NRC review, presuming the IST program remains consistent with the regulations, the ASME Code, or Generic Letter 89-04.

Question Group 69

Questions

Is a continuous feedback system required to provide a mechanism to reverify that relief requests are still valid based on ongoing maintenance and plant modification activities?

Response

The licensee is expected to have a feedback system that will maintain the IST program as a living document that will be updated to be consistent with changes in plant configuration. If a particular relief request is no longer required because of changes in hardware, system design, or new technology, the licensee is expected to revise the program to withdraw the relief request. Conversely, if a system modification results in the addition of a component to the IST program, the feedback system should ensure that the Code requirements or Generic Letter 89-04 provisions are met, or that a relief request is submitted, as appropriate.

Question Group 70

Questions

Relief request requirements are changed in the Generic Letter. Previously approved relief requests are now being challenged because the NRC uses a different reviewer. This appears to be a backfit issue.

If relief was granted by the NRC for an item during the first interval, is the same relief granted during the second interval even though the relief is not in compliance with GL 89-04?

In the 1st 10 Year submittal, an SER approved a relief request which is not consistent with the alternative positions in Generic Letter 89-04. Does the generic letter void previously approved alternatives/relief requests (via an SER) or may these alternatives/relief requests not consistent with Generic Letter 89-04 still be considered valid and so documented in the IST program?

When will it be known what the staff's position is on SER approved relief requests that contradict Generic Letter 89-04 dictated testing?

Response

We assume that the questions are not referring to interim reliefs but rather relief requests on which the NRC staff prepares an SER. Assuming that the reviewed information was complete, accurate, and remains up-to-date, an approved relief request may be currently followed even if it conflicts with the Generic Letter. These types of situations will be reviewed in preparation for inspections. Safety significant differences between the approved relief request and the Generic Letter will be discussed in an effort to obtain licensee agreement to adopt the Generic Letter position. Where agreement cannot be reached, the staff may consider initiation of backfit procedures. Relief requests are subject to review by the NRC staff at the ten-year update for consistency with current NRC regulatory positions, including those contained in Generic Letter 89-04. Reliefs that are inconsistent with the generic letter would likely not be approved for a succeeding ten-year interval.

Question Group 71

Questions

What is the long term status of the "relief" system?

Response

The section of the Commission's regulations pertaining to the relief request system is 10 CFR 50.55a. This regulation is not, and cannot be, superseded by Generic Letter 89-04. A revision to this regulation is under consideration. With respect to the "relief" system as described in the regulation, the staff may, at some time in the future, issue additional guidance to provide a pre-approval mechanism much as the generic letter does in certain of its positions.

Current Considerations

Though the NRC did not "pre-approve" relief requests through the guidelines, several sections in the guidelines allow the licensee to use certain OM-6 and OM-10 requirements pursuant to 10 CFR 50.55a(f)(4)(iv). (See Section 1).

Question Group 72

Questions

To conform to generic letter positions, what does "document in the program" mean? Should relief requests be generated with the understanding that the generic letter grants them? Or does a statement included in the program describing how the deviation conforms to the generic letter suffice?

Response

The IST program should include the deviation from the ASME Code that the licensee intends to take, and the basis for the change just as a program would normally contain. There should be sufficient information in the program to demonstrate that Generic Letter 89-04 is applicable to the situation in question and that the testing being performed conforms to the generic letter.

Current Considerations

Although the documents need not be in the format of a relief request, the position would typically be clearly referenced for each applicable component. If the format is a relief request, the licensee would typically state that it is considered approved by the GL 89-04 position. (See Section 2.5.3).

Question Group 73

Questions

Is the following statement correct? A relief request submitted prior to April 3, 1989 but not discussed in any SER and is not a subject of generic letter attachment 1 is approved for use without any further utility reviews.

Response

Relief requests that were on the docket before April 3, 1989, for plants that are not in Table 1 or 2 in Generic Letter 89-04 and are topics that were not discussed in Attachment 1 are approved by this generic letter. Any relief requests outside of the Generic Letter positions that are submitted after April 3, 1989, will require staff review and approval before implementation. The response to Question 74 explains the basis for this approach. Other statements regarding utility's required actions for the review of implementing procedures additionally apply.

Question Group 74

Question

What is the NRC's basis for stating that approval is by virtue of the generic letter for previously submitted relief requests when such reliefs could be outside the scope of the positions in the generic letter and have not undergone NRC review?

Response

From the general knowledge of the relief requests, the NRC staff selected the technical issues considered the most significant to be addressed by Generic Letter 89-04. The NRC staff checked a sampling of the current IST programs to provide confidence that those issues not addressed in the Generic Letter were not highly safety significant. Additional issues that would require the NRC staff to perform a detailed regulatory analysis may be addressed in future generic guidance.

Question Group 75

Questions

Regarding a multi-site, if one unit has an approved SER which grants relief on items which do not meet all the criteria of the generic letter, can the approved SER provide a basis for the other unit to go ahead and implement the relief request prior to NRC re-review (assuming design differences do not exist between the two units)?

Response

When relief is granted in an SER for one particular unit on a multiple unit site, that relief applies only to the one unit even if the other unit is essentially identical. If an SER is written for two (or more) units, the relief would apply to all units specified in the SER. The SER for one unit may not be used as a basis for implementing the request before staff approval. See also the response to Question 66.

Question Group 76

Questions

If an SER that is received by a plant on Table 1 after the generic letter was issued denies a relief, and another plant that is not getting an SER has the same relief request grandfathered (approved), is this fair?

Response

Such situations will be considered by the NRC staff when preparing for plant inspections. Safety significant differences between the approved relief request and Generic Letter 89-04 will be discussed at that time to try to obtain licensee agreement to follow the generic letter. If agreement cannot be reached, the staff will consider the need to initiate backfit procedures.

Question Group 77

Questions

Does the first sentence of [the IST PROGRAM APPROVAL] section apply to Table 1 and Table 2 plants? The last sentence infers it does not.

Response

The first sentence of the "IST PROGRAM APPROVAL" section of Generic Letter 89-04 states that "[t]his generic letter approves currently submitted IST program relief requests for licensees who have not received an SER provided that they (1) review their most recently submitted IST programs and implementation procedures against the positions delineated in Attachment 1 and (2) within 6 months of the date of this letter confirm in writing their conformance with the stated positions." This sentence applies only to plants not listed in Table 1 or 2.

Question Group 78

Questions

In the approval process, when an SER conditionally gives relief and requires further plan changes, is an SER supplement provided, or is relief approved by letter, or is the relief granted based on conformance to the SER stipulations?

Diablo Canyon's SER grants several relief requests with conditions. We are revising reliefs to meet these conditions. Will we need NRC approval of revised reliefs prior to implementation?

Response

If the conditional approval specifically identifies what must be done to obtain relief, then conformance with the condition is complying with the relief. A revised program should be sent to the NRC stating that the conditions have been met. In that case, a follow-up SER would not be issued. Where the relief request is denied and the staff asks for more information (e.g., additional analysis or basis), then a specific request must be made to the staff for its review and approval before implementation by the licensee.

Recent and Upcoming SERs

Question Group 79

Questions

For a Table 1 plant, can changes be made to the IST program in accordance with the generic letter, even though the SER has not been received?

Response

Any licensee may revise its IST program to conform to Generic Letter 89-04. The licensee should provide changes to the IST program to the NRC as discussed in the responses to Questions 61 and 65.

Question Group 80

Questions

Will the implementation schedule for procedure changes and hardware changes be specified in the SER? Will this schedule be similar to the generic letter; e.g., will the licensee have six months to effect procedure changes and 18 months/next refueling outage to make hardware changes?

Response

The implementation schedule for procedure and hardware changes will be contained in the SER. The NRC staff expects the schedules to be similar to those in the Generic Letter 89-04. See also the response to Question 57.

Question Group 81

Questions

Before the SER is issued or for the first six months thereafter, is it permissible for the licensee to use its current IST program as submitted to the NRC?

Response

Licensees should use the current version of their IST program. The generic letter, in effect, provides interim approval of the existing program for Table 1 licensees until the SER is issued.

Question Group 82

Questions

If a plant with an SER on its IST program has a 10 year review up coming, how should that be handled? Resubmittal?

Response

A plant with an SER that is preparing a revision for the 10-year update should revise the program to be in conformance with the provisions of Generic Letter 89-04. The licensee does need to submit the program update to the NRC. The program should indicate which relief requests require NRC review and approval and which relief requests are already approved through the generic letter. Staff review and approval of the unapproved relief requests are required before the licensee implements the new program.

Alternatives to Positions in the Generic Letter

Question Group 83

Questions

Are the new criteria always to be used even if it is not applicable? Can it be partially implemented if the licensee feels the relief request is sufficiently justified by specific in house experience?

Response

Certain positions in the Generic Letter 89-04 are not fully applicable to all plants. For example, the components listed in positions 3 and 11 are not applicable to all plants. Further, Position 7 is applicable only to BWRs. Alternatives to the positions of the generic letter, or partial implementation as this question suggests, should be justified in accordance with Paragraph B of the letter. Specific in-house experience is only one of the sources of information that should be utilized when evaluating alternative testing, and is not a substitute for the criteria in Paragraph B of the generic letter.

Question Group 84

Questions

Will any deviations from the requirements in the Generic Letter be reviewed and an SER issued for those relief requests?

Is a relief request required when only 2 or 3 of the 4 items identified in Generic Letter Item B, page 3, can be met?

Generic Letter 89-04 states in Paragraph B, that when licensees are unable to comply with the positions of Attachment 1, evaluation of alternate testing should address [four criteria]. Is it mandatory for each instance to address all 4 of the above items? In some instances or situations, the above items may not apply, or only a portion may apply. When evaluating an alternate test to one of the Positions of Attachment 1 of Generic Letter 89-04, may the alternate test be implemented without prior NRC approval providing an evaluation is performed and documented and retained in the IST Program? Does the documented alternative test evaluation in the IST program have to be formally submitted to the NRC as an IST program revision, and if so, in what time frame?
On Page 2 of Ted Sullivan's review, he indicated that the NRC will not issue SERs in Attachment 1 items and justified alternatives. Are the justified alternatives the 4 points on past component history? Can I use these 4 alternatives to justify a deviation from the Attachment 1 positions? If so, are these then approved by the generic letter? After issuing a confirmatory letter, can I go through the above process to get "automatic" or pre-approval of Attachment 1 exceptions in the future? Can the 4 points be used for non Attachment 1 items following a similar process?

For relief requests not covered by this generic letter, is (in accordance with Technical Specification 4.0.5) specific written approval required prior to implementation?

Response

Assuming that Section XI will not be followed, Paragraph B of the Generic Letter 89-04 provides guidance for the situation in which a licensee is unable to comply with one of the positions of the generic letter because of design considerations or personnel hazard (as opposed to inconvenience). In such a situation, a licensee may develop an alternative testing method provided an evaluation is performed that addresses four specific criteria. The alternate test would not be acceptable unless the data associated with those criteria are sufficient to justify its adequacy for detecting degradation and ensuring continued operability. Where the four criteria are satisfied, the alternate test is considered approved by the generic letter and may be implemented. The specific justification is expected to be documented in the IST program submitted to the NRC, but need not be documented in the form of a relief request. This documentation will be subject to review for completeness, accuracy, and applicability during NRC inspections.

If at some time, the circumstances change such that the justification obtained through Paragraph B is no longer valid, then the licensee must submit a relief request for staff review before continuing the alternate test. Paragraph B may also be used when future revisions to the IST program relating to the generic letter positions are prepared. If all four criteria cannot be met, then a relief request must be submitted to the NRC and the alternate test method cannot be implemented until staff approval is received. For technical issues outside the scope of the positions in the generic letter, the alternative provisions of Paragraph B may not be applied and, in these

cases, a relief request must be submitted for NRC approval before implementation.

Current Considerations

Refer to Section 6 for additional information.

Question Group 85

Questions

Since 10 CFR 50.55a(g) is a top tier document, is it still permissible to use its provisions of the relief request process when the requirements of the Code/generic letter cannot be met? Must these relief requests be approved prior to implementation in accordance with plant Technical Specification 4.0.5? If a required test cannot be done, should the utility use the exigency provision?

Response

The provisions of 10 CFR 50.55a(g) remain available for the licensee's use for submitting relief requests and obtaining approvals. In accordance with the Technical Specifications, approval of relief requests is required before implementation. Relief requests should indicate the date by which approval is needed. Generic Letter 89-04 is providing another method of receiving approval of deviations from the ASME Code requirements. The licensee may prepare a case to justify postponement of a particular test on the basis of exigency. At this point, we are unaware of any aspect of Generic Letter 89-04 that would qualify for the exigency provision.

Current Considerations

Refer to Section 6 for additional information.

Question Group 86

Questions

Was the generic letter issued as opposed to changing the regulation? Prior to regulation changes, will comments be solicited from the licensees?

Response

Generic Letter 89-04 is not considered an alternative to the regulation but is a vehicle to obtain preapproved relief from certain ASME Code requirements. If the regulation is changed, the normal rulemaking process will be followed and comments will be solicited.

Requests for Additional Information

Question Group 87

Questions

How do plants which have received requests for additional information (RAI) from the NRC but are not on the list of plants to receive an SER get RAI items resolved that are not addressed in the Generic Letter?
Does the Generic Letter or the RAI take precedence and which one must be complied with?

We received 86 questions (RAI from NRC) of which some were general in terms. A couple dealt with justification wording in which the questioner recommended a more detailed justification, although the alternate method would remain the same. Would we have to make these recommended changes and resubmit, or can we leave them alone? If revision is more of an administrative wording issue, then are they considered to require an SER?

What do I do about an RAI that I received prior to the generic letter and issues in the RAI are outside Attachment 1?

Response

There are a small number of plants that have received RAIs and that have not had an IST review meeting to discuss the RAI. Utilities in this category are plants not on either Table 1 or 2 and are expected to respond to Generic Letter 89-04 with a confirmation letter. Utilities that have received RAIs do not need to respond explicitly to the RAIs, but should use them to assist in responding to the generic letter. The RAIs provide an indication of possibly weak or questionable aspects of an IST program. For those cases where the intent of an NRC question is unclear, licensees may obtain clarification through the NRC Project Manager.

Question Group 88

Questions

Some questions in a recent RAI are in conflict with previously approved relief requests. Which one must be complied with?

Response

Previously approved relief requests remain valid despite what might appear to be a conflicting position in an RAI. This statement assumes that the previously approved relief was granted on the basis of accurate and complete information available to the NRC staff at that time.

Modification of the Generic Letter

Question Group 89

Questions

Is a NUREG to be issued on this Generic Letter to clarify underlying issues?

Response

There is no current plan to prepare a NUREG document to clarify any underlying issues with Generic Letter 89-04. These minutes will be sent to all licensees and attendees who provided their address.

Question Group 90

Questions

Will Generic Letter 89-04 be updated from time to time to provide additional positions on IST programs in areas such as the following? The ASME Section XI Code does not require leak testing for valves where leakage is continuously monitored, however, for PWR plants the NRC often requires leak testing for Category A valves such as the RCS accumulator/core flood discharge check valves which are monitored continuously for seat leakage.

Response

The staff has no plan to issue a supplement to Generic Letter 89-04. Another generic letter on IST may be issued in the future, but would cover new topics or expand on the current scope of components covered by the IST program required by the ASME Code. The Code does require that valves whose leak tight integrity is important for performance of their safety function be individually leak rate tested. From the staff's experience, most continuously monitored leakage detection systems do not

verify the leaktight integrity of each valve in the flow path and the staff does not consider these systems to meet the Code requirements.

Current Considerations

The Code requirements allow that the licensee need not leak test valves which function during of plant operation in a manner that demonstrates functionally adequate seat tightness; however, the valve record shall provide the basis for the conclusion that operational observations constitute satisfactory demonstration.

Backfit Concerns

Question Group 91

Questions

The Generic Letter states that "In cases where conformance with the stated positions would result in equipment modifications, the licensee should provide in his conformation letter a schedule for completing the required modifications." The Generic Letter goes on to state acceptable schedules for completion of these mods. Are these modifications subject to the provisions of 10 CFR 50.109 backfitting?

Please confirm that the NRC's opinion and present position is that the generic letter is not considered a backfit for all utilities.

Does the staff intend to do a backfit analysis regarding this position? We currently have approved relief requests for the first Ten Year Interval in which the staff has found our lack of instrumentation acceptable. This applies to other positions as well.

Do the modifications that are needed to conform with the stated positions require a backfit? If modifications are necessary to comply with the stated positions, are relief requests necessary if it is deemed impractical to make the modifications? If not through relief, how do we deal with these issues? What if no maintenance history is available to substantiate relief?

Defend or explain your basis for saying the generic letter does not require a backfit.

Response

Generic Letter 89-04 was presented to the NRC's Committee to Review Generic Requirements (CRGR) as a backfit issue, and certain positions were identified as changes to past staff positions. As discussed with the CRGR, the staff determined that those positions in the generic letter that represented changes from previous staff positions were necessary in order to bring licensees into compliance with the Commission's regulations. Therefore, according to 10 CFR 50.109 (a)(4)(i), a backfit analysis was not required to justify issuance of the generic letter. If the positions in the generic letter cannot be met, the option discussed in Paragraph B may be available. Further, if the licensee will not be following the generic letter positions, Paragraph B of the letter, and the ASME Code, the licensee must submit to the NRC staff a request for relief from the ASME Code.

Where a licensee is following a provision of its operating license or a particular exemption from the ASME Code that was granted by the NRC staff, a backfit analysis would need to be performed by the NRC staff before requiring any change to that licensee practice. With respect to the staff review of previously approved relief requests at the ten-year update of the IST program, however, a backfit

analysis would not be necessary. See the response to Question 70.

Use of OM-6 and 10

Question Group 92

Questions

When addressing cold shutdowns, OM-10 uses statements like "sufficient duration" and "shall continue." When trying to implement these statements, operations personnel frequently ask what is the NRC's definition of a cold shutdown of sufficient duration. Is cold shutdown testing expected to be back to back tests or can 1 or 2 days breaks be acceptable (i.e. shall continue is not easily defined)?

In 1987 and early 1988, the NRC rejected a general relief request to use OM-6 criteria for flow and delta pressure for pumps. Can we now revise our program to use the criteria of OM-6 and OM-10? If the answer is yes, do we need a relief request?

What is the time frame for the 10 CFR 50.55a(g) change? Is the NRC willing to accept the currently approved OM-6/OM-10? Will any of the guidance provided in the generic letter change with the implementation of Part 6 and Part 10 of OM?

Once OM-6 and OM-10 are approved, will it be required to implement them immediately (within 6 months) or will they be implemented at the next program update?

Response

Rulemaking to reference ASME standards OM-6 and 10 in the regulations is underway at this time. It can be said, however, that, in some recent relief request evaluations, the use of the pump allowable range limits identified in OM-6 for flow rate and differential pressure has not been found acceptable to the staff. The staff has not completed its assessment of the inter-relationship of Generic Letter 89-04 and OM-6 and 10. When appropriate references to OM-6 and 10 are incorporated in the regulations, these standards may be used by the licensee as the regulations permit the use of more recent referenced standards. We anticipate that rulemaking to reference these standards will be issued for public comment in the near future.

Current Considerations

On September 8, 1992, the revised rule took effect, as discussed in several sections of the guidelines. The NRC did not require plants to update on an accelerated schedule. (See 10 CFR 50.55a).

Solenoid-Operated Valves

Question Group 93

Questions

To perform position indication testing on solenoid operated valves, is a light check acceptable or must the position verification be performed by running the system or injecting air, etc. to prove valve position? Is a remote position verification required for SOVs with no positive means available?

Response

Verification of remote position indication by IWV-3300 is required to ensure that the indication accurately reflects actual valve position. This could take the form of a differential pressure test, flow rate measurement, or other change in some parameter that positively shows that the valve is in the indicated position. An indirect verification, using techniques such as radiography, may also be acceptable.

Current Considerations

Refer to Sections 4.2.5, 4.2.6, and 4.2.8 for additional information.

General Questions

Question Group 94

Questions

Please clarify what is meant by "one part of a broad effort" in the Background section of the Generic Letter.

Response

Generic Letter 89-04 is part of a larger program to improve IST throughout the industry and to provide additional information and clarification on the subject to all affected parties. The joint ASME/NRC Symposium on IST held in Washington, D. C., in August 1989 is also part of this effort. Additional generic regulatory guidance may be prepared on other IST aspects. For a discussion of the "broad effort" that NRC is pursuing, refer to the summary of the presentation by Tad Marsh provided in these meeting minutes.

Question Group 95

Questions

How do the Generic Letter 89-04 requirements differ from the ASME requirements?

Response

Generic Letter 89-04 is intended to provide fundamental information on the NRC's interpretation of certain Technical Specifications and ASME Code requirements, and to identify certain alternative testing that the NRC staff finds acceptable. The generic letter also goes beyond the ASME Code in that it covers procedural issues in addition to programmatic issues.
The generic letter may contain Code interpretations that differ from those of certain licensees. The one area that we are aware of in the generic letter that is different from the Code is contained in Position 8 on the starting point for the time period in Technical Specification action statements. This position is consistent with other Technical Specification starting points. This position is also articulated in the bases for certain of the Standard Technical Specifications.

Question Group 96

Questions

In a refueling outage that is greater than 3 months, how is the cold shutdown frequency handled? Can we perform the cold shutdown procedure once during the outage or do we perform the cold shutdown procedure every 3 months during the outage?

Response

When a component is required to be in service during the outage, the testing is expected to be performed quarterly during the outage. When a component is not required to be operable during an outage, the testing need not be performed quarterly. In accordance with IWV-3416 of the ASME Code, however, those valves must be tested within 30 days before return of the system to operable status. Further, as required by IWP-3400(a), pumps must be tested within one week after the plant is returned to normal operation.

Current Considerations

Refer to Section 3.1 for additional information.

Question Group 97

Questions

Is radiography on check valves an acceptable method for determining valve position?

Response

Radiography may be utilized if it indicates the position of the valve disk.

Question Group 98

Questions

Most plants have been given relief from measuring pump bearing temperatures per IWP-4310. Is it the policy of the NRC that this will continue to be an item of "generic" relief?

Response

It is true that some plants have been given relief from measuring pump bearing temperatures on the basis of the impracticality of measuring temperature for specific pump designs. This issue has not been treated as an item of "generic relief" because each relief request has been individually evaluated. For the foreseeable future, NRC will continue to evaluate these relief requests on a case-by-case basis.

Current Considerations

Refer to Section 5.1.2.

Question Group 99

Questions

Where pump parameter measuring instruments do not meet the specific requirements of the Code but do satisfy the fundamental technical requirements for testing, would it be acceptable to allow relief?

Response

It would be difficult to answer this question without more specific information. There have been cases where relief requests in this area have been approved. In those cases, however, the basis for relief has been that the instrumentation has been adequate to meet the fundamental objective of detecting degradation. In relief requests of this type, the licensees should address the reason that the ASME Code requirements are not currently being met and the basis for concluding that the fundamental objectives of IST are being accomplished.

Current Considerations

Refer to Section 5.5.

Question Group 100

Questions

The schedule for exercising manual valves should be extended to something less than once each quarter. Is this feasible?

Response

We are not aware of a basis for exercising manual valves at a frequency different from other valves. Because this subject is not specifically related to Generic Letter 89-04, it was not addressed at any length during the meeting. If the licensees are aware of reasons

why the frequency should be changed, we recommend that this subject be explored with the ASME OM Working Group on Valves.

Current Considerations

The licensees for certain plants disregard manual valves in planning the IST programs; however, manual valves that have a safety function that requires repositioning are required to be stroked at the Code-specified frequency. To date, no changes have been made by the OM Committee. See Section 4.4.6.

Question Group 101

Question

It has been said that some plants have excellent IST organizations. Who are they?

Response

Dresden is one example of a facility with a good IST organization.

Question Group 102

Question

How do we handle cold shutdown justifications in the future?

Response

Cold shutdown justifications were previously reviewed by NRR for adequacy. In the future, they will be reviewed during IST inspections. The cold shutdown justifications are expected to be described in the IST program the licensee provides to the NRC staff.

Current Considerations

Refer to Section 3.1.1.

Question Group 103

Question

After this meeting, what is the process for getting further questions answered regarding the generic letter?

Response

These meeting minutes will be distributed, which should answer most of the industry's questions. If after reading the meeting minutes you still have questions, you may contact the cognizant personnel through the NRC Project Manager.

Question Group 104

Questions

Does "needed to mitigate the consequences of an accident" mean an accident as described in Chapter 14 of the Final Safety Analysis Report (FSAR)?

Response

We assume that the question is directed to the chapter of the FSAR describing accident analyses performed by the licensee. Those analyses are intended to provide confidence that the public health and safety will be protected in the event of certain accidents and anticipated transients at a nuclear power plant. The term "accident" is also used in different sections of the Commission's regulations. For example, Appendix B to 10 CFR Part 50 establishes quality assurance requirements for the design, construction, and operation of

"structures, systems, and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public." Part 100 describes structures, systems, and components that must be designed to remain functional during a "safe shutdown earthquake" as those necessary to ensure:

> (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of this part.

As can be seen, the term "accident" is used by the Commission to describe a broad range of possible adverse events at a nuclear power plant. Therefore, although most of the accidents of concern to IST are addressed in the accident analyses chapter, licensees should be aware that there may be other accident analyses in the FSAR that need to be considered.

Question Group 105

Questions

This question is in reference to 10 CFR 50.55a(g)(4): "...to the extent practical within the limitations of design, geometry, and materials of construction of the components." In reviewing this wording, along with the statements of consideration, do you think this rule was intended to impose plant modifications as a result of meeting subsequent editions and addenda? That is, once the staff evaluates a licensee's determination of impracticality, will the NRC impose plant modifications as alternate requirements?

Response

The NRC staff in the Mechanical Engineering Branch of NRR has had lengthy discussions with the NRC Office of the General Counsel on this matter. The current interpretation of the rule is that it is not intended to require a blanket imposition of all plant modifications that would be necessary to comply with subsequent editions and addenda. The rule does require an evaluation of the impact on the licensee, that is the impracticality of making the modifications, as part of an assessment of the requests for relief from the ASME Code requirements. The legal staff has stated that there is nothing in the regulations that relieves licensees from making all hardware modifications to the plant to comply with changes to IST requirements throughout a plant's life in later editions of Section XI. Some hardware modifications can be required. The difficult issue to resolve is how much may be required. For example, major equipment or piping modifications may be beyond the limitations of practicality in meeting subsequent editions of the Code. We, however, regard modifications such as the installation of instrumentation to be practical as used in 10 CFR 50.55a(g)(4).

Question Group 106

Questions

For plants that do not have operating licenses, 10 CFR 50.55 requires that you apply the codes that are in effect 12 months prior to plant startup. Where does the 6 month conformance letter stand for construction plants in this situation?

Response

There are only two plants expected to receive operating licenses for which the staff's review of the IST program has not been completed. These plants are Comanche Peak and Watts Bar. These two plants will be treated essentially as Table 1 plants in that a review will be completed and an SER issued. The reviews of the Comanche Peak and Watts Bar IST programs, however, may not be completed in the same time frame as the reviews for plants listed in Table 1. To obtain the scheduled completion dates for the IST program reviews, the Comanche Peak and Watts Bar organizations should contact their respective NRC Project Managers.

Question Group 107

Questions

Currently, we only test the ICS pump suction check valves ICS 3A(B) to verify they open as part of the ICS pump test. Originally, the only safety function recognized was for the valves to open to provide a water source, the RWST, to the ICS pumps. During an independent review of the IST program, it was determined that these valves may also have a safety function to close when the pumps are taking suction from the RHR system. These valves, if they failed open, could provide another flowpath (to the RWST) besides the normal flowpath to containment. This flowpath would also allow potentially contaminated water from the containment sump into the RWST (NOT DESIRABLE). As part of our company's in-house safety system functional inspection, it was determined that if these check valves failed open, adequate flow to the containment would still be achieved. We are also converting the manual valves upstream of ICS 3A(B) into motor operated valves in order to prevent sump water from getting into the RWST. Do these check valves need to be leak tested?

Should Category A be applied to valves other than containment isolation valves (e.g., valves which isolate HVAC damper air accumulators: checks/SOVs)?

Response

The NRC staff has a generic concern with the current practice of categorization of check valves. The ASME Code assigns all check valves as Category C. If seat leakage of a check valve is limited to a specific amount, the Code also requires that valve to be assigned to Category A. Whereas Category C check valves are required by the Code only to be exercised on a periodic basis, Category A/C check valves must be leak tested in addition to being exercised. The NRC staff has found that, in many instances, check valves are not being assigned to Category A/C despite the fact that credit is taken by the licensee for the check valve providing an essentially leak tight function. The categorization of a check valve is not dependent solely on the function performed by the valve, such as whether it is a containment isolation valve. When determining the proper categorization of a check valve, a licensee should take all applicable aspects into account. For example, the licensee should determine (1) whether the flow requirements for connected systems can be achieved with the maximum possible leakage through the check valve, (2) the effect of any reduced system flows resulting from the leakage on the performance of other systems and components, (3) the consequences of the loss of water from the system, (4) the effect that backflow through the valve may have on piping and components, such as the effect of

high temperature and thermal stresses, and (5) the radiological exposure to plant personnel and the public caused by the leak. If any of the above considerations indicate that Category C testing may not be adequate, licensees should assign the check valve to Category A/C and should comply with the associated leak testing requirements.

Question Group 108

Questions

What is the NRC's opinion, per Generic Letter 89-04, of non-quantifiable demonstrations of performance? For example, a solenoid valve has no position indication that can be observed or timed, but bearing temperatures show no overheating.

Response

The NRC staff is discouraging the use of qualitative criteria as an alternative to the Code- required component testing. Licensees should strive to develop a quantitative method of determining the ability of a component to perform its required functions. This recommendation is based on the goal of IST to detect degradation prior to failure of the component. For specific examples, see the response to Question 1. With respect to the specific question, more details would be necessary before arriving at the acceptability of the suggested method.

Question Group 109

Questions

Should LaSalle County Station be on Table 2 of Generic Letter 89-04? If not, why? Zion Station underwent the same review 2 months after LaSalle and they appear on Table 2.

Response

Although the LaSalle nuclear power plant received an SER about a year ago, a significant revision to its IST program was subsequently submitted for NRC review. The NRC staff determined that a review of the IST program could not be completed in the necessary time frame. In the context of Generic Letter 89-04, LaSalle, therefore, has been classified as a plant that does not possess a current SER and will not be receiving an SER. As a result, LaSalle is expected to respond to the generic letter in accordance with the implementation provisions for plants not listed in Table 1 or 2.

Question Group 110

Questions

What additional NRC guidelines can be provided on testing skid-mounted pumps and valves (i.e., diesel generator systems: lube oil pumps/valves, internal engine cooling; RCIC systems — condensate vacuum pumps with only one source of power, etc.)? Most of these pumps and valves do not have the necessary test instrumentation to support ASME Section XI testing and do not fall within the scope statements of IWP and IWV. Will modifications need to be performed?

Response

The purpose of inservice testing is to provide assurance of the operability of components and to detect degradation in their performance. Where a particular component is integrated with other components in a system, it may be difficult to perform an individual test of that component. In specific cases for which individual testing is not feasible, an alternate test should be proposed by the licensee. In developing an alternate test, the licensee should attempt to develop quantitative criteria

to evaluate the operability and condition of the component.

Current Considerations

Refer to Section 3.4.

Question Group 111

Questions

Is temporary flow instrumentation (i.e., portable flow meter) permitted in lieu of a modification to install permanent flow instrumentation? If so, is relief required?

Response

The staff does not interpret the ASME Code as excluding the use of portable flow rate instrumentation, such as ultrasonic. We have seen difficulty, however, in meeting the Code-specified accuracy requirements with these instruments.

Question Group 112

Questions

Is trending a requirement for pumps? Is it a requirement for valves? The Code and the regulations do not address this, nor does the generic letter.

Response

We define "trending" as the analysis of test data to detect degradation of the tested component and to enable preventive maintenance to be performed before significant challenges to component operability occur.

The ASME Code contains few requirements for trending of test data. For example, the ASME Code in IWV-3417(a) provides for more frequent stroke-time testing of power-operated valves where an increase in stroke time is seen from a previous test. The NRC staff allows a reference value to be used for this comparison in Position 6 of Generic Letter 89-04. In IWV-3427(b), the Code provides for more frequent testing, and possibly maintenance, where the leak rate of a large valve increases beyond a specified amount from one test to another. In Position 10 of the generic letter, the NRC staff explains its view that this provision of the Code may not be worthwhile and may be suspended. Although the ASME Code is weak in the area of trending, the NRC staff remains of the view that trending is a valuable tool in the IST program. The Commission's regulations can be interpreted to require efforts in this area. More explicit guidance for trending may be developed in the future. In the meantime, we recommend that licensees analyze IST data to take advantage of the benefits of trending.

Current Considerations

The O&M Committees are processing several revision that address trending for pumps and valves. The NRC continues to believe that trending is a useful tool. With the movement toward performance based testing (e.g., local-leak rate testing, check valves), data will be more important in the near future for uses that are not currently implemented. In using IST data, trending of every component and measured parameter may not be useful, but the data should be maintained for trending when a use is defined.

APPENDIX B

VALVE TABLES

APPENDIX E
VALVE PROGRAM TABLE
UNIT 2

SYSTEM: Containment Spray
DRAWING NO.: M-110E035, Sheet 3

VALVE	CORD	FUNCTION	CLASS	CAT	SIZE	TYPE	ACT	POS	REQMT	FREQ	REMARKS
SI-00860C	C10	CS Pump 1-P14B Disch	2	B	6	GA	MO	C	BT-O PIT	QR QR	
SI-00860D	C10	CS Pump 1-P14B Disch	2	B	6	GA	MO	C	BT-O PIT	QR QR	
SI-00862A	I11	CS Pump 1-P14A Disch	2	A/C	6	CK	SA	C	CV-O SLT-1	QR RR	VRR-23, 29
SI-00862B	C11	CS Pump 1-P14B Disch	2	A/C	6	CK	SA	C	CV-O SLT-1	QR RR	VRR-23, 29
SI-00862G	H11	Train "A" Test Isolation	2	A	6	GA	MA	C	SLT-1	RR	Passive VRR-23
SI-00862H	D11	Train "B" Test Isolation	2	A	6	GA	MA	C	SLT-1	RR	Passive VRR-23
SI-00864A	H11	CS Pump Test Recirc	2	A	.75	GL	MA	C	SLT-1	RR	Passive VRR-23
SI-00864B	C11	CS Pump Test Recirc	2	A	.75	GL	MA	C	SLT-1	RR	Passive VRR-23
SI-00868A	I12	CS Nozzle A Hdr Isolation	2	A	6	GA	MA	O	SLT-1	RR	Passive VRR-23
SI-00868B	C12	CS Nozzle B Hdr Isolation	2	A	6	GA	MA	O	SLT-1	RR	Passive VRR-23

Table 1.0-7
UNIT 1 VALVE LISTING

DRAWING : M-0046
DRAWING TITLE : HIGH PRESSURE COOLANT INJECTION PIPING

VALVE NUMBER	DWG COOR	IST CLASS	FUNCTION CATEGORY	SIZE (INCH)	BODY STYLE	ACTU-ATOR	NORMAL POSI-TION	TEST TYPE	TEST FREQ	RELIEF REQUEST OR COLD SHUTDOWN	TECHNICAL POSITION
2301-003 -MO	A-7	2	B	10.000	GA	MO	C	BTO	M3		
								PIT	Y2		
FUNCTION : HPCI STEAM SUPPLY/BLOCKING VALVE, PRE-HEATS THE SUPPLY LINE											
2301-004 -MO	C-9	1	A	10.000	GA	MO	O	AT-01	RR		
								BTC	CS	CS-23A	
								BTO	CS	CS-23A	
								PIT	Y2		
FUNCTION : HPCI STEAM SUPPLY FROM THE REACTOR VESSEL TO THE TURBINE											
2301-005 -MO	B-10	1	A	10.000	GA	MO	O	AT-01	RR		
								BTC	CS	CS-23A	
								BTO	CS	CS-23A	
								PIT	Y2		
FUNCTION : HPCI STEAM SUPPLY FROM THE REACTOR VESSEL TO THE TURBINE											
2301-007 -AO	E-6	2	C	14.000	CK	AO	SYS	CTO	CS	CS-00A	
								PIT	Y2		
FUNCTION : HPCI INJECTION LINE TO FEEDWATER BACKFLOW PREVENTION											
2301-008 -MO	E-6	2	B	14.000	GA	MO	C	BTO	M3		
								PIT	Y2		
FUNCTION : HPCI INJECTION LINE TO FEEDWATER ISOLATION											
2301-009 -MO	E-5	2	B	14.000	GA	MO	O	BTO	M3		
								PIT	Y2		
FUNCTION : HPCI INJECTION LINE TO FEEDWATER ISOLATION											
2301-010 -MO	E-5	2	B	12.000	GL	MO	C	BTC	M3		
								PIT	Y2		
FUNCTION : HPCI FULL FLOW TEST RETURN TO CONDENSATE STORAGE TANK											
2301-014 -MO	C-6	2	B	4.000	GL	MO	C	BTC	M3		
								BTO	M3		
								PIT	Y2		
FUNCTION : HPCI MINIMUM FLOW RECIRCULATION LINE ISOLATION											
2301-020	E-1	2	C	16.000	CK	SA	SYS	CTC	SA	RV-00F	
FUNCTION : HPCI TO CONDENSATE STORAGE TANK BACKFLOW PREVENTION											
2301-023 -RV	B-3	2	C	1.500	RV	SA	C	CT-SP	YA		
FUNCTION : HPCI BOOSTER SUCTION LINE OVERPRESSURE PROTECTION											
2301-026	D-10	1	A/C	1.000	XFC	SA	SYS	AT-02	RR		
								CTC	RR	RV-00B	
FUNCTION : MAIN STM TO HPCI DP/P HI SIDE EXCESS FLOW CK VLV											
2301-027	D-10	1	A/C	1.000	XFC	SA	SYS	AT-02	RR		
								CTC	RR	RV-00B	
FUNCTION : MAIN STM TO HPCI DP/P LO SIDE EXCESS FLOW CK VLV											

BVPS-1 IST
VALVE TESTING OUTLINE

SYSTEM NAME: Main Steam — SYSTEM NUMBER: 21

Valve Mark Number	Valve Class	Valve Category	Valve Size (in.)	Valve Type	HSA	Drawing		Test Requirement	CSJ or Relief Requests	Comments
						OM No.	Coord.			
PCV-1MS-101A	2	B	6	Globe	A	21-1	A-5	QST	CSJ23	1OST-1.10-Stroke & Time Open/Closed (CSD)(RPV)
SV-1MS-101A	2	C	6 x 10	Relief		21-1	B-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)
TV-1MS-101A	2	B/C	32	Inverse Check	O	21-1	B-8	QST	CSJ24	1OST-21.4-Stroke & Time Closed (CSD)(RPV)
MOV-1MS-101B	2	B	2	Globe	S	21-1	E-8	QST		1OST-47.3A(3B)-Stroke & Time Closed (Q)(RPV)
NRV-1MS-101B	2	B/C	32	Check	O	21-1	D-8	QS	CSJ22	1OST-1.10-FS,RD (CSD)(RPV)
PCV-1MS-101B	2	B	6	Globe	A	21-1	C-5	QST	CSJ23	1OST-1.10-Stroke & Time Open/Closed (CSD)(RPV)
SV-1MS-101B	2	C	6 x 10	Relief		21-1	D-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)
TV-1MS-101B	2	B/C	32	Inverse Check	O	21-1	D-8	QST	CSJ24	1OST-21.5-Stroke & Time Closed (CSD)(RPV)
MOV-1MS-101C	2	B	2	Globe	S	21-1	G-8	QST		1OST-47.3A(3B)-Stroke & Time Closed (Q)(RPV)
NRV-1MS-101C	2	B/C	32	Check	O	21-1	F-8	QS	CSJ22	1OST-1.10-FS,RD (CSD)(RPV)
PCV-1MS-101C	2	B	6	Globe	A	21-1	E-5	QST	CSJ23	1OST-1.10-Stroke & Time Open/Closed (CSD)(RPV)
SV-1MS-101C	2	C	6 x 10	Relief		21-1	E-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)
TV-1MS-101C	2	B/C	32	Inverse Check	O	21-1	F-8	QST	CSJ24	1OST-21.6-Stroke & Time Closed (CSD)(RPV)
SV-1MS-102A	2	C	6 x 10	Relief		21-1	B-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)
SV-1MS-102B	2	C	6 x 10	Relief		21-1	D-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)
SV-1MS-102C	2	C	6 x 10	Relief		21-1	E-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)
SV-1MS-103A	2	C	6 x 10	Relief		21-1	B-4	SPT		1BVT 1.21.1 or 1BVT 1.21.2-(R)

COMANCHE PEAK STEAM ELECTRIC STATION UNIT 1 & 2
INSERVICE VALVE TESTING PLAN
TABLE 4 - CHEMICAL and VOLUME CONTROL
PAGE 9 OF 12

Valve Number	Flow Diagram (Coord.)	Valve/ Actuator Type	Size	Code Class	Category	Function	Safety Func. Pos.	Test Parameters/Schedule: Leak Test	Exercise Test	Fail Safe Test	Position Indicator Test	Remarks	
8378A	M1-0253-A (B-5) M2-0255 (G-3)	CK/SA	3	1	C	A	O	N/A	CV/Q (8)	N/A	N/A	Boration Flowpath	2
							C	N/A	CV/CS (2) RR V5	N/A	N/A	Reactor Coolant Pressure Boundary	
8378B	M1-0253-A (B-5) M2-0255 (G-3)	CK/SA	3	1	C	A	O	N/A	CV/Q (8)	N/A	N/A	Boration Flowpath	2
							C	N/A	CV/CS (2) RR V5	N/A	N/A	Reactor Coolant Pressure Boundary	
8379A	M1-0253-A (B-5) M2-0255 (G-3)	CK/SA	3	1	C	A	O	N/A	CV/Q (8)	N/A	N/A	Boration Flowpath	2
							C	N/A	CV/CS (2) RR V5	N/A	N/A	Reactor Coolant Pressure Boundary	
8379B	M1-0253-A (B-5) M2-0255 (G-3)	CK/SA	3	1	C	A	O	N/A	CV/Q (8)	N/A	N/A	Boration Flowpath	2
							C	N/A	CV/CS (2) RR V5	N/A	N/A	Reactor Coolant Pressure Boundary	
8381	M1-0253-A (E-3) M2-0255 (E-2)	CK/SA	3	2	A/	A	O	N/A	CV/Q	N/A	N/A	Boration Flowpath	
							C	LTJ/TS	CV/CS (2)	N/A	N/A	Containment Isolation	

Valve Number	Sys	Description	P&ID	Code Dwg	Vlv Category	Vlv Function	Test Proc	Test Type	Test Freq	Rel Req
2CC-73-1	2CC	21 RCP BRG WTR SUPPLY CHK	NF-39246-1	39	C	ACT-OPEN		E	Q	
2CC-73-2	2CC	22 RCP BRG WTR SUPPLY CHK	NF-39246-1	39	C	ACT-OPEN		E	Q	
CV31253	2CC	21 EXCS LTDWN HT EXCH OUTLET	NF-39246-1	39	B	ACT-CLOSE		E	Q	
MV32122	2CC	COMP COOLING WTR SUPPLY HEADER	NF-39246-1	39	B	ACT-CLOSE	SP-2163	E	R	
MV32123	2CC	COMP COOLING WTR SUPPLY HEADER	NF-39246-1	39	B	ACT-CLOSE	SP-2163	E	R	
MV32124	2CC	21 REACT CLNT PUMP BRG CLG WTR SUPPLY	NF-39246-1	39	B	PAS-OPEN		PV	2Y	
MV32125	2CC	21 REACT CLNT PUMP BRG CLG WTR RETURN	NF-39246-1	39	B	PAS-OPEN		PV	2Y	
MV32126	2CC	22 REACT CLNT PUMP BRG CLG WTR SUPPLY	NF-39246-1	39	B	PAS-OPEN		PV	2Y	
MV32127	2CC	22 REACT CLNT PUMP BRG CLG WTR RETURN	NF-39246-1	39	B	PAS-OPEN		PV	2Y	
MV32128	2CC	21 RSDL HT EXGR COMP CLNT INLT MV	NF-39246-1	39	B	ACT-BOTH	SP-2155	E	Q	
MV32129	2CC	22 RSDL HT EXGR COMP CLNT INLT MV	NF-39246-1	39	B	ACT-BOTH	SP-2155	E	Q	
MV32130	2CC	21 EXCESS LETDOWN HT EXCH SUPPLY	NF-39246-1	39	B	ACT-CLOSE		E	Q	
MV32211	2CC	21 COMP CLG PMP SUCT MV	NF-39246-1	39	B	ACT-BOTH	SP-2155	E	Q	
MV32212	2CC	22 COMP CLG PMP SUCT MV	NF-39246-1	39	B	ACT-BOTH	SP-2155	E	Q	
MV32268	2CC	21/22 RCP COMP CLG INLT ISOL MV B	NF-39246-1	39	B	ACT-BOTH	SP-2163	E	R	
MV32269	2CC	21/22 RCP COMP CLG INLT ISOL MV A	NF-39246-1	39	B	ACT-BOTH	SP-2163	E	R	
2CL-12-1	2CL	21 CONTAINMENT FAN COILS-SUPPLY	NF-39217-3	36	C	ACT-OPEN		E	Q	
2CL-12-2	2CL	23 CONTAINMENT FAN COILS-SUPPLY	NF-39217-3	36	C	ACT-OPEN		E	Q	
2CL-12-3	2CL	22 CONTAINMENT FAN COILS-SUPPLY	NF-39217-3	36	C	ACT-OPEN		E	Q	
2CL-12-4	2CL	24 CONTAINMENT FAN COILS-SUPPLY	NF-39217-3	36	C	ACT-OPEN		E	Q	
2CL-43-1	2CL	21 CLG WTR PUMP DISCH	NF-39216	36	C	ACT-CLOSE	SP-1106B	E	Q	

APPENDIX C

RELIEF REQUESTS

ILLINOIS POWER COMPANY
Clinton Power Station

ASME Section XI Relief Request

RELIEF REQUEST 2014 (Revision 3)

COMPONENT INFORMATION

These testable check valves (1E12-F041 A/B/C, 1E21-F006, and 1E22-F005) provide isolation from the reactor coolant system and the emergency core cooling systems (Residual Heat Removal, Low Pressure Core Spray, High Pressure Core Spray). These valves are ASME Section III Code Class 1, Section XI Category A/C valves. Valves 1E12-F041 A,B, and C are 12" diameter and valves 1E21-F006 and 1E22-F005 are 10" diameter. All of these valves are non-slam check valves. One of these valves (1E12-F041A), which is typical of the group, is circled on the attached drawing.

CODE REQUIREMENTS

The ASME Code, Section XI, Subsection IWV-3520 requires that these valves be exercised every three (3) months unless such operation is not practical during plant operation. In this situation, the valves may be part-stroke exercised during plant operation and full-stroke exercised during cold shutdown.

RELIEF REQUEST/JUSTIFICATION

Exercising these valves on a three month frequency using the emergency core cooling system pumps to inject water into the reactor is not in the interest of plant safety, because this cooler water would create an undesirable power transient. In addition, neither the Low Pressure Core Spray nor Residual Heat Removal pumps are capable of opening their injection valves against full reactor pressure. Mechanically exercising these valves during reactor operation is not practical because they are located inside the drywell and access is restricted due to radiation conditions.

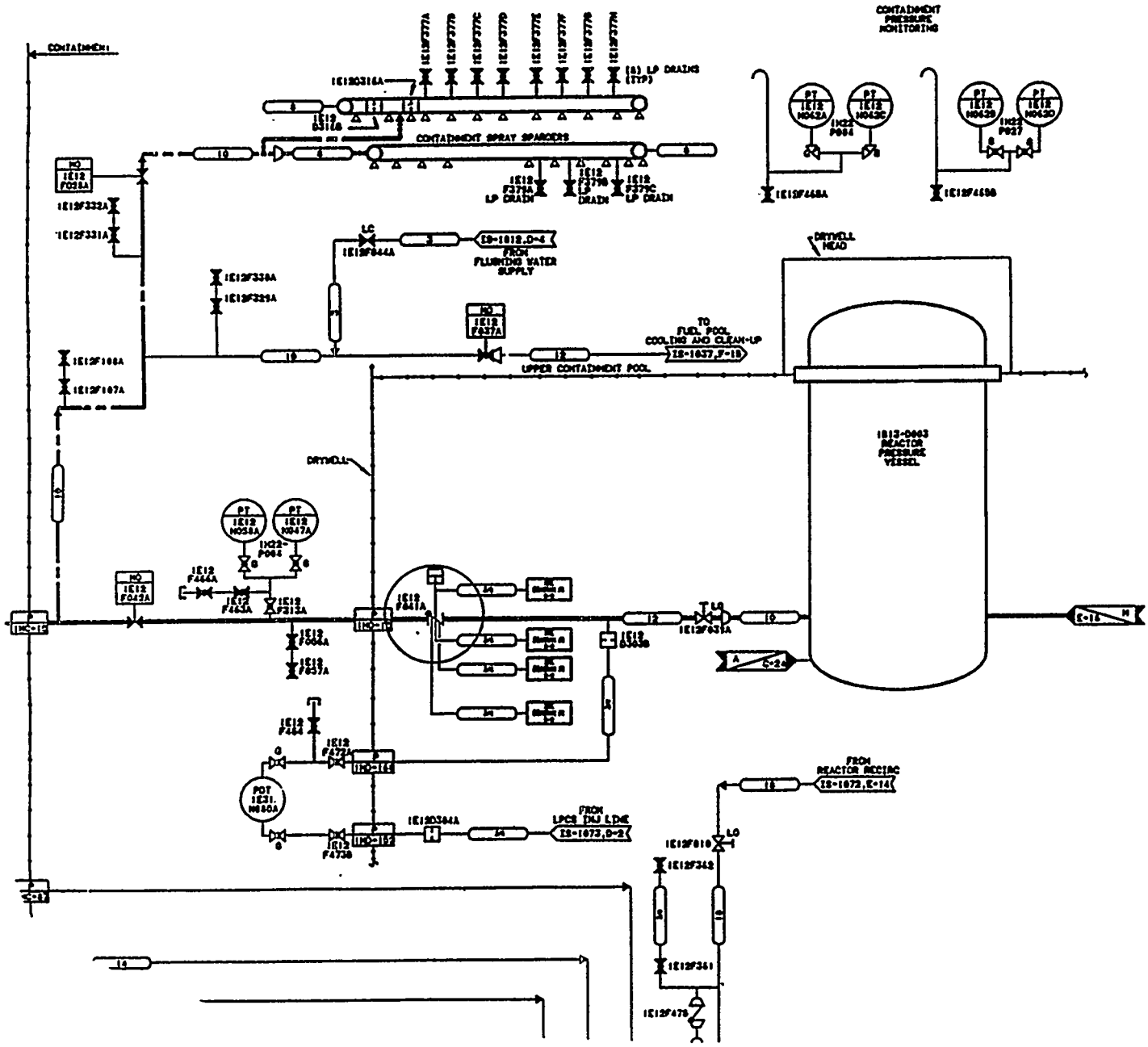
Mechanically exercising these valves on a cold shutdown frequency as allowed by the ASME Code is not practical because the air operator is not designed to perform a full stroke test. Although the air operator can be removed to perform the full stroke test, this is a significant maintenance activity and could interfere with work which is necessary to restore the plant to service. This would create an unreasonable hardship for Illinois Power Company.

Using pump pressure to exercise these valves during cold shutdown is also not in the interest of plant safety. Although temperature could be matched fairly closely between the injection source (emergency core cooling systems) and the reactor, a minor thermal mismatch between these temperatures creates an undesirable effect on the fatigue life of the reactor nozzles.

In addition, the injection lines associated with the residual heat removal system nozzles are not equipped with internal spargers. General Electric Service Information Letter 401 identifies problems in injecting water through this flow path and the potential damage to nuclear instrumentation or fuel assemblies which could occur if this flow path were used for other than emergency conditions.

ALTERNATE TESTING PROPOSED

Illinois Power Company will full stroke exercise the valves during refueling by measuring the torque required to lift the disc and then move the disc through a full stroke.


CONTAINMENT
CONTAINMENT SPRAY SPARGERS
CONTAINMENT PRESSURE MONITORING
DRYWELL HEAD
DRYWELL
1813-0003 REACTOR PRESSURE VESSEL
TO FUEL POOL COOLING AND CLEAN-UP
UPPER CONTAINMENT POOL
FROM FLUSHING WATER SUPPLY
FROM REACTOR RECIRC
FROM LPCS INJ LINE

RELIEF REQUEST PR-12
Third Ten-Year Interval IST Program Revision 3

System: Service Water

Components: Service water pumps PSWO-1A/B/C/D

Component Function: Cooling for safety-related coolers following design basis accident; ultimate heat sink.

Code Requirements: IWP-4110 and IWP-4120 for flowrate instrumentation accuracy and full-scale range.

Description of Relief:

Previously, the service water pump testing for pumps PSWO-1A, -1B, -1C, and -1D, was conducted at a flow rate approximately one-half accident flow rate in order to utilize flow instrumentation installed to measure service water flow through containment recirculation fan coolers. In response to a recommendation made by NRC during the team inspection of the service water system, November/December 1991, a new test methodology is proposed in PR-12. This effectively eliminates the need for Relief Request PR-7, and it is withdrawn upon NRC approval of PR-12. The new test method is expected to be implemented in the tests scheduled for November 1992.

The new test method will also provide full flow exercising of the service water pump discharge check valves 4601, 4602, 4603, and 4604. This will eliminate the need for employing a disassembly and inspection program for these four valves discussed in Relief Request VR-17, and it is withdrawn upon NRC approval of PR-12. The change also permits reclassification of twelve manual butterfly valves which function as the inlet and outlet valves for the four containment recirculation fan coolers and the two reactor compartment coolers from "Category A - Active" to "Category A - Passive." The appropriate changes to the IST Program for these valves will be made. These changes do not effect existing or new relief requests.

Basis for Relief:

The present system configuration and instrumentation does not provide permanently installed flow indication at the SW [service water] pump discharge piping to provide a positive means of determining full flow during pump tests. Employing a clamp-on ultrasonic flowmeter to measure full SW pump discharge flow is not currently addressed in ASME Section XI, Subsection IWP (Code).

The Code requires an instrument accuracy of 2% of full scale. The clamp-on ultrasonic flowmeter possesses an instrument accuracy of 3% of actual flow. Although the percentage error (3% of the actual flow as compared with 2% of

full scale) is stated as a larger numerical value, the actual absolute value of instrument inaccuracy at the reference flow rate of 5,600 gpm (approximate SW pump design [flow rate]) is actually less for the clamp-on ultrasonic flowmeter. The accuracy of the reading from a 1 - 10,000 gpm analog gauge is 5,600 ± 200 gpm (2% of full scale). The accuracy of the reading from the clamp-on ultrasonic flowmeter is 5,600 ± 168 gpm (3% of actual flow). Thus the actual maximum instrument error of the flow reading, as read on the clamp-on ultrasonic flowmeter, is less than the error as read on the analog gauge at the specified flow rate of 5,600 gpm.

The full-scale range (calibrated) of the clamp-on ultrasonic flowmeter is 40 ft./sec. This corresponds to a flow rate of approximately 17,000 gpm (for 14 inch pipe), which exceeds three times the reference value of 5,600 gpm.

Relief is requested to utilize a digital flowrate instrument for inservice testing of the service water pumps. Relief is required because the accuracy of the measurement will not be ± 2% over the calibrated range as required by OM-6, Table 1, Note (1). The accuracy will be ± 3% over the calibrated range (percent of reading) based on the piping configuration and the location for placement of the instrument. However, the accuracy achieved is more accurate than would be achieved with analog instrumentation which is required to be ± 2% of full scale (no more than three time reference value).

The digital clamp-on ultrasonic flowmeter yields a more accurate flow reading at the specified SW pump test flow rate of 5,600 gpm than an analog instrument and the range of the clamp-on ultrasonic flowmeter meets the requirement of ASME/ANSI OMa-1988, Part 6, Paragraph 4.6.1.2(b), i.e. reference flow rate < 70% of calibrated range. Repeatability of the digital readings will be assured by permanently mounting the instrument. With a ± 3% of reading accuracy, the digital reading will be in the range of 5432 gpm to 5712 gpm. An analog instrument with a ± 2% accuracy and a range of three time the reference would provide a reading in the range of ± 336 gpm (5264 gpm to 5936 gpm). In order to meet the accuracy requirements of OM-6 for digital instrumentation, modifications to the piping would be required in order to place the clamp-on flowmeter in a location five pipe diameters from an elbow. Similar modifications would be required to install permanent flow measurement analog instrumentation which would even then not provide a reading as accurate as will be achieved with the clamp-on flowmeter. Compliance with OM-6 would be a hardship without a compensating increase in the level of quality and safety, with the hardship being the modifications that would be required, with the accuracy of the reading not being increased.

This substantial improvement in test method provides for the measurement of a sufficiently accurate and repeatable value for SW pump flow rate. By employing this test method and obtaining the pump's corresponding differential pressure, the hydraulic performance of the SW pump can be more accurately assessed. Repeatability of flow rate measurement will be ensured through the permanent installation of clamp-on ultrasonic flowmeter instrumentation via the [XXX] Station minor modification process.

Alternative Testing

SW pump flow testing will utilize a permanently installed clamp-on ultrasonic flowmeter to allow rate measurement at a reference flow equivalent to the design point of the SW pumps.

RELIEF REQUEST NO. V2

SYSTEM Component Cooling Water

VALVE NUMBERS 1CC-1079/1080 1CC-1081/1082
2CC-1091/1092 2CC-1093/1094

CATEGORY A/C, C

CLASS 3

FUNCTION These check valves form the boundary between the non-safety Instrument Air or Nitrogen supply systems and the safety-grade accumulator and receiver tanks. The tanks provide an emergency air or nitrogen supply to certain safety-related components. The check valves are required to close upon failure of the air or nitrogen supply system in order to contain the compressed gas in the tanks.

TEST REQUIREMENT OM Part 10, para 4.3.2, "Exercising Tests for Check Valves"

BASIS FOR RELIEF Each valve listed is one of two check valves in series at the inlet to a safety-grade accumulator or receiver tank. In each case, only one check valve is required in order to meet the safety class interface criteria of ANSI N18.2a-1975. However, two check valves are provided for added reliability, not for redundancy. The safety-related components served by the accumulator and receiver tanks are redundant to other similar components which have their own dedicated safety-grade air supplies. As long as one of the check valves in the pair is capable of closure, then the safety analysis assumptions for the check valves are met. Some of the check valve pairs do not have provisions for testing each valve individually. However, the closure capability of each pair of check valves can be verified.

SUBSTITUTE TEST Each pair of series check valves will be exercise tested at the required frequency by some positive means to verify the closure capability of at least one of the valves. No additional exercise testing will be performed unless there is an indication that the closure capability of the pair of valves is questionable. In that case, both valves will be declared inoperable and not returned to service until they are either repaired or replaced.

DRAWINGS: M-2236, SAR Figure 9.2.6-4

REFERENCES: ANSI N18.2a-1975

RELIEF REQUEST VR-13

Valve Numbers:	1DG5182A,B	2DG5182A,B
	1DG5183A,B	2DG5183A,B
	1DG5184A,B	2DG5184A,B
	1DG5185A,B	2DG5185A,B

Number of Items: 16

ASME Code Category: B & C

ASME Code Section XI Requirements:

These valves are not within the scope of ASME Code, Section XI, Subsection IWV requirements. However, the requirements for stroke timing and trending of the valves associated with the Diesel Air Start System are being included as augmented components for inservice testing. These valves associated with the Diesel Air Start System shall be exercised to the position required to fulfill their function during plant operation per IWV-3412 and IWV-3522. Additionally, the stroke testing of power operated valves shall be measured to the nearest second and such stroke times trended to document continued valve operational readiness per IWV-3413 (b) and IWV-3417.

Basis for Relief:

The monthly Diesel Generator testing program, outlined in XXXX Station Technical Specifications and implemented by station operating procedures, exceeds the intent of the quarterly valve testing program which would be required by ASME Code, Section XI. Additionally, the stroke timing of solenoid operated valves associated with the Diesel Air Start System is impractical due to the fast actuation of these valves.

Alternative Testing:

The performance of XXX Station's Diesel Generator operability monthly surveillance will verify the operational readiness of the valves associated with the Diesel Air Start System. This surveillance testing will require the recording of the air pressures contained in both trains

RELIEF REQUEST VR-13
(continued)

A & B of the Diesel Generator Air Start Receiver Tanks both before and immediately after diesel generator start. By the comparison of these valves between trains, the satisfactory operation of the power operated and self-actuated check valves associated with the Diesel Air Start System can be adequately demonstrated. On an alternating basis, a portion of the air start system will be isolated and depressurized prior to diesel start. This will allow verification that the air start system check valves in the unisolated portion stroke open.

RELIEF REQUEST NUMBER GR-4

System: Various

Valve: Various

Category: A, B

Class: Various

Function: Various

Impractical Test Requirements: IWV-3413; Power Operated Valves Corrective Action, IWV-3417; Corrective Action

Basis for Relief: Generic Letter 89-04 Position 6 recognizes that measuring changes in stroke times from a reference value as opposed to measuring changes from the previous test is a better way to detect valve degradation. Generic Letter 89-04 Position 5 and OMa-1988, Part 10 provide NRC approved methodology for establishing a stroke time reference value, an acceptable stroke time band, and a limiting stroke time value. The alternative testing is in accordance with this methodology.

Alternative Testing: The power operated valve testing will be performed in accordance with OMa-1988, Part 10, paragraphs 4.2.1.4, 4.2.1.8, and 4.2.1.9. The acceptable band and Limiting Stroke Time (LST) will be determined as follows (RV time in Sec):

Operator Type	Ref. Value	Acc. Band	LST
Motor	RV > 10	0.85RV - 1.15RV	1.3RV
	2 ≤ RV ≤ 10	0.75RV - 1.25RV	1.5RV
Other	RV > 10	0.75RV - 1.25RV	1.5RV
	2 ≤ RV ≤ 10	0.50RV - 1.50RV	2.0RV
All	RV < 2	≤ 2	2

In addition, if a more restrictive value of stroke time exists in the Technical Specifications or the Updated Safety Analysis Report, it will be used as the LST instead of the value calculated above.

Approval: Relief granted with provisions in SER dated September 24, 1992.

RELIEF REQUEST NO. RP-8

System: Standby Service Water

Pumps:

Pump	Code Class	P & I D Dwg. Number
SW-P-1A	3	M524, SH 1
SW-P-1B	3	M524, SH 2
HPCS-P-2	3	M524, SH 1

Section XI Code Requirements For Which Relief is Requested:

IWP-3100 requires that the system resistance be varied until either the measured differential pressure or measured flow rate equals the corresponding reference value. The quantities of Table IWP-3100-1 are then measured or observed and compared to the corresponding reference value.

Basis for Relief:

1. Service Water systems are designed such that the total pump flow cannot be adjusted to one finite value for the purpose of testing without adversely affecting the system flow balance and Technical Specification operability requirements. Thus these pumps must be tested in a manner that the service water loop remains properly flow balanced during and after the testing and each supplied load remains fully operable per Technical Specifications to maintain the required level of plant safety during power operation.

2. The service water system loops are not designed with a full flow test line with a single throttle valve. Thus the flow cannot be throttled to a fixed reference value every time. Total pump flow rate can only be measured using the total system flow indication installed on the common return header. There are no valves in any of the loops, either on the common supply or return lines, available for the purpose of throttling total system flow. Only the flows of the served components can be individually throttled. Each main loop of service water supplies 17-18 safety related loads, all piped in parallel with each other. The HPCS-P-2 pump loop supplies four loads, each in parallel. Each pump is completely independent from the others (no loads are common between the pumps). Each load is throttled to a FSAR required flow range which must be satisfied for

Relief Request RP-8 (Continued)

the load to be operable. All loads are aligned in parallel, and all receive service water flow when the associated service water pump is running, regardless of whether the served component itself is in service. During power operation, all loops of service water are required to be operable per Technical Specifications. A loop of service water cannot be taken out of service for testing without entering an Action Statement for a Limiting Condition for Operation (LCO). Individual component flows outside of the FSAR mandated flow ranges also induce their own Technical Specification action statements that in turn can induce full plant shutdown in as little as two hours, depending on the load in question.

2. Each loop of service water is flow balanced before exiting each annual refueling outage to ensure that all loads are adequately supplied. A flow range is specified for each load to balance all the flows against each other. Once properly flow balanced, very little flow adjustment can be made for any one particular load without adversely impacting the operability of the remaining loads (increasing flow for one load reduces flow for all the others). Each time the system is flow balanced, proper individual component flows are produced, but this in turn does not necessarily result in one specific value for total flow. Because each load has an acceptable flow range, overall system full flow (the sum of the individual loads) also has a range. Total system flow can conceivably be in the ranges of 9247 - 10,079 GPM for SW-P-1A pump, 9212 - 10,043 GPM for SW-P-1B pump, and 1050 - 1158 GPM for HPCS-P-2 pump. Consequently, the desire to quarterly adjust service water loop flow to one specific flow value for the performance of inservice testing conflicts with system design and component operability requirements (i.e. flow balance) as required by Technical Specifications.

Alternate Testing to be Performed:

As discussed above in the basis for relief section, it is extremely difficult or impossible to return to a specific value of flow rate or differential pressure for testing of these pumps. Multiple reference points could be established according to the Code, but it would be impossible to obtain reference values at every possible point, even over a small range. An alternate to testing requirements of IWP-3100 is to base the acceptance criteria on a reference curve. Flow rate and discharge pressure are measured during inservice testing in the as found condition and compared to an established reference curve. Discharge pressure instead of

Relief Request RP-8 (Continued)

differential pressure is used to determine pump operational readiness as allowed by Relief Request RP-3 (Relief granted per SER/TER Reference 2.3.1, dated May 7, 1991). The following elements are used in developing and implementing the reference pump curves.

1. A reference pump curve (flow rate vs discharge pressure) has been established for SW-P-1A and SW-P-1B from data taken on these pumps when they were known to be operating acceptably. These pump curves represent pump performance almost identical to preoperational test data. The methodology employed for establishing a reference pump curve is similar to that for performing a comprehensive test being proposed by the OM Code Committee.

2. Pump curves are based on seven or more test points beyond the flat portion of the curve (at flow rate greater than 4800 gpm). Rated capacity of these pumps is 12,000 gpm. Three or more test data points were at flow rate greater than 9,000 gpm. The pumps are being tested at full design flow rate.

3. To reduce the uncertainty associated with the pump curves and the adequacy of the acceptance criteria, special test gauges (±0.5% full scale accuracy) were installed to take test data in addition to plant installed gauges and Transient Data Acquisition System (TDAS). All instruments used either met or exceeded the Code required accuracy.

4. For HPCS-P-2 pump, the reference pump curve is based on the manufacturer's pump curve which was validated during the preoperational testing.

5. Review of the pump hydraulic data trend plots indicates close correlation with the established pump reference curves, thus further validating the accuracy and adequacy of the pump curves to assess pumps operational readiness.

6. The reference pump curves are based on flow rate vs discharge pressure. Acceptance criteria curves are based on differential pressure limits given in Table IWP-3100-2. Setting the Code Acceptance Criteria on discharge pressure using differential limits is slightly more conservative for these pump installations with suction lift (Relief Request RP-3, SER/TER Reference 2.3.1, dated May 7, 1991). See the attached sample SW-P-1A pump Acceptance Criteria sheet. Area 1-2-3-4 is the acceptable range for pump performance. Areas outside 1-2-3-4 but within 5-6-7-8 define the Alert Range, and the areas outside 5-6-7-8 define the

Relief Request RP-8 (Continued)

required Action Range. These acceptance criteria limits do not conflict with Technical Specifications or Final Safety Analysis Report operability criteria.

7. Only a small portion of the established reference curve is being used to accommodate flow rate variance due to flow balancing of various system loads.

8. Review of vibration data trend plots indicates that the change in vibration readings over the narrow range of pump curves being used is insignificant and thus only one fixed reference value has been assigned for each vibration location.

9. After any maintenance or repair that may affect the existing reference pump curve, a new reference pump curve shall be determined or the existing pump curve revalidated by an inservice test. New reference pump curve shall be established based on at least 5 points beyond the flat portion of the pump curve.

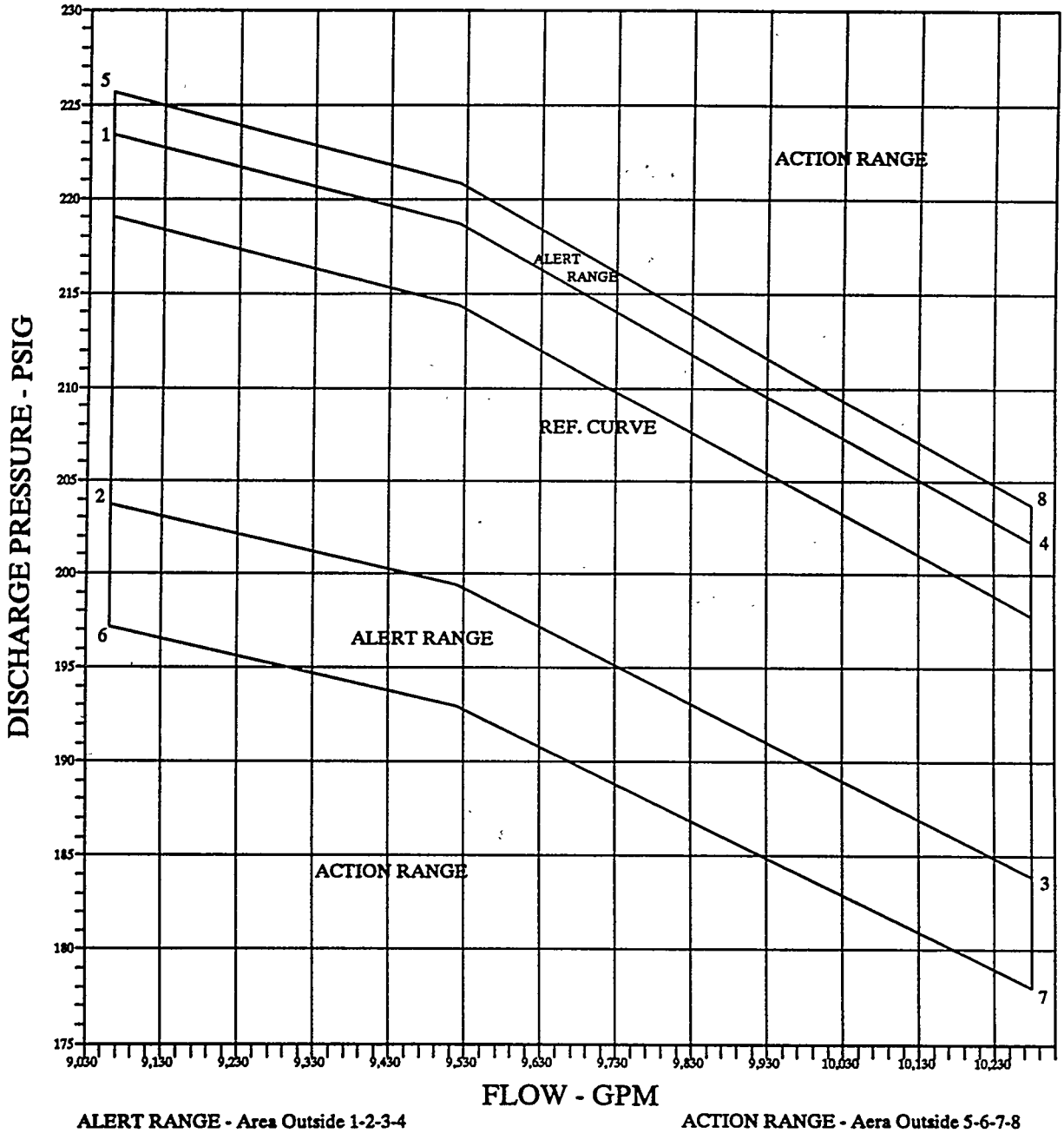
Quality/Safety Impact:

Design of WNP-2 Service Water System and the Technical Specifications requirements make it impractical to adjust system flow to a fixed reference value for inservice testing without adversely affecting the system flow balance and Technical Specification operability requirements. Proposed alternate testing using a reference pump curve for each pump provides adequate assurance and accuracy in monitoring pump condition to assess pump operational readiness and shall adequately detect pump degradation. Alternate testing will have no adverse impact on plant and public safety.

Relief Request RP-8 (Continued)

SAMPLE DATA SHEET

SW-P-1A ACCEPTANCE CRITERIA



ALERT RANGE - Area Outside 1-2-3-4

ACTION RANGE - Aera Outside 5-6-7-8

APPENDIX D

SAFETY EVALUATION



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM REQUESTS FOR RELIEF

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-528, 50-529, AND 50-530

1.0 INTRODUCTION

Section 50.55a of Title 10 of the Code of Federal Regulations, 10 CFR 50.55a, requires that inservice testing (IST) of certain ASME 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 alternatives are authorized or relief is granted by the Commission pursuant to ¶¶(a)(3)(i), (a)(3)(ii), or (f)(6)(i) of Section 50.55a. In order to obtain authorization or 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 and safety, or (3) conformance is impractical for its facility.

Section 50.55a authorizes the Commission to approve alternatives or grant relief from the ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to the relief that has been requested and alternatives proposed as part of the licensee's IST program are contained in this Safety Evaluation.

Section 50.55a(f)(6)(i) requires the Commission to evaluate determinations of impracticality and authorizes the Commission to grant relief and impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

By letter dated September 8, 1992, Arizona Public Service Company (the licensee) requested approval of a revised relief request for the four safety injection tank discharge check valves V215, V225, V235, and V245; and the four safety injection line discharge check valves V217, V227, V237, and V247.

2.0 DISCUSSION AND EVALUATION

The check valves which are the subject of this relief request provide

protection for the safety injection tanks and the high and low pressure safety injection lines from the higher pressure reactor coolant system during normal operation. In the event of a loss-of-coolant accident, the valves open to allow water to be delivered to the reactor vessel from the safety injection tanks and the safety injection system to cool the core.

The test requirement for these valves under Section XI of the ASME Code that is relevant to the relief requests is to full-stroke exercise the valves every 3 months, or part-stroke exercise every 3 months and perform a full-stroke test during cold shutdown, or perform a full-stroke test during cold shutdown if the valves cannot be part-stroked every three months.

The licensee was granted relief from these requirements in an NRC letter dated November 15, 1988. The testing method approved in that letter is to part-stroke exercise the safety injection tank check valves in Mode 3 (hot standby) after each refueling outage when the safety injection tank pressure is above 600 psig and to disassemble one valve of each type each refueling outage to verify freedom of disc movement. If it is found that the disassembled valve's full-stroke capability is questionable, then all 3 other valves of that type would have to be disassembled and inspected.

In its letter of September 8, 1992, APS proposes an alternate testing method which would consist of a full-stroke exercise of all 8 valves during each refueling outage. This would be accomplished by opening the safety injection tank isolation valve with pressure in the safety injection tank and with the reactor vessel head removed. This evolution would open a pair of the check valves, one of each type. This would be repeated for the other 3 pairs until all 8 are tested. The licensee would monitor the level and pressure drop in the safety injection tank to determine whether or not full opening of the valves was achieved.

The licensee has conducted two tests using the proposed revised method. Acoustic data from both tests provided additional assurance that each valve actually stroked to the full open position during the test.

The NRC staff has reviewed the proposed alternate test method and finds it acceptable, subject to two conditions discussed below. The proposed test method requires each valve to be tested in the manner in which it performs its safety function, and is therefore a more realistic and improved test. It involves full stroking, as opposed to the current partial stroking. It also does not rely on valve disassembly, which activity offers the opportunity for reassembly errors. An added benefit of the revised method is the reduced personnel radiation exposure since the valves no longer have to be disassembled.

The NRC staff therefore finds the revised test method to be acceptable, provided that (1) the valves are partial-stroke tested each cold shutdown if they have not been tested within the past 3 months, and (2) one valve of each type is confirmed to have opened fully by a non-intrusive method (e.g., acoustics) each refueling outage on a rotating schedule such that all valves are confirmed in this manner in a series of four refuelings.

The NRC staff concurs with the licensee's continued determination that compliance with the code requirements is impractical in this case. Full-stroke exercising of these valves is not practical in any plant mode other than refueling shutdown when the reactor vessel head is removed. Part-stroke testing every 3 months is not practical since a plant shutdown would be required to perform the test. It is, however, practical to conduct a part-stroke test at each cold shutdown. During cold shutdown, the safety injection check valves can be part-stroked by the normal flow delivered to the reactor coolant system via the shutdown cooling system. The safety injection tank discharge check valves can be tested in the same manner as they are currently being tested by part-stroke exercising in Mode 3 (hot standby) when the safety injection tank pressure is above 600 psig. The licensee has already confirmed in two separate tests that full opening of the valves can be established by acoustics.

As noted in the relief request, these valves also perform a safety function by closing to prevent over pressurization of SI piping from RCS pressure. Similar to the required valve open exercising requirements, these valves must be verified to be closed every three months or during cold shutdown if the closure verification of these valves cannot be performed every three months. Since these valves will be part-stroke exercised at cold shutdowns and since the Technical Specifications require leak testing of these valves after they are disturbed, the closure verification will be performed at cold shutdown through the leak testing. The licensee should either perform the closure verification every three months or prepare a cold shutdown justification if this testing is not practical and revise the IST program to reflect this testing, as appropriate.

3.0 CONCLUSION

The revised valve Relief Requests Nos. 33 and 34 transmitted by APS letter dated September 8, 1992 are acceptable for implementation, provided that the check valves are part-stroked each cold shutdown, and provided further that one valve of each type is confirmed to have opened fully by a non-intrusive method (e.g., acoustics) each refueling outage on a rotating schedule such that all valves are confirmed in this manner in a series of four refuelings.

The NRC staff has determined that granting of this relief pursuant to 10 CFR 50.55a(f)(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 NRC staff has considered the alternate testing being implemented and the impracticality of performing the required testing considering the burden if the requirements were imposed.

Date: October 23, 1992

APPENDIX E

BASES DOCUMENT

IST DESIGN BASIS DOCUMENT

VALVE(S): CS-16, CS-17

DRAWING: NF-39237, NF-39824

DESCRIPTION: 11,12 Containment Spray Pump Suction Check

CODE CLASS: 2

VALVE CATEGORY: C, Active

NORMAL POSITION: Closed

SAFETY POSITION: Open or closed

SAFETY FUNCTION(S): Valve is open to provide RWST water and flow to the CS pumps. Valve is closed to prevent backflow of containment sump water to the RWST upon a passive failure of the RHR to CS MOV.

NORMAL FUNCTION(S):

TEST TYPE: Partial stroke open quarterly per SP1090 and OM-10 paragraph 4.3.2.1 and 4.3.2.2(b) and (e) with the full stroke open at refueling per SP1372. Obturator travel to the closed position is test quarterly per SP1354 and OM-10 paragraph 4.3.2.1 and 4.3.2.2(a).

COMMENTS: See Deferral CS1 and CS2.
Non-intrusive testing is performed to assure the valve is full open using the head of the RWST as the driving force. Should testing with the RWST head be unsuccessful the valve is disassembled and inspected.

REFERENCE:B18 Containment Spray System Description

1-MS-02017C-S, 1-MS-02017D-S, 1-MS-02018C-S, and 1-MS-02018D-S (M-201, Sh 1)
2-MS-02017C-S, 2-MS-02017D-S, 2-MS-02018C-S, and 2-MS-02018D-S (M-2201, Sh 1)
MSIV Pneumatic Operator Exhaust Valves

These valves open/shift to provide an exhaust path for air from the underside of the MSIV operating cylinder when an MSIV closing signal is received. Although these valves are not classified as Class 1, 2, or 3, they are included in the Program for completeness.

Test Requirement: BT-O

1-MS-02017A-S, 1-MS-02017B-S, 1-MS-02018A-S, and 1-MS-02018B-S (M-201, Sh 1)
2-MS-02017A-S, 2-MS-02017B-S, 2-MS-02018A-S, and 2-MS-02018B-S (M-2201, Sh 1)
MSIV Pneumatic Operator Supply Valves

These valves close/shift to secure supply air to the underside of the MSIV operating cylinder when an MSIV closing signal is received. Although these valves are not classified as Class 1, 2, or 3, they are included in the Program for completeness.

Test Requirement: BT-C

1-MS-02019 and 1-MS-02020 (M-201, Sh 1)
2-MS-02019 and 2-MS-02020 (M-2201, Sh 1)
AFW Steam Supply Stop/Check Valves

These normally-closed valves open to provide flowpaths for steam from each of the steam generators to the respective AFW Pump turbine. They close to provide isolation between the steam generators in the event of a steam line break upstream of the MSIV,s. (FSAR 10.2.2)

Test Requirement: CV-O BT-O BT-C PIT

APPENDIX F

DESIGN BASES REVIEW PROCESS DESCRIPTION FOR COMPLIANCE WITH GENERIC LETTER 91-18 GUIDANCE

Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

August 17, 1994

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington D.C. 20555

Attention: Mr. William T. Russell

Subject: Inservice Testing Program Plan for Pumps and Valves
Program Scope Update

Byron Station Units 1 and 2
(NPF-37/66; NRC Docket Nos. 50-454/455)

Braidwood Station Units 1 and 2
(NPF-72/77; NRC Docket Nos. 50-456/457)

Dear Mr. Russell:

During two recent regional inspections of the Inservice Testing (IST) program (May, 1993 at Braidwood and January, 1994 at Byron) a weakness in the program scope was identified. Byron and Braidwood Stations committed to jointly review the scope of the IST program and develop a scoping basis document. This scoping effort was being performed in accordance with the scoping guidelines found in ASME/ANSI OM-1988, Parts 6 and 10. The use of OM-6 and OM-10 will enable this review to be used for Byron's ten-year (second interval) program update.

The program scope review was completed on June 30, 1994. The scope review identified that 90 and 74 valves (two unit total) need to be added to Byron and Braidwood's programs, respectively. Both sites intend to aggressively pursue initial testing of all the identified valves; however, several of the valves being added can only be tested in plant conditions achieved during a cold shutdown or refueling outage. Because of this, the sites have designated the valves into one of 3 test implementation groups:

Group 1 - Unit 1 and Common Cold Shutdown/Refueling
Group 2 - Unit 2 Cold Shutdown/Refueling
Group 3 - Normal Quarterly test

Both sites intend to test Groups 1 and 2 valves during the appropriate upcoming outages. Group 3 valves will be tested at normally scheduled quarterly intervals. For Byron Station, all new valves will receive initial testing by the completion of the upcoming Unit 2 refueling outage (current completion date of 4/16/95). Similiarly, Braidwood plans on completing all initial valve testing by the end of the upcoming Unit 1 refueling outage (current completion date is 10/95).

The following details the site specific implementation plan:

Byron's Schedule

	Implementation Plan
09/14/94	Submit IST Program revision including additional scope.
09/30/94 - 11/12/94	*Begin implementation of quarterly tests (Group 3) and of valves identified as Refueling Outage/Cold Shutdown for Unit 1 (Group 1)
02/95 - 04/16/95	Begin implementation of testing valves identified as Refueling Outage/Cold Shutdown for Unit 2 (Group 2). Quarterly testing (Group 3) implementation continues.
04/16/95	All newly identified valves have been initially tested and are being tested per frequency requirements.

* Please note that this implementation schedule reflects testing of the Group 3 valves from 9/30/94 to 4/16/95. This timeframe is necessary because of the resources required to support the testing of Group 1 & 2 valves during the Unit 1 & 2 outages, which are scheduled within a short timeframe.

APPENDIX G

COMMENTS AND RESPONSES ON DRAFT NUREG-1482

Draft NUREG-1482 was published November 1993. *Federal Register*, Volume 58, Number 240, pages 65738 and 65739, December 16, 1993, published proposed Supplement 1 to Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," which referenced the draft NUREG-1482. Public comments were solicited on both documents. A public meeting was held on February 2 and 3, 1994, and the public comment period closed March 10, 1994. This attachment includes most of the comments and a response to each. The comments have been arranged according to the section in the draft NUREG-series report. Comments related to the same issue have been consolidated. Many comments have been paraphrased. The responses to the comments have been incorporated into the final NUREG-series report where appropriate. Changes between the draft NUREG-1482 and the final NUREG-1482 are generally discussed in the comments and responses; however, the staff also made changes to address other issues raised in the intervening period through inspection activities, OM Committee meetings, and the NRC/ASME Third Symposium on Testing Valves and Pumps, held July 1994.

COMMENTS ON SECTION 1, "INTRODUCTION"

Comment 1-1

Is it the intent that licensees can use the stated recommendations in the NUREG-series report regardless of their current code-of-record as long as the use is documented in the IST program submittal to the NRC? The draft report indicates that documenting use of the new guidance in the IST program is sufficient for certain circumstances. However, in the past some licensees have been directed to submit plant specific relief requests for items preapproved by GL 89-04.

Response 1-1

Yes. When using the guidance of the NUREG-series report, certain recommendations can be implemented without requesting further approval from the NRC. It is acceptable to document the use of such recommendations in the IST program (discussed further in Response 1-7). GL 89-04 directs licensees to document the use of Positions 1, 2, 6, 7, 9, and 10 in the IST program, but does not direct that the documentation must be in the form of a relief request. GL 89-04 granted approval to follow the alternative testing delineated in Positions 1, 2, 6, 7, 9, and 10 if the provisions of GL 89-04 are followed, pursuant to 10 CFR 50.55a(g) [now (f)]. Most licensees have documented the use of these positions in relief requests for convenience; however, documentation in the program is acceptable in another format as long as it is clear that the provisions of the referenced positions are documented and discussed in adequate detail to indicate conformance with such provisions. Perhaps the reason certain licensees may have been directed, presumably by NRC inspectors, to submit relief requests was that the conformance was not adequately documented in the program.

Comment 1-2

Does the NUREG-series report provide the "Commission approval" as needed per 10 CFR 50.55a(f)(4)(iv) for using later editions of the Code? Is this a pre-approval document? If so, when can we start using the report for pre-approvals?

Response 1-2

The NRC will state the endorsement of the NUREG-series report in Generic Letter 89-04, Supplement 1, which will give the "Commission approval" as required by 10 CFR 50.55a(f)(4)(iv). The approval is effective when the final generic letter supplement is issued.

Comment 1-3

Does the NRC anticipate the approval of later editions of the Code into 10 CFR 50.55a before the end of 1994?

Response 1-3

Even if a proposed rulemaking is issued before the end of 1994, it is unlikely that the final rule would be effective before the end of 1994. The later edition of the code for inservice testing (IST) would be the Operations and Maintenance Code.

Comment 1-4

Throughout the document, "the Code" is referenced when it is apparent that reference to either Section XI, OM-6 and OM-10, or ASME/ANSI Operation and Maintenance Standards, 1988 Addenda (OMa-1988) is intended. This is confusing and, in some cases, misleading. All references to Code requirements should carefully refer to the proper document.

Response 1-4

The document is written for the latest edition incorporated into Paragraph (b) of 10 CFR 50.55a, which is as noted in Section 1. To the extent practical, the document reflects the applicable section, subsection, or paragraph of the appropriate documents.

Comment 1-5

In invoking certain requirements of OM-1, 6, and 10, without an approved relief request, as allowed by 10 CFR 50.55a(f)(4)(iv) for licensees that have not updated to the appropriate editions of the Code that endorses these standards, do these standards have to be implemented in their entirety or can select sections be implemented?

Response 1-5

Licensees may update to the 1989 Edition of the Code in its entirety. This edition references OM-1, OM-6, and OM-10 as the rules for IST. Portions of OM-6 and OM-10 are listed for approval by the NUREG-series report, as endorsed by GL 89-04, Supplement 1, in Section 1. Use of the later edition of the Code, or portions listed in Section 1, is to be documented in the IST program. The NUREG-series report gave approval for such use in accordance with 10 CFR 50.55a(f)(4)(iv).

Comment 1-6

When does the NRC expect to incorporate the OM Code into 10 CFR 50.55a?

Response 1-6

NRC is considering the OM Code in the preparation of a proposed rule expected to be published in the *Federal Register* by October 1995.

Comment 1-7

The draft guidelines state several times that, although the requirements are as stated in the ASME OM Standards and the licensee is complying with the Code, "if a licensee chooses to implement this guidance, this section [of the guidelines] must be explicitly referenced in the IST program." A licensee should not have to state in the IST program the methods of ensuring Code compliance, if the licensee is complying with the code.

Response 1-7

The approval to use the later edition (or portions of the later edition) of the code applies for licensees not already using OM-6 and OM-10. For licensees using earlier editions, a reference to the guidelines section is necessary to ensure that the requisite approval pursuant to 10 CFR 50.55a (f)(4)(iv). This approval is generic through the NUREG-series report as endorsed by GL 89-04, Supplement 1. Only a reference is required. The entire recommendation need not be restated in the IST program.

Comment 1-8

It appears from the second paragraph of this section that the staff will use the NUREG guidance as a basis for granting relief even if a relief request was not written using the

NUREG. If this is the intent, then a backfit analysis should be required since this additional guidance, which may be more restrictive than 10 CFR 50.55a or the ASME Code, would then become a defacto regulatory requirement.

Response 1-8

The guidance discussing the use of the NUREG-series report for granting relief or approving alternatives is for requests conforming to the guidance. NRC will reference the applicable section in the report and not repeat the entire evaluation. The recommendations in the report for requesting alternatives include issues for which an acceptable alternative is stated. Licensees may continue to propose other alternatives that will be evaluated individually and may or may not be approved as requested. The report recommendations, other than when discussing regulatory requirements, are not themselves requirements.

COMMENTS ON SECTION 2, "DEVELOPING AND IMPLEMENTING AN INSERVICE TESTING PROGRAM"

Section 2.1, "Compliance Considerations"

Comment 2.1-1

In the second paragraph, it is stated that a licensee must receive the Commission's approval prior to performing testing per later editions of the Code. Is it assumed that this is intended to mean "before substituting the later requirements" since simply performing an additional test should not be the NRC's concern unless an unreviewed safety question exists?

Response 2.1-1

The discussion in Section 2.1 relates to compliance with the regulatory requirements. The sentence you refer to followed a sentence that states that "IST may meet the requirements of subsequent editions." The discussion did not consider testing outside that required for IST; however, the sentence was deleted to eliminate confusion.

Comment 2.1-2

The section states that changes to the scope, test methods, or acceptance criteria are subject to the requirements of Section 50.59. Section 50.59 does not specifically address programmatic documents or any documentation other than those that could result in an unreviewed safety question. A detailed safety analysis (per § 50.59) of IST program elements (other than plant procedures) is typically not performed at most plant sites and, if required, would result in a complex and difficult process.

Response 2.1-2

The IST program consists of various documents, many of which are administrative, that may not be covered by a 10 CFR 50.59 review process. However, a determination pursuant to 10 CFR 50.59 may be part of the process if components are deleted from the program, if acceptance criteria are changed, of if a test method is modified.

Comment 2.1-3

A valve must be tested in accordance with the IST program if the valve is realigned under 10 CFR 50.59 during plant operation and is temporarily made active when it was previously passive (not inservice tested). However, what actions should be taken if the alignment will be restored to passive status during the next refueling outage and the valve cannot be tested during power operating conditions? Adding testing requirements to the IST program and then deleting them seems to be an administrative hardship.

Response 2.1-3

If testing cannot be performed, it may be difficult to establish a basis for considering the valve capable of performing the "new" active safety function. The procedure change, the related evaluation for 10 CFR 50.59, and a "temporary change" to the IST program would be adequate for documenting the new alignment without creating an administrative hardship beyond that required to ensure the acceptability of making the change. This situation is the responsibility of the plant operating review committee in determining the

acceptability on a case-by-case basis. A situation such as this may be treated as a nonconforming condition, and guidance in Section 7 may apply.

Comment 2.1-4

Section 2.1 discusses Regulatory Guide (RG) 1.147 and lists four code cases. Are these Code Cases listed because they are the only ones that apply to IST? Please clarify the NUREG. Also, please add a discussion indicating that code cases that have been incorporated into a licensee's program but are no longer listed in RG 1.147 (because they have been incorporated into ASME Codes) may continue to be implemented by licensees.

Response 2.1-4

The code cases listed in Section 2.1 are those included in RG 1.147 that relate to IST. Code Case N-427 discusses the use of superseded code cases. If a code case was listed in an earlier revision of RG 1.147, the use would be acceptable for the applicable editions of the code, unless specifically revoked by the regulatory guide.

Comment 2.1-5

In Section 2.1, it is stated that a licensee must obtain NRC approval to use portions of later editions and addenda of the ASME Code and receive that approval prior to performing or conducting specific tests. The wording of this requirement should be consistent with the wording of 10 CFR 50.55a. If formal approval is required prior to implementation, the regulation should so state. Entergy, in the past, has performed testing to later editions and addenda which were approved by the Commission and contained in 10 CFR 50.55a(b) by notification of the intended use of an already approved regulation.

Response 2.1-5

Paragraph (f)(4)(iv) of 10 CFR 50.55a states that IST may meet the requirements of later editions or addenda incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed in paragraph (b), and subject to Commission approval. By your interpretation of the regulation, the phrase requiring Commission approval would not be needed. It became evident during the public meeting held to discuss the NUREG-series report that several licensees had interpreted the regulation similar to Entergy. In discussing successive inspection intervals, Subsection IWA-2413 of the 1989 Edition of Section XI allows the use of later editions (or portions thereof if all related requirements are met) approved by the regulatory body. If the use of later editions and addenda is documented in the IST program, it is unnecessary to attempt to request further approval at this time; however, it may be prudent to submit a letter to the NRC stating such application of later editions or addenda of the Code. Future rulemaking efforts will clarify the use of later editions and addenda of the ASME Code.

Comment 2.1-6

The guidance states that the NRC may authorize alternatives to the ASME Code testing requirements submitted as relief requests. 10 CFR 50.55a(a)(3) does not specify that an alternative be requested as a relief request. It is recommended to delete the last four words of the sentence to be consistent with 10 CFR 50.55a.

Response 2.1-6

The guidance reflects actual practice. It does not state that alternatives have to be submitted as "relief requests," but rather that we may grant relief or authorize an alternative submitted as a relief request under either paragraph (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. Only recently has the NRC received requests from licensees that differentiate between "relief" and "proposed alternatives." Licensees may continue to use a relief request format, and when no specific paragraph was referenced, the NRC reviewer would use the approach used in the licensee's justification for the request. Similar information to a relief request is needed, in most cases, to describe and justify an alternative. If a licensee elects to request an alternative in a letter or in some format other than as a relief request, the request will be reviewed. A phrase has been added to clarify that another format is acceptable.

Comment 2.1-7

The reasons stated for NRC approval of alternatives appear overly narrow. The NRC should also approve alternatives when a licensee has shown that a reduction or deletion of testing will still provide an acceptable level of quality and safety. Additionally, proposed alternatives should not need to comply with any ASME Code edition if the alternative will not reduce the level of quality and safety.

Response 2.1-7

Approval under 10 CFR 50.55a(a)(3)(i) is based on an alternative providing an acceptable level of quality and safety. The alternative would monitor equipment in a manner that gives equivalent results as would be achieved by monitoring in accordance with Code requirements. Licensees may propose alternative methods to the extent that they believe provide an acceptable level of quality and safety. However, the staff does not generally approve alternatives that do not meet the level that would be achieved by the Code testing. The NRC is working with an industry group with participation of ASME, EPRI, NRC, and industry members to establish a risk-based testing methodology. Such a methodology will establish a basis for reducing or deleting testing. If NRC received a request to delete or reduce testing based on risk, the staff would most likely delay review until confirming that such a methodology is acceptable.

Section 2.2, "Criteria for Selecting Pumps and Valves for the IST Program"

Comment 2.2-1

When describing the scope for pump and valve testing, ASME Section XI, OM-6, OM-10, and OM-1 do not use terms such as *safety-related* or *safety function*. The exact wording used varies slightly between each document, but in the scope statement, they all use words similar to a specific function in shutting down a reactor to the cold shutdown condition or in mitigating the consequences of an accident. When referring to scope, why does the first paragraph of Section 2.2 use terms such as "safety function" and "all safety-related?" It would appear that terms similar to "safe shutdown" or "accident mitigation" would more accurately reflect the scope statements of the Codes.

Response 2.2-1

Section 2.2 has been modified to reflect the terminology used in 10 CFR 50.55a and the Code.

Comment 2.2-2

Regarding "safe" versus "cold" shutdown, will the Commission be responsive to relief requests for restricting the program applicability only to those systems and components required for "safe" shutdown versus "cold" shutdown?"

Response 2.2-2

The application depends entirely on the licensing basis of the plant. Relief requests for plants licensed for *cold* shutdown as the *safe* shutdown of the plant would not be acceptable. A relief request is not required for plants licensed with hot shutdown or hot standby as the *safe* shutdown condition; however, it is recommended that the IST program document state the special condition for the plant in an introductory section.

Comment 2.2-3

The scope of later editions of the Code (OM-6 and OM-10) include testing of components that are required for "maintaining the cold shutdown condition." What guidelines are given on how long cold shutdown must be maintained? As the required period of maintaining the cold shutdown condition increases, more and more support systems not designed to mitigate the consequences of an accident (design basis accidents in Chapter 15 of the SAR) come into use.

Response 2.2-3

The period of interest would coincide with the safety analysis for the plant. For example, if the safety analysis is based on the capability to maintain cold shutdown for 30 days, IST would apply to the pumps and valves within the scope of 10 CFR 50.55a that are used to meet this capability.

Comment 2.2-4

Section 2.2 states that the NRC will consider expanding the scope of 10 CFR 50.55a to include all safety-related pumps and valves in future rulemaking. The scope of 10 CFR 50.55a should not be changed from its current scope because it would result in an increase in scope without a compensating increase in the level of safety. For example, the rulemaking would require testing of pumps and valves that were not originally designed to accommodate testing in accordance with Section XI/OM.

Response 2.2-4

If NRC expanded the scope of 10 CFR 50.55a, it would do so only after doing a backfit analysis in accord with 10 CFR 50.109. If the expansion did not meet the criteria for justifying a backfit, it would not be implemented in the regulation. ASME created a special task group to review the scope and testing requirements from a risk perspective. Changes to the scope of the Code may result in future changes to the scope of 10 CFR 50.55a.

Comment 2.2-5

Do deviations from the Code for noncode components require a "relief request," or is a documented basis for the testing sufficient?

Response 2.2-5

Deviations from the Code for noncode components need not be written as "relief requests," but it is recommended that they be documented clearly in the IST program. If it is

not clear that the deviations relate to noncode components, it might be assumed that the requirements of 10 CFR 50.55a are not being met. Some licensees use the relief request format to document such deviations, while other licensees use notes, footnotes, or short descriptions in the program document.

Comment 2.2-6

Clarify which of the following represents the scope of the IST program: (1) ASME Boiler and Pressure Vessel Code (BPVC), Section XI, Class 1/2/3 components; (2) Regulatory Guide 1.26 Quality Group A/B/C; or (3) OM Parts 6 and 10 scope statement. If pumps or valves are not ASME Code Class 1/2/3, then are they outside the scope of the IST program? What about an ASME BPVC Section III plant versus an ANSI B31.1 plant? FSAR identification of the code class? FSAR commitment to place component in IST program?

Response 2.2-6

The scope of the IST program is defined in 10 CFR 50.55a, Paragraphs (f)(1), (f)(2), and (f)(3). For components that fall within the scope defined in these paragraphs, the scope of the IST program is further narrowed by the scope of the ASME BPVC, Section XI, Subsections IWP and IWV, and, when applicable, OM-6 and OM-10. If the scope of IWP/IWV or OM-6/OM-10 appears to be broader or narower than the scope of 10 CFR 50.55a, the more narrow scope applies. If the FSAR indicates that a system or component is Code Class 1, 2, or 3, the system or component is within the scope of 10 CFR 50.55a. If the FSAR states that a system or component is designed, fabricated, and maintained as code class at the option of the owner as permitted by Paragraph IWA-1320(e), then the application of the requirements in Section XI are also optional. If a licensee committed to include a component in the IST program, the component is within the scope of the program but may be removed under 10 CFR 50.59 if the criteria are met. If the TS require a component to be tested under the IST program, the component is within the scope.

Comment 2.2-7

What is an "accident" as used in the code? Is it the intent of 10 CFR 50.55a to include components other than those included in the mitigation of design basis accidents in Chapter 15 of a facility's Safety Analysis Report?

Response 2.2-7

When discussing safety functions to "mitigate the consequences of an accident," the code is referring to design bases accidents or other expected events stated in the plant's safety analysis report. The scope of the IST program is defined in 10 CFR 50.55a(f) and further narrowed by the scope defined in IWP/IWV which, in addition to mitigating the consequences of an accident, cover components used for safe shutdown and maintaining safe shutdown. Devices that give overpressure protection are included in the Code beginning with the 1986 Edition. See Appendix A for similar discussion for Question 104 from the GL 89-04 meetings.

Comment 2.2-8

What kind of documentation would be required for deleting entire systems from the IST program such as reactor core isolation cooling (RCIC) or standby liquid control (SLC)? Both of these systems have been proven to be outside our IST program scope as identified during a recent design bases documentation (DBD) review.

Response 2.2-8

The documentation would need to include, as a minimum, the changes made to the safety analysis report under 10 CFR 50.59 (if necessary) and the evaluation of the change to the IST program that stated the basis (or referenced the basis in the DBD documentation). Most IST programs for BWRs include SLC, as it is one of the systems required for safe shutdown, to maintain safe shutdown, and to mitigate the consequences of an accident. The TS for many BWRs include a surveillance for the RCIC and SLC pumps and valves and may need to be changed.

Comment 2.2-9

Our facility currently conducts component testing for emergency diesel generator (EDG) support systems (fuel storage and transport, lube oil, cooling water, starting air, and combustion air/exhaust), as required by 10 CFR 50, Appendices A and B, under the IST program. In so doing, administrative overhead is minimized since this testing can be conducted as part of an established, mandatory program. We currently classify these systems as Code Class 3, which appears consistent with NUREG-0800, "Standard Review Plan," Sections 3.2.2 and 9.5.X. In the response to Question Question 54, it is stated that EDG air start systems are typically not code class systems. It has been convenient for us to consider these systems Class 3 for COMPONENT testing under IWV/IWP; however, it has been difficult (and, due to the media and service conditions, of very little value) to attempt repairs/replacements and pressure testing under the rules of Section XI for these systems. Could we consider these systems as Code Class 3 for IST only (i.e., not ISI), or reclassify these systems as non-code class and continue performing component testing within the IST program? This also applies to certain safety-related pump lube systems.

Response 2.2-9

Licensees for plants licensed under the standard review plan (SRP) may have classified certain systems as Code Class 3 that would not be so classified in earlier plants. The licensees may have classified the systems in this manner expecting that the systems would be required to be code class; however, the SRP recommends rather than requires that these systems be classified as Quality Group C (corresponds to Code Class 3 in RG 1.26). Regulatory Guide 1.26 states that it does not cover systems such as instrument and service air, diesel engine and its generators and auxiliary support systems, diesel fuel, emergency and normal ventilation, fuel handling, and radioactive waste management systems. However, the guide states that these systems should be designed, fabricated, erected, and tested to quality standards commensurate with the safety function to be performed.

The licensee is responsible for determining if the classification of Code Class 3 is required or if it is optional under IWA-1320(b) or (c). IWA-1320(b) states that optional construction of a component within a system boundary to a classification higher than the minimum class established in the component design specification shall not affect the overall system classification by which the applicable rules are determined. IWA-1320(c) states that where all components within the system boundary or isolable portions of the system boundary are classified to a higher class than required by the group classification criteria, the rules of IWB, IWC, and IWD may be applied to the higher classification. See ISTA 1.3.2,

"Classifications," of the OM Code for similar information on components within the scope of the OM Code. If the code classification is changed pursuant to 10 CFR 50.59, the pumps and valves may remain in the IST program as augmented components (denoted as noncode), as noted in Position 11 of GL 89-04. Additional guidance on the scope of the IST program may be provided in another document.

Comment 2.2-10

Section 2.2 should include a discussion of valves which may be required to close to prevent exceeding the 10 CFR 100 off-site release limits. It should be pointed out that each valve that closes automatically as a result of radiation readings should be examined to see whether the failure of the valve to close could lead to exceeding the 10 CFR 100 limits. It should also be pointed out that if the fluid involved is a liquid which will not flash to steam, the likelihood of exceeding the 10 CFR 100 limits is remote.

Response 2.2-10

The "Current Considerations for Position 3" in Appendix A address back flow of check valves. A reference to IN 91-56 has been added to Section 2.2. The NRC is evaluating the need for additional guidance in this area.

Comment 2.2-11

The draft NUREG-1482 acknowledges that the scope of the OM Standards and Code has been expanded to include all safety-related pumps and valves in the IST program. Until 10 CFR 50.55a is changed, the scope of the IST program will continue to include those components within the code classes. However, the NRC stated that they would consider expanding the scope of the IST program to include all safety-related pumps and valves. The current scope of code classes is adequate. Safety-related valves and pumps outside the code class boundaries are addressed by other measures such as the plant-specific technical specifications, maintenance rule, and the industry post-maintenance testing programs. Including all safety-related components in the IST program increases the regulatory burden without a corresponding increase in overall safety. Mandatory imposition of ASME IST requirements on non-code classed components constitutes a backfit. Many of the components were not designed with the necessary provisions to perform testing (flow instruments, gages, etc.), modification would be necessary to perform tests in compliance with code requirements. The industry could on a plant-by-plant basis identify the components important-to-safety which are not code classed. Secondly, history, current testing and preventative/predictive maintenance schedules could be reviewed for adequacy and revised as appropriate. Again, this approach is in line with implementing the maintenance rule. The intent would be to provide documented justification of these practices providing assurance of availability. The other extreme could require a similar review, generate reliefs, and probably ultimately result in unnecessary plant modifications.

Response 2.2-11

Members of the OM Committee at the time the scope statement was developed have stated that the committee did not intend to increase the scope of OM-6 and OM-10 beyond the scope of the 1986 Edition of Section XI. Originally, the scope statement was written to apply to ASME Code Class 1, 2, and 3 components. The scope statement was written to include these components because many plants were licensed before Code Classes 2 and 3 were included in the construction code. The scope was intended to be consistent with

10 CFR 50.55a. Therefore, it would be inappropriate to assume that the scope of OM-6 and OM-10 is broader than 10 CFR 50.55a. The components outside the scope of 10 CFR 50.55a may be included in the scope of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (the "Maintenance Rule"). If codes and standards are developed for components other than ASME Code Classes 1, 2, and 3, the NRC would determine if changes to the regulation would be needed. Any such changes would be subject to the provisions of 10 CFR 50.109, "Backfitting."

Comment 2.2-12

Section 2.2 states that components necessary to achieve and maintain cold shutdown may not be within the scope of IST for plants which were licensed to operate with a "safe" shutdown condition of hot standby or hot shutdown. However, 10 CFR 50.46(b)(5) required that the calculated core temperature shall be maintained at an acceptable low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core. Is a temperature greater than boiling an acceptably low temperature post-LOCA? Also, many of the systems or components used to bring a plant to cold shutdown are the same ones used for long-term decay heat removal. Even if a plant is licensed for hot shutdown, are the systems and components required by 10 CFR 50 to remove decay heat and maintain core temperature required to be tested and inspected per the Codes? Please clarify.

Response 2.2-12

The requirements for 10 CFR 50.46(b)(5) for long-term post-LOCA cooling would be established by the ECCS calculated cooling performance established to meet the requirements for 10 CFR 50.46. The requirements of 10 CFR 50.46 will be met as long as the temperature is decreasing. The ECCS pumps and valves are within the scope of 10 CFR 50.55a. Guidance in the NUREG-series report does not supersede any regulatory requirements. Certain requirements of 10 CFR Part 50, such as Section 50.46, were backfit on earlier licensed plants. SECY-92-223 gives information on the resolution of such issues.

Section 2.4.2, "Valves"

Comment 2.4.2-1

Under system description, replace "pump" with "valve."

Response 2.4.2-1

The change is made as noted.

Comment 2.4.2-2

Section 2.4.2 has a paragraph headed "Active/Passive." The examples in Appendix B to this NUREG do not list this information for the valves. Even though "Active/Passive" is not included in Appendix B, it is not needed because it is inferred from the testing required.

Response 2.4.2-2

The examples in Appendix B are from actual IST submittals and do not include all of the items recommended in Section 2.4.2. It would be helpful to include "Active/Passive." Too often, inferences create confusion while clarity eliminates confusion.

Comment 2.4.2-3

In a case where testing of excess flow check valves is controlled by a technical specification surveillance requirement, may the approximately 100 valves be addressed generically, or must each valve be listed in the valve table of the IST program?

Response 2.4.2-3

It may be more appropriate to list each valve, particularly if the valves are shown on different drawings and if some of the valves are leak tested while others are not. If valves are grouped together on the valve table, the number of valves (and the valve numbers) must be clearly indicated.

Comment 2.4.2-4

Table 2.3 appears to provide an acceptable example pump table format. Could a similar acceptable example valve table format be provided?

Response 2.4.2-4

Appendix B includes several sample valve tables with various differences and of various formats. Various formats would be acceptable as long as the appropriate information is presented. If valves are sorted by system, a cross-reference by valve number is helpful.

Comment 2.4.2-5

IWV-2100 defines a passive valve as one which is not required to change position to accomplish a specific function. Can a valve ever be removed from its safety position and still be considered passive? If so, how often?

Response 2.4.2-5

Though this question may better be addressed by the OM Committee, it would seem appropriate that the position of the valve may be changed while the valve is out of service without requiring IST if the valve is temporarily removed from service, or if the plant is in a mode that does not require the valve to be in its "passive" position. However, if a valve has to reposition to fulfill a safety function, and if the valve is normally in the opposite position or may be routinely repositioned during power operations, it is an active valve and is subject to IST. If it is repositioned to create a new valve alignment (e.g., as corrective action for a condition of another valve in the line), the licensee would consider IST in determining whether the new alignment is acceptable.

Section 2.4.3, "Piping and Instrument Diagrams"

Comment 2.4.3-1

The staff recommends that drawings be included in the program submittal. This recommendation places an unnecessary burden on the licensee to supply drawings in the IST program plan. Drawings are available in updated FSAR submittals. In addition, Section XI boundary drawings are available in the inservice inspection program plan. Redundant drawings in the IST program plan are not justified. However, if relief requests are submitted, submitting the pertinent drawings to the NRC to assist their review is warranted when NRC concurrence is required.

Response 2.4.3-1

Neither the technical staff at the NRC nor the contractors who review relief requests maintain a set of SARs for each plant. The IST reviewers do not receive a copy of the

inservice inspection program plan. Drawings are helpful in reviewing relief requests, whether submitted as part of the program or as an attachment to any relief request or proposed alternatives. However, the staff will limit requests unless necessary so as not to place a burden on licensees.

Section 2.4.4, "Bases Document"

Comment 2.4.4-1

The last sentence of Section 2.4.4 could be misinterpreted to mean that the bases document would be included as a licensing bases document. Is it the intent that the bases document be a licensing bases document, or simply be used to assist in the performance of a 10 CFR 50.59 evaluation search for applicable licensing bases documents?

Response 2.4.4-1

The recommendation was not intended to imply that the bases document itself must be a licensing bases document. The statement has been clarified.

Section 2.4.5, "Deferring Valve Testing to Cold Shutdown or Refueling Outages"

Comment 2.4.5-1

What is "impractical?" What could be considered when determining impracticality? Economic considerations? If the only test that can be performed for verifying closure is an LLRT [local leak-rate test], is that alone sufficient to establish impracticality as discussed in Section 4.1.3?

Response 2.4.5-1

Impractical conditions could result in a plant shutdown, which would cause unnecessary challenges to safety systems, undue stress on components, and additional cycling of equipment, and may reduce the life expectancy of the plant systems and components. An impracticality may be a limitation of design, geometry, or material of construction of components (e.g., no test taps, pumps cannot overcome pressure, no available flow path). Radiation exposure and personnel safety may constitute an impractical condition in certain plant modes. Testing that could cause a plant trip or require a power reduction would be impractical. Section 4.1.3 gives guidance on setting up leak test equipment.

Comment 2.4.5-2

Is there a need or preference on the part of the NRC for licensees to include cold shutdown justifications and refueling outage justifications in the 120-month submittal of the IST program?

Response 2.4.5-2

Yes. It is important that the NRC have a complete program document for reviews of relief requests, reviews of changes to technical specifications, and event assessments.

Section 2.5.1, "Justifications for Relief"

Comment 2.5.1-1

Examples are given for justifying relief. One of the examples specified is ALARA. Can ALARA alone be used to justify cold shutdown or refueling outage testing frequencies without a relief request, provided all the requirements of Paragraphs 4.2.1, 4.3.2,

and 6.2 of OM-10 are met for deferring testing and documenting the deferral in the IST program? Does NRC have any predetermined acceptable limits for radiation exposure for the performance of a single test which will allow changing test frequency from quarterly to cold shutdown or refueling outages?

Response 2.5.1-1

ALARA relates to controlling exposure during an activity, not specifically to eliminating activities; however, it may be a basis for deferring an impractical test when exposure limits to perform testing (or possibly to access a valve for repair in the event it could fail during a test) are prohibitive. The testing could be deferred to cold shutdown or refueling outages when the exposure limits would no longer be prohibitive. ALARA is part of an overall program required by 10 CFR 20.1101, including activities such as IST. NRC has not established "predetermined acceptable limits" for deferring an IST activity.

Comment 2.5.1-2

We believe that the following items are examples for determining impracticability of exercising a valve during plant operation: (1) risk of a plant trip, (2) risk of damage to a system or component, (3) excessive personnel hazard, (4) risk of test-induced component hazard, (5) effect on plant safety, (6) difficulty of test, (7) cost of test, and (8) failure of component in a non-conservative direction would cause total loss of system function (non-redundant). However, the typical burden of performing non-intrusive test techniques, by itself, does not constitute impracticability.

Response 2.5.1-2

The list appears to address impractical conditions, except that the difficulty and cost of testing do not, alone, constitute impracticalities.

Section 2.5.3, "Content and Format of Relief Requests"

Comment 2.5.3-1

Since none of the relief request examples were provided with a title, exactly what type of title does the NRC have in mind for requests?

Response 2.5.3-1

Sample titles follow: (1) Relief Request Number 1, (2) Safety Injection Pumps Relief Request, and (3) Check Valves in Series Relief Request. A unique number is also useful for identification purposes.

Table 2.1, "Typical systems and components in an inservice testing program for a pressurized-water reactor"

Comment T2.1-1

Although the table has some merit, it would be much more valuable if the staff would provide guidance with respect to more complex issues such as the requirement for maintaining redundancy, passive failure protection, etc.

Response T2.1-1

The guidance does not address issues outside the scope of inservice testing. The items mentioned apply to IST in determining the scope of the program, determining what components would remain in service during testing, and considering when removing equipment from service for testing; however, these items are needed for the safe operation of the plant and are not specific to IST. Such guidance is beyond the scope of this document.

Comment T2.1-2

Table 2.1, in several places, refers to "pump and discharge check valves." This statement should be modified to include suction check valves, as these valves are required to be operable in order for the pump to function.

Response T2.1-2

A reference to pump suction valves has been added.

COMMENTS ON SECTION 3, "GENERAL SUPPLEMENTAL GUIDANCE ON INSERVICE TESTING"

Section 3.1, "Inservice Test Frequencies and Extensions for Valve Testing"

Comment 3.1-1

This section should state that it refers specifically to valve exercising and not to testing in general.

Response 3.1-1

The title of the section has been changed to state that it applies to valve testing.

Section 3.1.1, "Deferring Valve Testing to Each Cold Shutdown or Refueling Outage"

Comment 3.1.1-1

With incorporation of the 1989 Edition of the ASME Code into 10 CFR 50.55a, is a relief request required to defer testing of valves on a refueling outage frequency?

Response 3.1.1-1

Supplement 1 to GL 89-04 gives approval to use Section 3.1.1 of NUREG-1482 for implementing the paragraphs of OM-10 on deferring testing of valves to refueling outages. Although the supplement does not invalidate existing relief requests, the licensee may write test deferrals rather than relief requests, with a statement that Section 3.1.1 of the NUREG-series report is being used. A single reference to Section 3.1.1 may be included in the IST program document rather than referencing it in each test deferral.

Comment 3.1.1-2

When considering deferring valve testing to cold shutdowns or refueling outages, some valves could be tested quarterly, but the testing involves a hardship; i.e., a limiting condition for operation of 3 to 4 hours in length, the repositioning of a breaker from "off" to "on," and necessity of manual operator actions to restore the system should an accident occur while the test is in progress. Performing a test quarterly for such situations can put the plant at a greater risk than the benefit achieved with a quarterly test. Is this a sufficient reason to defer a test to cold shutdown?

Response 3.1.1-2

Section 3.1.2 gives guidance on some of these situations. Otherwise, it would be appropriate to weigh the safety effect against the benefits of testing as a basis for deferring testing from quarterly to cold shutdowns or refueling outages. A method is described in NUREG/CR-5775.

Comment 3.1.1-3

Section 3.1.1.2 discusses testing valves during power ascension from a refueling outage. What does the phrase "except for valves which must be tested during power ascension for which technical specification requirements for the valves or the system determine when the valves are required to be operable" mean and where did it come from as it is not part of OM-10?

Response 3.1.1-3

The phrase is the subject of Section 3.1.1.2 of the report. OM-10 requires that valves tested on a refueling outage frequency be tested before returning the plant to operation. Several licensees have stated that certain valves cannot be tested until power ascension begins. This section was included to give guidance for such valves and to state that the operability of technical specifications would control the time for testing such valves. It is intended that such valves will be stated as tested on a refueling outage frequency, even though the plant may return to "operation" before the testing is completed. Although valves tested during power ascension from cold shutdowns that are not refueling outages would be tested similarly, the requirement in OM-10 differs for valves tested on a cold shutdown frequency.

Comment 3.1.1-4

When performing testing during cold shutdown periods, there should be a priority or time limit for testing valves that are specifically required to be operable (with a safety function) under cold shutdown conditions. Also, the requirement to continue to test these valves at a quarterly frequency should be discussed and clarified.

Response 3.1.1-4

While the comment is well intended, neither OM-10 nor IWV seems to require that testing be performed before operating a system used only during cold shutdown, or that testing continue at a quarterly frequency for valves tested only during cold shutdown. These standards appear to require (1) that valves tested quarterly continue to be tested quarterly, even when the plant is shut down, unless the system is out of service, and (2) that valves and pumps in systems in service during shutdown conditions be tested quarterly as long as the plant remains in that mode. The OM Committee may clarify the intent through the inquiry process.

Comment 3.1.1-5

Section 3.1.1.3 allows refueling outage testing for valves requiring containment to be de-inerted. When happens if a forced outage with containment de-inerting occurs? Should these valves be tested during cold shutdown even through refueling outage justification is included in the IST program and allowed by Section 3.1.1.3?

Response 3.1.1-5

The staff determined that few outages require de-inerting and that maintaining a separate schedule for valve testing was not warranted. When an extended cold shutdown necessitates de-inerting the containment, testing is at the discretion of the licensee. The length of the shutdown and the extent of other outage activities could be considered in making a decision. The requirements of Paragraph 4.3.2.5 of OM-10 or IWV-3416 of Section XI for valves in systems out of service may apply for extended outages of several months (see Section 3.1.3). Guidance on minimizing shutdown risk that may affect such a decision may also apply for extended outages.

Comment 3.1.1-6

Are licensees expected to invest in check valve nonintrusive equipment for the specific purpose of testing valves quarterly in lieu of during cold shutdowns or refueling outages?

Response 3.1.1-6

No.

Comment 3.1.1-7

Referring to Item (1) of the guidance from the 1976 NRC letters to licensees, does this mean that cycling non-redundant valves in a remaining operable train may be deferred to the next cold shutdown when one train is out of service, since their failure would cause a loss of total system function, even if testing is specified in the technical specification surveillance?

Response 3.1.1-7

In the licensing process, NRC weighed the possible safety consequences and benefits of performing a test required for a technical specification surveillance even when one train is out of service. The guidance in the NUREG-series report and in the 1976 letters does not supersede technical specification requirements.

Comment 3.1.1-8

For implementing cold shutdown testing requirements of OM-10, Paragraphs 4.2.1.2(g) and 4.3.2.2(g), why does the section have to be referenced in the IST program if a licensee already uses OM-10? It is not clear what additional requirements are imposed by OM-10, Paragraph 6.2, for not completing all cold shutdown valve exercising. What is the NRC's position on the effort that a plant must expend to complete all cold shutdown valve exercising during short outage? Is any documentation required for the valves that were not tested during the short outage but are beyond the required 92-day frequency?

Response 3.1.1-8

If a licensee has already updated the IST program to the requirements of OM-10, Section 3.1.1.1 does not need to be referenced. It is to be referenced by licensees using earlier editions of the Code to implement the referenced portion of OM-10. The staff deleted the reference in this section to Paragraph 6.2, which does not impose any related requirements and was incorrectly referenced. The NRC does not have a position on the efforts a licensee expends in performing cold shutdown valve testing; however, it is expected that a "good faith" reasonable effort would be expended. The Code does not require documentation for valves not tested during a cold shutdown outage other than as would be required for maintaining the IST schedule.

Section 3.1.2, "Entry into a Limiting Condition for Operation to Perform Testing"

Comment 3.1.2-1

It is unclear why the relief request example would be acceptable. Based on the example, it appears that pump testing could also be deferred. For example, some plants do not want to inject auxiliary feedwater into steam generators during power operations so they manipulate valves (manual, motor-operated, or air-operated valves) in test lines to provide a flow path. If a relief would be granted for valve stroking, would it also be granted for pump testing under similar circumstances?

Response 3.1.2-1

Pumps are generally tested quarterly on minimum recirculation test lines if the normal flow path is not available, as in your example for injection auxiliary feedwater into the steam generators. Position 9 of GL 89-04 discusses

testing on minimum flow with no measurement of flow and recommends that a more substantial flow test be performed during outages using installed flow elements. The new "comprehensive pump test" requirements in the OM Code will also address pump testing at normal flow rates. Licensees have submitted relief requests and test deferrals for check valves in pump discharge lines because the full accident flow cannot be obtained during quarterly testing. The example in Section 3.1.2 has been modified slightly to represent the condition more accurately, to ensure that your concern is addressed, and to ensure that licensees understand that a relief request is not necessary for deferring pump testing in accord with Position 9.

Comment 3.1.2-2

This section states that "IST which results in a system being completely removed from service may not be acceptable." However, the subsequent example of a relief request evaluation references TS 3.0.3. This specification establishes the shutdown action requirements that must be implemented when a limiting condition for operation is not met and the condition is not specifically addressed by the associated action requirements. TS 3.0.3 allows one hour to prepare for an orderly shutdown before changing the plant operation.

Response 3.1.2-2

Entry into TS 3.0.3 may not be the sole basis for requesting relief or an alternative. However, if testing cannot be complete within one hour, or if a total system function is removed and cannot be restored within one hour, this additional information would give additional justification. The example, which has been deleted, was from an actual relief request. Simply stating that the test requires entry into TS 3.0.3 does not preclude testing; however, entry into TS 3.0.3 would be the basis for deferral and would be supplemented by the reason (e.g., "results in entry into TS 3.0.3 because all ECCS systems become inoperable during this valve alignment").

Comment 3.1.2-3

In Section 3.1.2, does "multiple LCO" refer to only a single LCO on two separate systems or does it also refer to two or more LCO actions on the same system?

Response 3.1.2-3

The sentence including the reference to "multiple LCO" has been deleted because it was not necessary. The preceding sentence stated the major point of the discussion.

Comment 3.1.2-4

Draft NUREG-1482 takes the position that licensee should perform required quarterly testing, even if entry into a limiting condition for operation (LCO) is required. Relief requests to defer testing must contain justification in addition to the entry into the LCO. This is a rather inflexible position, and may unduly restrict prudent or cost-effective scheduling.

Response 3.1.2-4

NUREG-1482 does not take a position on entry into an LCO to perform surveillance testing. It merely references the position in NRC Generic Letter 87-09. LCO were developed with surveillance testing in mind. While entry into an LCO may be part of an adequate justification for relief, the relief request (or test deferral) must discuss the conditions that result from the testing or from

entering the LCO. GL 87-09 includes further guidance on allowable outage times for equipment. NRC is flexible in requiring licensees to follow the test frequency requirements of the Code. If there is sufficient justification for deferring testing, the Code allows such deferral. The licensee needs to ensure that the justification includes more than a simple statement that entry into an LCO is necessary for testing. Brief sample statements follow: (1) testing must be deferred to cold shutdown because the plant would enter TS 3.0.3 if the licensee did testing that removes all ECCS from service and places the plant in an unanalyzed condition and (2) testing must be deferred to cold shutdown outages because the plant would enter an LCO for the system when the valve is stroked to the fully closed position, and, if the valve fails to reopen automatically, it cannot be accessed during power operations for manual repositioning.

Section 3.1.3, "Scheduling of Inservice Tests"

Comment 3.1.3-1

If plant-specific technical specifications, rather than standard technical specifications, reference a 50-percent grace period rather than a 25-percent grace period for testing frequencies, how should the IST tests be treated?

Response 3.1.3-1

The inservice tests would be subject to the same extension that the technical specifications allow for other surveillance tests unless specifically exempted; however, the extension would not apply to safety and relief valve testing performed at five- and ten-year intervals unless the technical specification so states.

Comment 3.1.3-2

The statement that the Code requires testing throughout extended shutdown periods for operable equipment applies only to OM documents, not previous versions of Section XI.

Response 3.1.3-2

Refer to the discussion in the basis for the recommendation in Section 3.1.3.

Comment 3.1.3-3

Does equipment removed from service with no maintenance need to be tested after returning to service?

Response 3.1.3-3

The equipment would not need post-maintenance testing but may need tests for other reasons.

Section 3.2, "Start of the Time Period in Technical Specification Action Statements"

Comment 3.2-1

In the discussion on TS action statements and operability declarations, should NRC Generic Letter (GL) 91-18 be referenced as a basis for determining operability?

Response 3.2-1

See the GL 91-18 discussion in Section 7 of NUREG-1482.

Comment 3.2-2

If we are testing a pump and it fails, and we are quite sure the problem is with the gauge, do we have to declare the pump inoperable

immediately, or can we replace the gauge first if we have not yet completed the test?

Response 3.2-2

The response to Question 46 in Appendix A and Paragraph 6.1 of OM-6 and IWP-3230(d) allow that a gauge may be recalibrated (or replaced) and the test rerun (or completed). If you are not certain that the gauge is the problem, it is recommended that the test be completed as soon as possible with the recalibrated or replaced gauge to confirm the results. Additional guidance is given in GL 91-18.

Comment 3.2-3

What does the statement "the period the component could be considered operable based on the preliminary analysis is limited in the event the component is later determined to be incapable of continued operability" mean?

Response 3.2-3

When a preliminary analysis is done to assess operability, a more detailed analysis may be necessary if additional expertise is needed to review the condition of a component. The more detailed engineering analysis must be performed in a timely manner following declaring a component operable based on a preliminary analysis. The more detailed analysis may result in determining that the component is incapable of performing its safety function. Making this assessment quickly will limit the time a component is considered operable (based on the preliminary analysis). In many cases, the preliminary analysis will be sufficient for long-term assessment or the more detailed analysis will confirm the preliminary analysis. Few situations will likely require a more detailed analysis and few will likely result in declaring the component inoperable.

Comment 3.2-4

Position 8 of GL 89-04 states that a test may be halted because of a gauge malfunction. Does this guidance apply to any instrument such as a bad accelerometer)? We have seen indications of high vibration that were actually indications of poor instrument responses at low frequencies (1 - 5 Hz). May we halt the test and repeat it using a new accelerometer? May we process the existing data electronically to obtain a true overall vibration reading before making an initial operability determination?

Response 3.2-4

Corrective action provisions in the code (IWP-3230(d) and Paragraph 6.1 of OM-6) allow that instruments may be recalibrated and a test rerun. Neither the code requirements nor Position 8 limit the instruments covered by the provisions. Therefore, an accelerometer meets the scope of the provisions. Replacing instruments rather than "recalibrating" meets the intent of the provisions (see Response 3.2-2). Licensees have a responsibility to ensure that if instruments are replaced rather than recalibrated, the correct instrument number is logged in the test report.

Section 3.3, "120-Month Updates Required by 10 CFR 50.55a(f)(4)(ii)"

Comment 3.3-1

Is the NRC considering deleting the 10 CFR 50.55a requirement to perform a 10-year program update? Such a deletion would allow the IST plan to change as needed rather

than "dump all new procedures on the operators" once every ten years.

Response 3.3-1

The NRC is considering a change to the 10-year update requirement which will require a change to the regulations.

Comment 3.3-2

If a relief request was recently approved by the NRC after GL 89-04 was issued, would it again need to be approved when a new ten-year update is being implemented if the request

a. meets the guidelines of GL 89-04 and NUREG 1482?

b. meets the intent of GL 89-04 and NUREG 1482 with some exceptions?

c. gives alternative testing technique?

d. seeks exemptions from certain Code requirements?

Response 3.3-2

a. Further-approval is not required. Certain documentation requirements apply..

b. NRC approval is required.

c. NRC approval is required unless the alternative meets "other test methods" stated in the Code.

d. NRC approval is required.

Comment 3.3-3

Section 10 CFR 50.55a does not give guidance on when updated programs should be submitted. What is an acceptable period before the start of the next interval?

Response 3.3-3

Common practice is to submit a revised program within 6 to 9 months before the beginning of the interval. Some licensees submit the programs on the day the interval begins. The regulations require implementation at the beginning of the interval. Relief requests due to impracticalities and alternatives approved in accord with GL 89-04 or GL 89-04, Supplement 1 (NUREG-1482), may be implemented during the interim period from submittal to receipt of an NRC safety evaluation (see Section 6). Other alternatives proposed may not be implemented until approved by NRC.

Comment 3.3-4

Is there any way in which a plant now submitting a 10-year interval updated IST program can use the ASME OM Code? The ASME OM Code appears to be superior to the ASME B&PV Code for IST because the general section (ISTA) of the OM Code applies specifically to IST rather than 90 percent to ISI as is the case with the general section (IWA) of ASME Section XI of the B&PV Code.

Response 3.3-4

IST programs may not be developed using the OM Code until it is endorsed in 10 CFR 50.55a by rulemaking, though the requirements of the 1990 Edition of the OM Code are the same as OM-6 and OM-10 for testing pumps and valves. If there are specific provisions in ISTA that address IST, it may be possible to use these as guidance where no previous guidance exists.

Comment 3.3-5

Paragraph (f)(5)(iv) of 10 CFR 50.55a states that relief requests must be "demonstrated to

the satisfaction of the Commission" not later than 12 months after the expiration of an interval. This appears to say that Commission approval is required to be obtained within 12 months of the end of an interval. This is beyond the control of licensees and does not state when relief requests are required to be submitted. Revision to clarify this issue should be made. A submittal requirement for some period before the interval should be considered to allow time for NRC review and disposition.

Response 3.3-5

Section 3.3 and Section 6.3 have been revised to include a recommendation that the relief requests be submitted before the interval start date.

Section 3.3.1, "Extension of Interval"

Comment 3.3.1-1

Section 3.3.1 gives an example of a licensee extending an interval from December 14, 1994, to September 16, 1995, in accordance with the Code. Since the interval was increased by 9 months, we assume that the subsequent interval must start between September 16, 2004 (i.e., September 16, 2005 minus 12 months) and December 16, 2005 (i.e., September 16, 2005 plus 3 months). Is this correct?

Response 3.3.1-1

Yes. The ASME Code allows intervals to be extended or decreased up to one year cumulative and also allows intervals to be extended for outages greater than 6 months. In response to an inquiry (ASME Section XI File Number IN93-002), the ASME Boiler and Pressure Vessel Committee stated that Section XI, IWA-2430(d), allows the inspection interval to be extended or decreased for reasons other than to enable an inspection to coincide with a plant outage. This would apply to IST intervals as well. In Interpretation XI-1-86-54, the committee stated that the 1-year extension need not be applied only during the last one-third of the interval and that the extensions may be applied serially for both out-of-service and plant outage conditions.

Comment 3.3.1-2

The first paragraph of Section 3.3.1 states that intervals may be extended only because of an extended outage and that the licensee must request approval of the extension. The reason for requesting an extension for up to one year is not specified in the regulations or the ASME Code. Additionally, neither the ASME Code nor 10 CFR 50.55a requires a request for approval, or even notification to the NRC, for an interval extension of up to one year.

Response 3.3.1-2

The discussion has been changed to remove the issue of requesting approval of an extension. Only an extension that exceeds the one year allowed by the Code need be approved by the NRC. An inquirer recently asked whether Section XI, IWA-2430(d) allows the inspection interval to be extended or decreased for reasons other than to enable an inspection to coincide with a plant outage. The Section XI Committee responded affirmatively (ASME Section XI IN93-002). Notifying the NRC of the extension is a courtesy, rather than a requirement, to assist the staff in planning reviews and in maintaining a list of the interval dates.

Section 3.3.2, "Concurrent Intervals"

Comment 3.3.2-1

Can guidance be given for licensees who wish to use the same Code edition for multiple units, but do not wish to place the units on concurrent intervals?

Response 3.3.2-2

The guidance for the first situation described in the recommendation and in the example would result in multiple updates over the 120-month interval.

Comment 3.3.2-2

Is a relief request necessary if concurrent dates are desired for plants with different commercial operating dates if the utility does not want to update the IST programs for both units on each plant with a 120-month anniversary.

Response 3.3.2-2

The regulations require a request for an alternative.

Comment 3.3.2-3

It is unlikely that any licensee would use such an interval schedule for concurrent intervals since the schedule increases the total number of program updates required for each unit.

Response 3.3.2-3

Though an interval schedule for concurrent intervals is unlikely, changes in code editions may make it beneficial for a licensee to revise the programs more often than required.

Section 3.3.3, "Implementation of Updated Programs"

Comment 3.3.3-1

Does this section imply that any new relief requests for a program updated for new intervals can be implemented without prior NRC review or approval for the first 12 months of the interval?

Response 3.3.3-1

When the rule was issued, the interval (period) for updating inservice inspection (ISI) programs was 40 months and the interval for updating inservice testing (IST) programs was 20 months. In 1976, NRC issued licensees guidance in which it recognized that relief requests would be submitted for review and approval and suggested that licensees submit the programs as early as possible before the beginning of a new interval. The revised programs were to comply with the requirements of editions of the code and addenda in effect no more than 6 months before the start of each 40-month or 20-month period. However, the ISI intervals established for examination schedules in accordance with Section XI were based on 120 months. The rule included the provision for demonstrating

> to the satisfaction of the Commission not later than 12 months after the expiration of the initial 120-month period of operation from the start of facility commercial operation and each subsequent 120-month period of operation during which the examination or test is determined to be impractical.

The 12-month provision remained when the rule was changed November 1979 to increase the length of the intervals for both ISI and IST programs to 120 months. The phrase "to the

satisfaction of the Commission" implies that the relief request has been submitted and has been found acceptable by the NRC staff. Future rule changes may clarify the appropriate time period for submitting and implementing relief requests for updated programs. Refer to Sections 6 and 7 for more discussion on relief requests.

Comment 3.3.3-2

Explain the significance and any requirement for complying with the sections of the codes that refer to new reference values when implementing a "new" program to the current version of the Code (IWP-3112 of Section XI, Paragraph 4.5 of OM-6, and Paragraph 3.5 of OM-10).

Response 3.3.3-2

New reference values would be necessary for parameters not currently measured. New "reference values" for currently monitored parameters may not be necessary if previous reference values were acceptable. The code does not require new reference values to be established because a later edition is used.

Comment 3.3.3-3

When a licensee updates a program at the 120-month interval, is the program to be implemented before a safety evaluation is received?

Response 3.3.3-3

The regulations require the updated program to be implemented for inservice testing done after the interval start date. Although the licensee may need time to fully implement the updated program, the regulations require that the new program be implemented even in the period before the NRC issuees a safety evaluation for the relief requests submitted for the new interval program. The staff gives guidance for implementing relief requests before NRC approval elsewhere in NUREG-1482.

Comment 3.3.3-4

If the regulations do not allow a licensee to continue with the previous program 120-month program until the NRC has reviewed the relief requests for the new interval, how can relief requests be submitted within 12 months following the new interval start date?

Response 3.3.3-4

The regulations require a program to be updated to the later edition of the ASME Code each 120-month interval. The regulations state that the licensee must demonstrate to the satisfaction of the Commission not later than 12 months after each 120-month interval where a pump or valve test requirement in the code or addenda is impractical and is not included in the revised inservice test program. See Section 6 for guidance on impractical code requirements.

Comment 3.3.3-5

Our next 10-year interval begins in November 1995. We would like to begin gradually implementing the IST procedure revisions to incorporate the new edition and addenda, rather than waiting and using all new procedures on one date. What is the regulatory process to accomplish such an implementation (i.e., relief request, code case N-465, N-473, etc.)?

Response 3.3.3-5

Several licensees have asked this question. The licensee can use Code Cases N-465 and N-473; however, the best action is to inform the NRC that you are beginning your implementation early to have the revised procedures in place by the interval start date, or before testing during the new interval, and will be submitting your program (including any relief requests) by a certain date. NUREG-1482 includes other guidance on implementing alternative requirements.

Section 3.4, "Skid-Mounted Components and Component Subassemblies"

Comment 3.4-1

When are the OM codes and standards expected to address the scope of skid-mounted components and component subassemblies to be included in IST programs? Will the code address skid-mounted components for major components beyond those listed in the first subparagraph of Section 3.4?

Response 3.4-1

In the June 1994 OM Committee meetings, committees at various levels were considering proposals for both skid-mounted pumps and valves. It is expected that the published position will be included in the 1995 Addenda to the OM Code. The scope addresses components mounted on the skid and those not mounted on the skid but functioning much the same as skid-mounted components (e.g., check valves in the service water system that supply cooling water to a pump) where testing the major component can be considered adequate to test the function of the pumps or valves.

Section 3.5, "Testing in the As-Found Condition"

Comment 3.5-1

In the past, several licensee have been cited for Code violation for pre-exercising valves before taking stroke time measurements. Does this section imply that these citations were invalid and such pre-exercising is acceptable, although not necessarily condoned?

Response 3.5-1

It is beyond the scope of this document to evaluate previous violations. While the Code does not appear to prohibit pre-exercising of valves for stroke time measurements, testing in the as-found condition gives a better indication of the ability of a valve to operate in the event it is actuated in response to a safety signal.

Comment 3.5-2

Does Appendix J require the licensee to leak test containment isolation valves in the as-found condition?

Response 3.5-2

Paragraph III.C.1 of Appendix J to 10 CFR Part 50, for example, states that "Each valve to be tested shall be closed by normal operation and without any preliminary exercising or adjustments (e.g., no tightening of valve after closure by valve motor)." NUREG-1482 does not establish policy for Appendix J testing.

Comment 3.5-3

What is meant by "as-found" condition? All references in the report are to stroking by normal means. What if a valve is scheduled for maintenance? Is an "as-found" test one that is

done before the maintenance or after the maintenance with stroking by normal means?

Response 3.5-3

The "as-found" condition is the condition of a valve without pre-stroking or maintenance. Section XI does not require stroke-time testing or check valve stroking before maintenance; however, degradation mechanisms may not be found if no "as-found" testing is performed. Post-maintenance testing is required when the maintenance could have affected the valve's performance. Similarly, the "as-found" testing recommendation applies to pumps as well. Most inservice testing is performed in a manner that represents the condition of a standby component if it were actuated in the event of an accident. The recommendation was for developing the test implementing procedures and doing the tests at regular frequencies. It was not meant to imply that inservice testing be done before maintenance. If the condition of a component must be assessed, testing before performing maintenance may be performed. Post-maintenance testing is only one part of inservice testing.

Table 3.1, "Required tests and test frequencies for pumps and valves"

Comment T3.1-1

In the frequency column for fail-safe actuators, the frequency is given as only once every 3 months. The Code allows for the extension of the fail-safe tests as it does for valve exercise tests. Refer to IWV-3415 and OM-10, Paragraph 4.2.1.1.

Response T3.1-1

Change made as noted.

Comment T3.1-2

There appears to be an omission that leak test requirements may be satisfied when the operation in the course of plant operation would satisfy the exercising requirements of the code.

Response T3.1-2

The allowance for demonstrating the leak-tight function during the course of operation is treated as an exception to the scope of IWV-3420, with certain provisions for record requirements (Paragraph 4.2.2.1 of OM-10). The test frequency for valves not subject to the exception continues to be once every 2 years (see IWV-3421 or Paragraph 4.2.2.3(a) of OM-10).

COMMENTS ON SECTION 4, "SUPPLEMENTAL GUIDANCE ON INSERVICE TESTING OF VALVES"

Section 4.1, "Check Valves"

Comment 4.1-1

A normally open check valve is also considered an active valve and should be included in the IST program even if IWV-3414 applies.

Response 4.1-1

IWV-3414 discusses valves in regular use and states that valves that operate in the course of plant operation at a frequency that would satisfy the exercising requirements need not be additionally exercised if the observations otherwise required for testing are made and analyzed during such operation, and are recorded in the plant record at intervals no greater than specified in IWV-3411. Even if valves are "exercised" in accordance with IWV-3414, they need to be included in the valve list in the IST program, and the record (e.g., plant log, test procedure) needs to state that the test requirements are met.

Comment 4.1-2

What constitutes a "blocked" check valve? What is meant by "positively held in place"?

Response 4.1-2

A check valve is blocked if in a system that has flow blocked by a flange closure in the line, a locked closed valve other than a check valve, or some other means of precluding flow through the system. A valve that is "positively held in place" has an operator or other auxiliary device that maintains the disc in an open or closed position. A stop check valve is an example.

Comment 4.1-3

Is it permissible to establish groups of check valves for disassembly and inspection where the population is drawn from multiple units of like design and construction?

Response 4.1-3

It is acceptable to group valves from multiple units if two units are "identical," if the units will be subjected to the same service conditions, and if the valves otherwise meet the grouping criteria. If a generic problem is found while disassembling and inspecting valves during a refueling outage on one unit, all valves in the group in that unit must be inspected during the refueling outage, and the valves in the group in the other unit must be inspected at the next refueling outage for that unit.

Section 4.1.1, "Closure Verification for Series Check Valves without Intermediate Test Connections"

Comment 4.1.1-1

Criterion 14 does not mention ***two*** valves for the reactor coolant pressure boundary.

Response 4.1.1-1

Though most plants were licensed with two valves at each reactor coolant pressure boundary, the ***two*** has been deleted from the sentence.

Comment 4.1.1-2

In the guidance for testing two check valves in series, it states that **both** valves must be declared inoperable and be repaired or replaced before they are returned to service. The guidance should state that only the **affected** valve or valves be repaired or replaced and not imply that it is mandatory to repair or replace both valves.

Response 4.1.1-2

The recommendation has been modified to state that corrective actions for both valves, as necessary, are to be taken. The basis for the valves being tested in series includes an assumption that the condition of the individual valves cannot be ascertained. If the condition of each valve can be determined individually, the recommendation does not apply. However, a condition may be observable externally, or special tests may be available to indicate the **affected** valve. The change made to the recommendation addresses the concerns of the comment, as "corrective actions" covers more that "repair" or "replacement." The OM Committee is developing Code requirements to address such conditions.

Section 4.1.2, "Exercising Check Valves With Flow and Nonintrusive Techniques"

Comment 4.1.2-1

Is the relief for an extension of the test frequency mentioned in this section for extension ***beyond*** the sample testing matrix given?

Response 4.1.2-1

The sentence has been modified to clarify when relief is required.

Comment 4.1.2-2

Is it permissible to include groups of valves for nonintrusive testing from a population of greater than four valves if there is a commensurate increase in the testing frequency?

Response 4.1.2-2

The group size of four was selected because most plants would not have more than four valves that have identical service (e.g., four accumulator discharge check valves, four injection loop valves). Groups of valves tested according to the guidance in Section 4.1.2 are valves of the same design, manufacturer, service, and service conditions. If a group of more than four valves meets these criteria, the group may be appropriate for the testing described in Section 4.1.2, because each valve is tested and the test is verified regularly on at least one of the group.

Comment 4.1.2-3

Is audible indication of check valve "slam" qualify an acceptable nonintrusive testing technique for verifying check valve closure?

Response 4.1.2-3

The OM Committee is better suited to determine whether this method would meet the "other positive means" allowed in the Code; however, NRC would expect that if such a method was used, it would be repeatable, could be distinguished from other noise contributors, and would be done in

accordance with the applicable quality controls and assurance.

Comment 4.1.2-4

The NRC recommendation stated that the flow rate must be sufficient to stroke the valve to the backstop. This statement could be interpreted to mean that nonintrusive examination results are unacceptable unless the valve makes an acoustic impact from the disc striking against the backstop. Most check valves at our facility are sized to accommodate large flows that may be expected with various accident conditions. Many valves are larger than needed to pass the design flow and are thus not affected by the small drop in pressure across the valve. As a result, in many valves the disc will not impact the backstop even though full design flow is passed. Our check valve nonintrusive examination (NIE) equipment has two technologies: acoustics and either external magnetics or ultrasonics.

The NUREG-series report seems to be based on acoustics only. This limits the usefulness of the plant's NIE system since credit for UT or magnetic data cannot be taken. For example, credit cannot be taken for the NIE test if full design flow is verified through a valve but the acoustic sensor does not detect an impact. This appears to be true even if ultrasonic testing (UT) data shows the valve disc to be 90-percent open. Our plan is to use two technologies to obtain NIE data for the IST program. We envision a greater role for the UT (or magnetic) data than the NUREG-series guidance seems to allow.

We suggest that appropriate NIE acceptance criteria can be developed once full design flow is verified. In our example, acceptance criteria would be a 90-percent open disc (verified by UT) plus or minus a tolerance. In other cases, the acceptance criteria may be an acoustic impact detected at the backstop. However, the NUREG-series report seems to set a generic acceptance criterion of backstop impact with which we do not agree.

Response 4.1.2-4

The description in this section was not meant to limit the use of nonintrusive techniques to acoustics. The statement suggesting that the flow rate must be sufficient to stroke the valve to the backstop was incorrect and has been deleted. An acceptable test method must demonstrate that a check valve disc opens to the position necessary to fulfill its safety function, which may not be full-open to the backstop.

Comment 4.1.2-5

Please clarify the requirements for check valve full flow testing. Can full-stroke exercising be verified by passing maximum required accident flow through the valve? Is nonintrusive testing acceptable to verify full stroke?

Response 4.1.2-5

Full-stroke exercising of a check valve can be verified by passing full accident flow (measured) through the valve or by using nonintrusive techniques that verify the capability of the valve to stroke to the position necessary for it to fulfill its safety function. If that position is known, as discussed in Comment 4.1.2-4 above, or if the valve strokes fully open, nonintrusive techniques can be used to verify the stroke. Section 4.1.2 describes an acceptable method for testing a group of identical valves located in different trains of the same system where it has been demonstrated that nonintrusive methods can verify that the valves stroke to the position necessary to fulfill their safety function. In the example, the same reduced flow is used for subsequent testing, with direct flow measurement, or without direct flow

measurements but with procedurally-controlled system alignment and monitoring of a system characteristic or parameter to establish the same reduced flow. The method must be repeatable.

Comment 4.1.2-6

The question is related to using a sampling program when converting from an intrusive to a nonintrusive testing program for a group of four identical check valves. After the first test of all four valves of the group using the nonintrusive method, is a relief request then required to go to a rotating sampling test program in accordance with Section 4.1.2? We understand that a relief request is not required to change from an intrusive method to a nonintrusive method.

Response 4.1.2-6

If all the valves in the group are flow tested, the staff would accept a "sampling" of one valve each refueling outage to verify that the test method is repeatable for implementing nonintrusive test methods. If the "sampling" reveals problems with repeatability of the test conditions, or other problems that might affect the testing of the other valves, the nonintrusive techniques must be used for the other valves during the same outage. Relief is not required because the method meets the "other positive means" of the Code. A test deferral justification is not necessary when extending the test interval in accord with OM-10. If a sampling program does not include a flow test of each valve on a regular basis, relief would be necessary. The OM-22 working group on check valves changed the OM Code to allow a similar sampling for disassembly and inspection as discussed in Position 2 of GL 89-04. OM-22 is also considering a sampling plan with broader applications.

Comment 4.1.2-7

Please discuss in detail the process for qualifying nonintrusive testing as an alternative method to check valve full flow testing.

Response 4.1.2-7

Position 1 of GL 89-04 gives general guidance for qualifying such a method. Further information is available through the OM working group for check valves and the Nuclear Industry Check (NIC) valve group.

Comment 4.1.2-8

Once nonintrusive techniques have been successfully used to verify that a check valve disc reached the backstop under reduced flow conditions, should not measurement of the flow through the valve be sufficient for periodic full-flow testing if meaningful flow criteria can be established?

Response 4.1.2-8

Measurement of the flow through the valve is sufficient with periodic reverification or sampling a group of valves. The example in Section 4.1.2 is not the only acceptable means to implement such a program for a group of valves. Periodically verifying single valves may also be acceptable as "other positive means." The example could apply to (1) tests in which flow can be measured but is below design accident flow, and (2) tests in which flow cannot be measured directly in the line but is otherwise quantifiable to ensure repeatable conditions.

Comment 4.1.2-9

Will the use of nonintrusive techniques on a rotating schedule for full-flow testing require

occasional disassembly and inspection of the check valves to verify the adequacy of the nonintrusive techniques, as has been suggested by the NRC to some licensees in the past?

Response 4.1.2-9

Disassembly and inspection may be necessary as part of the initial or periodic verification for certain techniques. Disassembly and inspection would not otherwise be necessary to meet the requirements of IST. Valves may need to be disassembled to confirm a nonintrusive conclusion, to take corrective actions, or to do preventive maintenance as part of a check valve program.

Comment 4.1.2-10

Is measurement of C_v with the application of meaningful flow versus differential pressure criteria considered "other positive means" in accordance with IWV-3522 of the Code?

Response 4.1.2-10

The NRC contracted with Oak Ridge National Laboratory (ORNL) to review such a test method used at the Fort Calhoun and Beaver Valley plants. ORNL was to determine if the measurements and reduction of the data give adequate assurance that the accumulator discharge check valves at both plants would function properly. ORNL found that the results are useful if the test is performed in a controlled manner with accurate instruments. The tests can also be verified using nonintrusive techniques during the initial testing. A safety evaluation was issued for the Fort Calhoun test, which included the report prepared by the ORNL staff on the results of their review (see NRC Letter, Docket 50-285, to OPPD, October 2, 1993).

Comment 4.1.2-11

(1) If a nonintrusive test fails to verify full disk movement, are disassembly and inspection acceptable corrective actions for the failed train? In some cases, little time is available to do nonintrusive testing with flow (e.g., safety injection check valve testing), and the conditions for performing another flow test cannot be duplicated without delaying startup.

(2) Certain flow tests used with nonintrusive techniques impart just enough energy to the disk to cause it to make a marginally audible impact against the backstop. In these cases, variations in initial conditions could produce inconclusive nonintrusive test results. The only reasonable corrective actions would be disassembly and inspection because the tests may be of marginal value.

Response 4.1.2-11

(1) The licensee determines the types of corrective action taken when a test is inconclusive or when the results indicate unacceptable functioning of the check valve. Disassembly and inspection may be parts of corrective actions to ensure the functional capability of the valve. In response to Question Group 15 in Appendix A, the staff stated that a flow test for part-stroke exercising of the valve "is expected to be performed" following reassembly if practical.

(2) Several nonintrusive methods such as radiography, ultrasonics, and magnetics can verify disk position without requiring audible disk-backstop impact. The method selected must give conclusive results and be repeatable for the application.

Comment 4.1.2-12

If the flow testing proposed in Section 4.1.2 must pass the maximum required accident flow through each check valve, why would nonintrusive techniques ever be required? What actions are necessary if one of the valves that is only flow tested and found to have problems? Would all of the valves in the group have to be tested using nonintrusive techniques? What is the minimum required data to be obtained from the periodic flow testing and what deviation from the data obtained during the baseline test is acceptable?

Response 4.1.2-12

The test method discussed in Section 4.1.2 applies to tests performed with less than an accident flow rate. If accident flow rate is passed through the check valve being tested, nonintrusive techniques are not necessary to establish the functionality of the valve. The nonintrusive techniques would be used to verify that the test at reduced flow would indicate adequate disk movement for full-stroke exercising the valve in accordance with the Code. An allowable flow variation would be established during the baseline testing using the nonintrusive techniques. If the flow rate during future testing cannot be established within the range, the test is unacceptable and the licensee could begin (1) nonintrusive tests to verify that full-stroke exercising is achieved even at different flow conditions or (2) corrective actions to determine the cause of the failure to meet the acceptance criteria for the test. If other valves meet the acceptance criteria, the licensee need take corrective action only for the valve with a problem if it is not the valve used for reverification by nonintrusive techniques unless the cause is determined to apply to the other valves as well. The rotation of the nonintrusive techniques over the four outages (in the example) is to verify that the test method and test conditions remain constant.

Comment 4.1.2-13

What are the accuracy requirements and specifications for non-intrusive testing and diagnostic techniques? Are they as stringent as current code requirements for instrument accuracy?

Response 4.1.2-13

The code does not address instrument accuracy for testing valves. The owner has the responsibility to qualify the method following the steps in GL 89-04, Position 1, with particular emphasis on items 3, 4, and 6. The instruments used must accurate as necessary to qualify the method for repeatability and adequate results.

Comment 4.1.2-14

Does the use of a sampling program to fully stroke check valves constitute a change in test frequency from that required by the code? Is demonstration of impracticality required for this new test frequency?

Response 4.1.2-14

When using a sampling for non-intrusive techniques, all the valves in the group are flow tested at the same frequency, which can be deferred in accordance with OM-10 as needed; however, only one of the groups must be tested using non-intrusive techniques each time. Therefore, this practice does not change the test frequency.

Comment 4.1.2-15

Section 4.1.2 clearly states that a relief request is not required to use non-intrusive techniques. Is a relief request also not required to implement a check valve non-intrusive sampling plan?

Response 4.1.2-15

A relief request is not required for a sampling plan that calls for the licensee to continue flow testing all valves in the group with non-intrusive techniques applied to one of the group during each test. If not all the valves are flow tested, the alternative must be evaluated by the NRC.

Comment 4.1.2-16

We have several check valves that we exercise by disassembly. We cannot flow test these valves because we do not have the instrumentation or test fittings to allow testing. What would be an acceptable test plan for exercising these valves by non-intrusive testing?

Response 4.1.2-16

Other positive means using nonintrusive methods may be acceptable if the methods are qualified and repeatable. A method qualified according to the guidance in GL 89-04, Attachment 1, Position 1, would be acceptable.

Section 4.1.3, "Use of Nonintrusive Techniques for Check Valve Testing"

Comment 4.1.3-1

Please confirm that "test setup and performance limitations" of backflow testing by performing a leak test is adequate justification for deferring testing to a refueling outage. Could such a test be scheduled once each cycle instead of during a refueling outage? Can the tests be deferred because the plant has to enter an extended limiting condition for operation (LCO) to do them?

Response 4.1.3-1

It is acceptable to defer backflow testing to a refueling outage for a check valve that can only be tested by performing a leak test, when test equipment setup is necessary. Relief would be necessary to perform the testing at a frequency other than as specified in the Code. Entering an LCO is not, alone, sufficient basis for deferring testing, as the LCO were established with testing in mind; however, if a test necessitates entry into an LCO, that may further justify deferring the test. Refer to Section 3.1.2.

Section 4.2.1, "Increased Frequency of Testing for Valves That Can Be Tested Only During Cold Shutdown Outages"

Comment 4.2.1-1

The first sentence of the NRC recommendation is not clear. It appears to say that power-operated valves cannot be tested at power.

Response 4.2.1-1

The sentence contained a typographical error that has been corrected ("it" was supposed to have been "if"). The recommendation is for power-operated valves that cannot be tested during power operation of the plant.

Comment 4.2.1-2

There is no advance notice about which valves tested during cold shutdown will be in a range for stroke time which requires increased testing as specified in IWV-3417(a). Since a

cold shutdown justification has demonstrated that the test can only be performed at cold shutdown, it is not practical to prepare a relief request, submit the request to the NRC for evaluation, and obtain approval within 30 days, when the next test would be required. Would it be acceptable to do an engineering analysis to determine the acceptability of the valve for continued operation and do the next test during the next cold shutdown outage?

Response 4.2.1-2

Paragraph 4.2.1.9(c) of OM-10 allows analysis for declaring a valve operable after testing indicates the stroke time is above the limiting value, or has increased above the reference value by a specified percentage. This approach may be used to the extent that it applies. If a valve stroke time exceeds the limits of the safety analysis, it could not be declared operable until a reanalysis indicates the new (increased) stroke time is acceptable. The intent of Section 4.2.1 was to inform licensees that the requirements of IWV-3417 for increased testing apply to valves independent of the exercising frequency specified in IWV-3412.

Comment 4.2.1-3

Can licensees that have not updated to OM-10 delete monthly testing without an approved relief request in accord with 10 CFR 50.55a(f)(4)(iv) because OM-10 deletes monthly testing for valves that require an increased stroke time?

Response 4.2.1-3

OM-10 not only deleted the monthly test, but it changed the test requirements for monitoring changes in the stroke time of valves. If the requirements of OM-10 are used as discussed in Section 4.2.7 of this document, the monthly testing do not apply. However, the requirements of IWV-3417(a) apply if the testing is continued in accord with Subsection IWV-3400.

Comment 4.2.1-4

It is not clear that the requirements of IWV-3417(a) and (b) for corrective action or monthly testing apply to valves with valid cold shutdown justifications.

Response 4.2.1-4

It appears that the requirements of IWV-3417 are independent of the deferral of exercising to cold shutdown outage allowed by IWV-3412. If a valve demonstrates the effects of degradation, it is appropriate to assess the acceptability of operating with the valve in that condition or to repair the valve while the plant is in a cold shutdown condition.

Comment 4.2.1-5

Section 4.2.1 states, in part, that OM-10 does not allow for an increased test frequency. It is our understanding that while OM-10 does not specifically state that frequency shall be increased, neither does OM-10 prohibit an increase in test frequency. The increase in test frequency may be selected as an additional corrective action or as a temporary corrective action. We interpret this section to be applicable to those times when testing frequency is not able to be increased due to plant conditions (i.e., plant is operating).

Response 4.2.1-5

The statement was not meant to imply that licensees may not take actions that exceed the requirements of OM-10 as a precautionary

measure or temporary monitoring. The statement has been changed.

Section 4.2.2, "Stroke Time Measurements for Rapid-Acting Valves"

Comment 4.2.2-1

Does GL 89-04, Position 6, require individual stroke time testing of rapid-acting valves, or is a pass/fail determination based on a 2.0 second criterion sufficient?

Response 4.2.2-1

GL 89-04 and OM-10 allow assigning a limiting stroke time of 2 seconds for rapid-acting valves. The stroke times for these valves need not be compared to previous stroke times. It is necessary to measure the stroke times only to assure that they are less than 2 seconds. Recording the measured value would be necessary and then a pass/fail criterion could be applied easily.

Comment 4.2.2-2

Two rapid-acting valves are actuated by the same handswitch and share the same position indicating lights. Is it permissible to stroke time both valves simultaneously if the lights verify that both valves full stroke in two seconds or less?

Response 4.2.2-2

The approach appears to meet the intent of GL 89-04, Position 6, and OM-10, Paragraph 4.2.1.8(e).

Comment 4.2.2-3

New technologies allow for stroke timing valves locally as connected to the valve actuator (motor operator, air operator, solenoid operator, etc.). These techniques do not include the initiation time (signal processing from switch to actuation) which is also in milliseconds. Is there a conflict in this guidance and old guidance defining "switch-to-light" testing?

Response 4.2.2-3

The traditional method of stroke timing power-operated valves was to use stopwatches to measure the stroke time from initiation of the signal at the handswitch to the change in position-indicating lights (switch to light). The traditional method includes signal processing time from the switch to the valve actuator. Monitoring stroke times for valves that stroke in milliseconds using the diagnostic equipment that measures only actual valve travel is acceptable for indicating degrading trends; however, the method does not reveal increases that could occur in the signal to the valve.

Most valves that would benefit from this monitoring are rapid-acting valves. The traditional method would have a set limit of 2 seconds, which masks any signal processing time unless a gross change occurs. If measuring the stroke times locally needs to be supplemented by a periodic test to include the signal processing times, a periodic 2-second limit test could be performed to augment the IST. The code does not specify a particular method, so there is no conflict in using more than one method.

Section 4.2.3, "Measurement of Valve Stroke Time"

Comment 4.2.3-1

This section indicates that when diagnostic equipment is used for measuring the valve stroke time, the additional information obtained on the condition of the tested valve could justify extending the test interval. Could

a test interval be extended for the disassembly and inspection of check valves?

Response 4.2.3-1

The OM-22 working group is considering such a possibility. Position 2 of GL 89-04 discusses extension of disassembly and inspection and the justification necessary to extend the frequency established for sampling a group of valves.

Comment 4.2.3-2

IWV-3413(b) specifies that "the stroke time of all power-operated valves shall be measured to the nearest second for stroke times 10 sec. or less." Paragraph 4.2.1.4(b) of OM-10 states that "the stroke time of all power-operated valves shall be measured to at least the nearest second." When establishing a limit of 2 seconds for rapid-acting valves in compliance with Position 6 of GL 89-04 or Paragraph 4.2.1.8(e) of OM-10, is it acceptable to round off the measured stroke time to the nearest second? Can rounding off be applied when establishing reference values? For example if the reference value is measured as 3.75 seconds, can this be specified as 4 seconds in the procedures with acceptance criteria based on 4 seconds and then rounded off? Example (in seconds):

Measured reference value: 3.75
Alert Low: 2.81
Alert High: 4.69

Rounding off to nearest second:

Measured reference value: 4
Alert Low: 3
Alert High: 5

Response 4.2.3-2

Basing measurements and reference values on at least the nearest second meets the Code requirements.

Section 4.2.4, "Main Steam Isolation Valves"

Comment 4.2.4-1

The word "fraction" has been changed to "friction."

Response 4.2.4-1

Change made as noted.

Comment 4.2.4-2

The inadequacy discussed in the referenced information notice (IN 85-84) pertained to fail-safe testing of the MSIVs at a couple of utilities, including Turkey Point. This issue was resolved at Turkey Point by reviewing the design of the actuator and eliminating the fail-safe classification in the IST program. The staff recommended in this section that licensees review their fail-safe testing. Perhaps this recommendation should point out this fact and request other licensees to review their fail-safe designations.

Response 4.2.4-2

If a valve does not have a fail-safe function, the Code requirements for fail-safe testing do not apply. A change in the safety function of a valve is subject to the requirements of 10 CFR 50.59.

Section 4.2.5, "Verification of Remote Position Indication for Valves by Methods Other Than Direct Observation"

Comment 4.2.5-1

Would the use of nonintrusive testing methods also be acceptable?

Response 4.2.5-1

If nonintrusive methods can be used to verify the position of the valve obturator, it would be similar to using an "other method" such as leak testing or observing flow shutoff. *Nonintrusive techniques* has been added as an example of other methods that are not directly observable.

Comment 4.2.5-2

When verifying the position indication of valves, direct observation of the valve stem of certain types of valves such as wedge disk gate valves may not provide assurance that the valve disk is attached to the stem. In these cases, the NRC should recommend that other positive means be used to supplement the local observation.

Response 4.2.5-2

Paragraph 4.1 of OM-10 includes such a requirement, where practicable, to supplement local observation by other indications such as use of flow meters or other suitable instruments to verify obturator position. A statement has been added to Section 4.2.5, though the recommendations were originally intended to address cases where local observation is not possible.

Section 4.2.6, "Requirements for Verifying Position Indication"

Comment 4.2.6-1

The Code requirement for position indication verification should be applied to any position indicators associated with a valve. It was never the intent of the Code to restrict verification of position indication to only the safety position of a valve.

Response 4.2.6-1

Although the Code does not restrict verification of position indication to only the safety position of a valve, the NRC has found during inspections that some plants verify valve position indication for only the safety position of the valve. A portion of the recommendation has been removed so as not to conflict with the code requirements.

Comment 4.2.6-2

The NUREG-series report recommends that the position indication for both positions of a valve be verified, even if the valve has only one safety position. The ASME Code does not require this verification if the valve has only one safety position. The staff recommends that the licensee periodically verify the remote locations that include position indication for operators for use in an accident condition, or in cycling the valve to the safe position. This recommendation exceeds requirements specifically addressed by the OM Code and clarified by ASME Code Interpretation XI-1-89-10. This recommendation would impose additional testing requirements that have not been reviewed for backfit considerations.

Response 4.2.6-2

The recommendation is not a requirement, and therefore, cannot be enforced as such.

Although it is thus not a backfit, a portion of the recommendation has been deleted because it could be misinterpreted. The NRC believes it is good practice to verify any position indications that an operator may rely on in an emergency situation. NRC would not take enforcement action if the recommendation is not followed. However, it may be necessary, as part of an integrated program for emergency operating procedures or Appendix R safe shutdown, to periodically verify position indication for valves that are also in the scope of IST. These verifications may be combined for the IST valves.

Section 4.2.7, "Stroke Time Measurements Using Reference Values"

Comment 4.2.7-1

Position 6 of Generic Letter 89-04 states it is acceptable to measure changes in stroke time from a reference value as opposed to the previous test. If the licensee's IST program is under the rules of ASME Section XI, but the licensee elects to use the reference value method as opposed to the previous stroke, why must the licensee also follow OM-10, Paragraphs 4.2.1.8, 3.1, 3.2, 3.6, 4.2.1.1, 4.2.1.9, and 5? If the reference value method is as good as or better than using the previous test for measuring changes in stroke time, what is the technical reason for it being unacceptable to use ASME Section XI acceptance criteria with the reference value method? The NUREG-series report should be revised to allow plants that have not updated to OM-10 and that have developed procedures in accordance with GL 89-04 for using reference values to continue in accordance with the procedures.

Response 4.2.7-1

The editions of Section XI before the 1989 Edition did not address the use of reference values. The acceptance criteria in Section XI are based on changes from the previous test. Therefore, the requirements in OM-10 for using reference values for the stroke time of power-operated valves are the only ones approved by the NRC (except for specific plants). GL 89-04, Position 6, discusses alternatives for rapid-acting valves and states that measuring changes in stroke times from a reference value is an acceptable alternative to the requirements of IWV-3417(a); however, the statement in Position 6 applies to valves with stroke time 10 seconds or less and gives no guidance on how such testing is to be implemented. Because the requirements have been developed through the consensus process of the OM Committee, it is appropriate to allow the use of OM-10 for the monitoring of stroke times for power-operated valves. No furhter action is needed if NRC has approved relief for a program a licensee already developed for monitoring power-operated valves that is not in accordance with OM-10. The requirements in OM-10 differ only slightly for a licensee using reference values incorporating the 25-percent increase for the corrective action limit for valves with stroke times greater than 10 seconds and incorporating the 50-percent increase for valves with stroke times of 10 seconds or less.

NUREG-1482 does not change any previous guidance on the methodology because GL 89-04 gave no specific guidance. Rather, the report only refers a licensee to the requirements in OM-10 developed to allow the use of reference values. An existing program established to an edition of the Code before the 1989 Edition would not have to be changed if the program has been submitted to

NRC in response to GL 89-04. However, the program would have to be revised if it conflicts with the guidance of GL 89-04 or if an NRC safety evaluation has based acceptance on OM-10 requirements. The requirements of OM-10 may be used for the test methodology. Other licensees may need to assess whether a relief request is needed to ensure their methodology is acceptable. Licensees may review the use of OM-10 for eliminating the need for increased testing, whether using reference values or not, especially for valves not tested during power operations. Licensees may propose specific alternative requirements

Comment 4.2.7-2

It is unclear if relief is required to use stroke time reference values. The recommendation section states that reference values can be used in accordance with the later approved codes. The basis section and referenced relief request seems to indicate relief is required. Also, is "Figure 4.2" now Appendix C, page C-11?

Response 4.2.7-2

When using editions of Section XI, IWV, before the 1989 Edition, relief was required to use reference values because the method was not in accordance with the Code. Some plants used reference values and documented the method as meeting Position 6 of GL 89-04. However, Position 6 "granted" generic relief for this alternative only for valves with stroke time of 10 seconds or greater (see Response to Question 40 in Appendix A). Section 4.2.7 approves of the licensee using the requirements of OM-10 for establishing stroke-time acceptance criteria for these and other valves in plants not using OM-10. Any method not in conformance with OM-10 would require relief.

The referenced figure is Appendix C, page C-11.

Comment 4.2.7-3

We expect there will be times, when following "lube and tune" type maintenance, when the post-maintenance stroke test used for establishing the reference value will be too fast, resulting in an overly restrictive reference range. This will result in needless nonconformance reports because of "out-of-range" strokes on subsequent tests. This is particularly true of air-operated valves that have a large standard deviation when comparing historic stroke timing data. It is recommended that the first measured stroke time following maintenance or design change activities not be the reference value.

Response 4.2.7-3

Section 4.2.7 does not discuss a method for establishing reference values. The Code requirements are specified in Paragraph 3.3 of OM-10, which does not require that the first measured value be the reference value. Licensees establish reference values for valve stroke times in various ways such as by averaging a specific number of tests performed following the maintenance activity, averaging several IST tests, or using the first test following maintenance.

Comment 4.2.7-4

Section 4.2.7 seems to remove the option to establish a limiting value which is a deviation from a reference value based upon valve size, valve type, and actuator type as specified in GL 89-04, and seems to say that OM-10 limits are the only acceptable limits. What is the intent?

Response 4.2.7-4

The recommendation allows the use of OM-10 requirements in lieu of IWV-3413 for power-operated valves. The discussion in Section 4.2.7 refers to the use of reference values. Guidance in GL 89-04, Position 6, does not discuss details of using reference values. Licensees have typically made proposals for implementing such an alternative that have been evaluated by the NRC. Guidance in GL 89-04, Position 5, for establishing "limiting" values of stroke times remains acceptable even when using OM-10. Paragraph 4.2.1.4 of OM-10 specifies that the limiting value(s) of full-stroke time be specified by the owner. Perhaps you are confusing the use of reference values, and the recommendation to use the multipliers specified in Paragraph 4.2.1.8 of OM-10, with establishing limiting values. These are two separate issues, though both pertain to establishing the values at which corrective action is required.

Comment 4.2.7-5

When using OM-10 for monitoring stroke times of valves, can separate reference values be established for the same valve to account for different train-related fail safe performance characteristics?

Response 4.2.7-5

Paragraph 3.5 of OM-10 gives the requirements for establishing additional reference values and may allow different reference values for a single valve if there is justification. For example, test conditions could affect the reference stroke time depending on pressure or flow in the system. It may be necessary to have more than one test condition, such as dynamic and static, which would necessitate different reference values. The licensee should consider such differences when monitoring the stroke time.

Comment 4.2.7-6

The recommendation implies that licensees must use OM-10 if they use reference values to measure changes in stroke time. This is not the case. Licensees may continue to use IWV-3413 along with the guidance originally provided in GL 89-04.

Response 4.2.7-6

IWV-3413 requirements are not based on using reference values. GL 89-04 discusses the use of reference values in Position 6 for valves with stroke times of less than 10 seconds. It does not, however, give guidance on the use of reference values for stroke time. OM-10 does give specific requirements for the use of reference values and acceptance criteria. Licensees may continue to use IWV-3413, if applicable for the current interval, or use OM-10 and Section 4.2.7 of the NUREG-series report. When alternatives to the requirements of OM-10 are deemed appropriate by a licensee, an alternative can be proposed and will be reviewed and evaluated individually. NRC incorporated OM-10 into the regulations and thus recommends the guidance therein on reference values for stroke timing of valves.

This guidance does not preclude a licensee from using IWV-3413 and a conservative baseline value for comparison to future tests.

Comment 4.2.7-7

The following paragraphs from OM-10 do not state requirements related to the methodology of measuring stroke time from a reference value as opposed to the previous test, and should be deleted from the list of related

requirements: Paragraphs 3.1, 3.2, 3.6, and 4.2.1.1.

Response 4.2.7-7

References to Paragraphs 3.1, 3.2, and 3.6 have been deleted because they are not specific to monitoring stroke times of power-operated valves. However, 4.2.1.1 through 4.2.1.9 remain as related requirements because they constitute the alternative to paragraphs IWV-3410 through IWV-3417. Paragraph 4.2.1.1 specifies the frequency of testing.

Section 4.2.8, "Solenoid-Operated Valves"

Comment 4.2.8-1

When evaluating certain nonintrusive testing methods for pilot-operated solenoid valves, the licensee should be cautioned to ensure that the technique evaluates the disc movement and not merely the movement of the plug or pilot valve.

Response 4.2.8-1

A caution has been added to the basis for the recommendation.

Section 4.2.9, "Control Valves with a Fail-Safe Safety Function"

Comment 4.2.9-1

If a valve must control (regulate) to perform its safety function, why should the appropriate testing be determined by the existence of a fail-safe position? Even if a valve does not have a safe position, this does not diminish the importance of its safety function to control.

Response 4.2.9-1

The control function is exempted from the code requirements; however, the fail-safe function is not. The OM Committee discussed an inquiry at the OM meeting in December 1994 and may issue clarifications.

Comment 4.2.9-2

Is it the intent to require additional full stroke-time tests of control valves such as turbine control valves when the operability is determined adequately during the component test? This question also applies to skid-mounted components.

Response 4.2.9-2

Section 3.4 covers skid-mounted components. Valves in this classification may require testing, but a valve in the non-code portion of a system is outside the scope of Section 50.55a. If a valve is within the code-class portion of a system and the test of the major component is the IST of the "skid-mounted" component, it is recommended that the determination be documented in the IST program. If the determination is not documented, it may not be clear that the determination was made.

Comment 4.2.9-3

Section 4.2.9 states that the motor-operated valve (MOV) testing program established in accordance with GL 89-10 and performed on a periodic schedule is an acceptable alternative, along with a periodic valve stroke, for control valves that cannot be stroke-time testing by traditional methods. Would the GL 89-10 periodic testing program be an acceptable alternative for other motor-operated valves with appropriate justification?

Response 4.2.9-4

The alternative discussed in Section 4.2.9 has been found acceptable in consideration of design limitations that made the testing

required by the code impractical. The NRC may approve an alternative such as an GL 89-10 program if the licensee can show an equivalent level of quality and safety. The OM Code Committee is developing testing requirements for MOVs that could replace current testing requirements.

Section 4.3, "Safety and Relief Valves"

Comment 4.3-1

What is the appropriate test frequency for a Class 2 or 3 safety or relief valve that cannot be grouped with other valves based on valve type and manufacturer? Should the valve be set pressure tested once every 10 years or once every 48 months?

Response 4.3-1

Note (1) of Table 2 in OM-1 appears to require set pressure testing of a single valve every 48 months if it is in a group of one. The question was discussed by OM-1 working group members in the June 1994 meeting. Though the requirements were written with larger groups of valves in mind, the committee determined that any fractions of valves calculated to comply with the table would be rounded up to the next higher number. Therefore, a single Class 2 or 3 safety valve would be tested at least every 48 months.

Section 4.3.1, "Scope"

Comment 4.3.1-1

Overpressure protection relief valves that do not perform safety-related functions should be included in the preventive maintenance program of the plant.

Response 4.3.1-1

Although the proposed alternative to include these valves in the preventive maintenance program rather than in the IST program has merit, approval of the alternative would be required because the proposal does not meet the requirements of the 1989 Edition of the Code.

Comment 4.3.1-2

The NUREG-series report should provide guidance on whether the scope defined in IWV-1100 of the 1986 Edition of Section XI and OM-1 applies to small sentinel valves installed for thermal relief of service water heat exchangers in the uncommon event they are isolated from service. The issue of whether the 1986 Edition of ASME, Section XI, expands the scope of pressure relief under IWV-1100 is debatable and clearly does not provide an increase in safety.

Response 4.3.1-2

The revised scope in Part 1 of the OM Code more clearly states that the requirements are applicable to safety and relief valves required to protect systems or portions of systems that perform a specific function in shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident. The NRC has asked the Working Group for Part 1 to assess and clarify the scope. See Thomas F. Hoyle's paper, "Introduction to OM-10, Technical Differences Between IWV and OM-10," NUREG/CP-0111, and OMc-1994 Addenda to Part 1 of the OM Code for further guidance.

Comment 4.3.1-3

Are plants currently subject to the 1986 Edition or 1989 Edition of Section XI the only plants that must include safety and relief devices that give only overpressure protection in the IST program? In these plants, the devices do not perform a specific function in shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident.

Response 4.3.1-3

Previous editions of ASME Section XI described the scope as those Class 1, 2, and 3 valves (and their actuating and position-indicating systems) in light-water cooled nuclear power plants, that are required to perform a specific function in shutting down a reactor to the cold shutdown condition or in mitigating the consequences of an accident. Therefore, if the safety or relief devices did not perform a function in shutting down a reactor to the cold shutdown condition or in mitigating an accident, they would not be subject to the requirements of ASME Section XI, Subsection IWV.

Comment 4.3.1-4

Does OM-1 require testing of a relief valve installed on a non-essential portion of a safety system if the valve is isolated automatically during design basis accidents?

Response 4.3.1-4

The valve would not be within the scope of OM-1 if the portion of the system for which the valve provides overpressure protection is isolated during design basis accidents, and that portion of the system is not required to shutdown the plant, maintain safe shutdown, or mitigate the consequences.

Comment 4.3.1-5

If a system relief valve is not required or even expected to actuate during any accident scenario or sequence of events, is the valve required to be tested in accordance with OM-1?

Response 4.3.1-5

The scope of OM-1 is not directly related to an actuation during an event. It includes valves that provide overpressure protection for a system required to function during an accident as defined in Section III, Subsections NB, NC, and ND.

Comment 4.3.1-6

The draft NUREG-series report states that the "pressure relief valves which are installed in the applicable system to protect against overpressure may not typically perform a safety-related function." The classification methodology for active components is taken from Regulatory Guide 1.48 and includes those pumps, valves, and pressure relief devices "that must perform a mechanical motion during the course o f accomplishing a system safety function."

System safety functions include any function that is necessary to ensure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shutdown the reactor and maintain it in a safe shutdown condition, or (3) the capability to prevent or mitigate the consequences of accidents that could result in offsite exposures comparable to the guideline exposures of 10 CFR Part 100. This active component classification methodology and the scope statements of ASME OM (Parts 1, 6, and 10) have the same meaning (i.e., pumps, valves, and pressure relief devices performing nuclear safety functions).

The passive valves in the IST program are found through individual system reviews. The passive valves include those valves required to perform a nuclear safety function (as defined above) by maintaining their position and for which ASME OM Part 10 specifies leakage testing or position indicator testing requirements. ASME OM Part 1 provides requirements for pressure relief devices required to perform a specific function in shutting down a reactor or in mitigating the consequences of an accident. The IST program scope should include those pressure devices that do an active nuclear safety function, which is consistent with ASME OM-1987 Interpretation. 1-2 and the active component classification methodology described above.

Response 4.3.1-6

The scope issue for Part 1 will need to be addressed by regulatory changes or changes by the OM Committee. The comments have been referred to the OM Committee to use in assessing and clarifying the scope.

Section 4.3.3, "Test Supervisor Qualifications"

Comment 4.3.3-1

(1) ASME Performance Test Code (PTC) 25.3-1976, Paragraph 1.06, states that "this Code only applies to testing of valves where the pressure and flow capacity of the facility is adequate to conduct the test." PTC 25.3-1976, Paragraph 3.02, concludes with "may be considered qualified to supervise the test." How can this be interpreted as a requirement for IST as stated in Section 4.3.3?

(2) What must be included in an acceptable formal education for the test supervisor qualification in the 1977 Addendum to PTC 25.3-1976? For example, how many class hours are needed?

Response 4.3.3-1

(1) PTC 25.3-1976 applies to IST through reference in ASME Section XI, IWV-3512. The ASME Code committee stated that, although the test supervisor's qualification of PTC 25.3-1976, paragraph 3.02, apply in accord with IWV-3512, the provisions are permissive (allow discretion).

(2) The alternative in the 1977 Addendum states that a person who supervises the test shall have a formal education in thermodynamics and fluid mechanics, but the alternative does not require an engineering degree.

Comment 4.3.3-2

The section refers to Code Case N-442 which is not listed in Section 2.1 with the other referenced code cases for IST. Is this an NRC-approved code case?

Response 4.3.3-2

Code Case N-442 applies to Section III, Division 1, Subsections NB, NC, ND, and NE, of the ASME Code and has been endorsed by the NRC in Regulatory Guide 1.84. Because it does not apply to Section XI, it has not been listed in Regulatory Guide 1.147 for use by licensees in IST programs.

Comment 4.3.3-3

Code Case N-442 has been annulled because it has been incorporated into the ASME Code, Section III. May it be referenced in a relief request?

Response 4.3.3-3

Yes. The code case could be used to determine an acceptable alternative and to justify the alternative in the proposed request.

Comment 4.3.3-4

What action is required for plants which have performed relief valve setpoint testing that was not supervised by an individual who satisfies the requirements of Test Supervisor as defined in ASME/ANSI PTC 25.3-1976? Is this a reportable occurrence?

Response 4.3.3-4

The licensee could review test records to verify that the set pressure tests were supervised by a person meeting the minimum requirements of the licensee's QA program. The qualifications are discretionary in that the licensee can use the qualifications given in the PTC or specify other qualifications. If minimum qualifications cannot be determined, the "event" may be reportable.

Comment 4.3.3-5

Section 4.3.3 recommends that the test supervisor's qualifications be included in the test records. We use personnel qualified in accord with requirements of the quality assurance program and believe this is sufficient documentation.

Response 4.3.3-5

The recommendation has been changed from test records to plant records. The documentation need not be part of the test report, but be readily available in the plant records system at the site.

Section 4.3.4, "Frequency and Method of Testing Automatic Depressurization Valves in Boiling-Water Reactors"

Comment 4.3.4-1

In the NRC Recommendations, "... if a 2-second limiting value **of** is assigned using ..." Delete "of" in the sentence.

Response 4.3.4-1

Change made as noted.

Comment 4.3.4-2

Does IWV-3410 (OM-10, Paragraph 4.2.1) require exercising Category A/C and B/C safety valves and relief valves?

Response 4.3.4-2

Valves in more than one category are subject to the testing requirements for all the applicable categories unless there is a specific code exemption. The OM Committee is reviewing exercising requirements for safety and relief valves.

Comment 4.3.4-3

PECO has established a maximum limiting stroke time of greater than 2 seconds for the automatic depressurization valves because of the variance in the measured values from 1.4 to 2.2 seconds. We do not consider the 2-second stroke time limit reasonable based on reference stroke times achieved.

Response 4.3.4-3

Stroke times may vary when attempting to obtain the indication of valve full stroking by using acoustic monitors as that does not allow for tight control of the test. The OM Committee is addressing whether the ADS valves need to be subject to the stroke time test requirements, or if OM-1 gives adequate indication of the capability of the valves to stroke.

Section 4.3.5, "Jack-and-Lap Process"

Comment 4.3.5-1

Paragraph 3.4.1.1(d) of OM-10 is referenced although no paragraph by this number exists.

Response 4.3.5-1

The reference has been changed to Paragraph 3.4.1.1(d) of OM-1.

Section 4.3.6, "Safety/Relief Valve Setpoint Adjustments"

Comment 4.3.6-1

Does this section imply that a licensee must do a root cause analysis of the failure and take corrective actions to prevent recurrence before returning a safety/relief valve to service if the valve has exceeded its setpoint by greater than 3 percent? Can the licensee follow logic discussed in Section 3.2 as an alternative and do a preliminary analysis to declare the valve operable and exit the action statement, with a more detailed analysis to follow?

Response 4.3.6-1

OM-1 requires the "cause" of failure to be determined and corrected. A condition could be found and corrected and the valve setpoint verified to be within the acceptable range such that it may be placed in service. Once the condition that necessitated corrective action has been found, the licensee could do further analysis into the "root cause" of the particular condition. Generally, corrective action programs are established to take such an approach. An example of the difference between "cause" and "root cause" can be shown for setpoint drift. When the safety valve setpoint has "drifted" above the acceptable limit, adjustments may correct the condition such that the valve can be put back into service. However, the root cause of the setpoint drift may be unknown. The Boiling-Water Reactor Owners' Group has conducted research on the root cause of the setpoint drift in main steam safety and relief valves of boiling-water reactors, for example, and has recommended a change to the valves that may correct the condition to prevent recurrence.

Section 4.3.7, "Setpoint As-Found Value"

Comment 4.3.7-1

If the as-found test is within acceptance criteria, and no adjustment or maintenance is required, is it permissible to perform only one additional lift (i.e., two total lifts to verify both as-found and as-left set pressure)?

Response 4.3.7-1

The as-found set-pressure must be determined before doing a maintenance or set pressure adjustment, or both (e.g., see Paragraph 7.3.1.1 of OM-1-1987). If no maintenance or set pressure adjustment is performed and the set pressure meets the acceptance criteria, then the number of tests required by the "number of tests" would be met in your example. An

inquiry to the OM Committee to clarify the intent may be appropriate.

Comment 4.3.7-2

Given the hypothetical, but not unusual, case where the first lift of a relief valve is found to be unacceptable but two or more succeeding lifts are within tolerance, what is the proper course of corrective action?

Response 4.3.7-2

The first lift is the only lift which may be interpreted as being the as-found test. If this as-found set pressure exceeds the appropriate acceptance criterion, corrective action, as determined necessary by the owner, must be followed. Additional valves shall be tested as required.

Section 4.3.8, "Vacuum Relief Valves"

Comment 4.3.8-1

It appears that only those vacuum breakers that protect components from an increase in internal vacuum (as it is associated with pressure relief or pressure equalization) are required to be in the scope, such as suppression pool-to-reactor building vacuum breakers in a BWR. Does this mean that vacuum breakers that only prevent the formation of a water leg in piping are not required to be in the scope (e.g., vacuum breakers in the safety relief valve discharge piping to the suppression pool in a BWR)?

Response 4.3.8-1

The valves in your example are within the scope of OM-1 since they open to equalize pressure resulting from "vapor condensation . . . capable of causing an internal or external pressure increase" as stated in Section III, Division 1, Subsection NC/ND-7111. However, if you determine that these valves do not perform functions within the scope of the definition for "overpressure protection," they would not be required to be in the IST program.

Comment 4.3.8-2

What is the setpoint of a "simple check valve" used as a vacuum breaker? What if the check valve has no leak tight criteria (i.e., if it is is not Category A/C)?

Response 4.3.8-2

The setpoint is the pressure (vacuum) force at which the valve is required to open to relieve vacuum. If the check valve has no leak tight criteria, leak testing is not required. If the requirements for vacuum breakers do not apply, only the requirements of OM-10 apply to the check valves.

Comment 4.3.8-3

This section implies that licensees must use OM-1. If a licensee is required to use only IWV, then OM-1 does not apply for vacuum relief valves and their requirements.

Response 4.3.8-3

Your comment is correct. The words "if applicable" have been added after "OM-1."

Section 4.4.1, "Pressurizer Power-Operated Relief Valve Inservice Testing"

Comment 4.4.1-1

Is it assumed that where PORV testing at <u>each</u> cold shutdown is prescribed, it is not necessarily limited to more frequently than every 92 days?

Response 4.4.1-1

Item (e) of the recommendation states that if the plant frequently enters the cold shutdown mode, testing of the PORVs is not required more often than once every 3 months. The IST program could clearly state such a provision.

Comment 4.4.1-2

The original guidance in ANO-1 was also to leak test a block valve (Category A). Later guidance, including Section 4.4.1, leaves that test out. What is the expectation?

Response 4.4.1-2

The basis of the original guidance could be reviewed to determine if it still applies. The licensee could do a review under 10 CFR 50.59 to determine if any commitments made in response to GL 90-06 were beyond guidance it later obtained from NRC. The licensee could then revise its response to GL 90-06. The safety evaluation for ANO-1, of May 24, 1994, does not discuss leakage testing of the block valve but states that the block valve is tested in accordance with Section XI. Section XI does not require leak testing if the valve is not required to be Category A.

Section 4.4.2, "Post-Accident Sampling System Valves"

Comment 4.4.2-1

Section 4.4.2 notes that containment isolation valves included in the post-accident sampling system are required to be included in the IST program. The basis for including this as a separate section of the NUREG-series report is not clear, since containment isolation valves in any system should come under the test requirements of Appendix J, the IST program, or both.

Response 4.4.2-1

The section was included in the guidelines to clarify that the remaining valves may not be within the scope of 10 CFR 50.55a. The issue has been discussed in previous NRC inspections.

Section 4.4.3, "Multiple Containment Isolation Valve Leak-Rate Testing"

Comment 4.4.3-1

The requirement to base the leak rate acceptance criteria on the smallest valve in a group is inconsistent with common sense. If a small valve that is tested with several large valves is severely degraded, the leakage will not likely increase at a significant rate. In contrast, a minor change in the condition of a large valve could result in leakage orders of magnitude greater than that even plausibly in a small valve. Are other approaches acceptable to establishing acceptance criteria?

Response 4.4.3-1

As noted in the recommendation, other methods of establishing acceptance criteria may be acceptable, and other methods have been approved. For example, tests were conducted at the Clinton Power Station to determine the maximum size of an opening that could result from a particle that is below the system filtration size. The acceptance criteria are based on the results of these tests. A method that ensures detection of leakage within safety analysis limits is acceptable. For a discussion on the approach used at the Clinton Power Station, see "Modeling Valve

Leakage," by Steven R. Bell and Randall Rohrscheib in NUREG/CP-0137.

Comment 4.4.3-2

The methodology for establishing leakage limits for valves tested in groups is the responsibility of the licensee and need not be approved by the NRC. This methodology is at a level of program detail that should not be included in the IST program document submitted to the NRC, but rather should be described in the IST program implementing procedures available at the plant site.

Response 4.4.3-2

When using OM-10, the leakage rate acceptance criteria are the responsibility of the owner. The approval of relief requests to IWV-3420 requirements was necessary before OM-10. It is recommended that documentation of the method be available at the plant site as part of the implementation of IST.

Comment 4.4.3-3

Sections 4.4.3 and 5.3 give details for methodology to be included in the IST program. Can the methodology be included in plant IST administrative procedures or surveillance test procedures, as appropriate?

Response 4.4.3-3

The details may be included in the IST program documents, which include administrative procedures or implementing procedures. The statements have been clarified.

Section 4.4.4, "Post-Maintenance Testing Following Stem Packing Adjustments and Backseating of Valves to Prevent Packing Leakage"

Comment 4.4.4-1

Can Section 4.4.4 be revised to include manual adjustment of valves with backseats to stop external packing leakage, to be allowed through performance and acceptable results of an engineering evaluation?

Response 4.4.4-1

In NRC Information Notice 87-40, the staff discusses backseating valves. Both Westinghouse and General Electric had issued guidance on backseating to minimize deformation to valve stems. Backseating is not listed in IWV or OM-10 as an example of a maintenance activity. The licensee would have to assess the effect on the operation of a particular valve if backseating is performed and determine if post-maintenance is required. GL 89-10 test results may indicate whether backseating of a particular valve affects the stroke time of a valve. Any information would need to be included in an evaluation.

Comment 4.4.4-2

It is not clear that an engineering evaluation must be performed in all cases where packing is adjusted without post-maintenance testing, and not just in those cases where the torque value exceeds the manufacturer's limit. It should be clarified that if the torque exceeds the manufacturer's limit, the manufacturer must supply data for the engineering analysis.

Response 4.4.4-2

The recommendation has been clarified to address this comment.

Section 4.4.5, "Leak-Rate Testing Using OM-10 Requirements"

Comment 4.4.5-1

Section 4.4.5 states that one difference between IWV-3420 and Paragraph 4.2.2.3 of OM-10 is that OM-10 allows a pressure decay test. IWV-3424 states that "valve seat leakage may be determined by one of the following...". Does Section 4.4.5 preclude the use of other seat leakage test techniques such as pressure decay? Why was the word "may" used instead of "shall"?

Response 4.4.5-1

The statements in Section 4.4.5 do not preclude the use of other methods in accord with IWV-3424. For the purposes of the ASME codes and standards, the use of the word "may" is discretionary action, while the word "shall" means a requirement.

Section 4.4.6, "Manual Valves"

Comment 4.4.6-1

Are manual (handwheel) valves required to be in the IST program if their only safety function is for leak tightness? Do they have to be included if they only have to be capable of changing position, but do not have to be leak-tight to perform their safety function?

Response 4.4.6-1

If a manual valve is not required to change position, periodic exercising is not required. If a manual valve is required to be leak-tight, periodic leak testing is required. If a manual valve is required to both change position and to be leak-tight, periodic exercising and leak testing are required. If a manual valve has position indication, the position indication must be periodically verified even if no other testing is required.

Comment 4.4.6-2

Must a manual valve be tested if it is Class 1, 2, or 3and "can be used" to mitigate accidents, bring a plant to cold shutdown, or maintain the plant in that mode, even if it is used for conditions "outside design basis" (i.e., accident with more than a single failure)?

Response 4.4.6-2

IST is not required if the function is not required by the safety analysis. Such valves may be required to be periodically exercised under another program or as a good practice.

Comment 4.4.6-3

Why would it be necessary to verify the position indication for passive valves? This seems to imply that the valve may not be in its required position during an accident. If so, then the valve is not passive. Does this apply to manual valves or to computer indications (e.g., computer mimics)?

Response 4.4.6-3

If position indication has not been periodically verified, an operator may incorrectly assume, based on incorrect position indication, that a valve is in its passive position, when in fact, it is in the wrong position. OM-10 requires position indication testing for all valves with position indication except Category D valves. This testing applies whether the valve is active or passive, power-operated, or manually operated (see Table 1 of OM-10). Earlier editions of IWV were not so specific.

Comment 4.4.6-4

We request additional guidance on relief actions and frequency justifications (e.g., stroke time not required on manual valves, valve position verification for manual valves).

Response 4.4.6-4

Additional guidance has been noted in the recommendation. While stroke-timing would not apply, other test requirements would apply.

COMMENTS ON SECTION 5, "SUPPLEMENTAL GUIDANCE ON INSERVICE TESTING OF PUMPS"

General Pump Issues

Comment 5-1

Define "vertical line shaft pumps." Does this term include vertical pumps having a common pump/motor shaft, such as residual heat removal or containment spray pumps?

Response 5-1

The OM Task Group on Pumps recently proposed to define "vertical line shaft pump" as "a vertically suspended pump, where the pump driver and pumping element are connected by a line shaft within an enclosing column which contains the pump bearings, making pump bearing vibration measurements impracticable." This definition may change before it is approved.

Comment 5-2

Do the lube oil systems on safety-related pumps and diesels fall under the ISI/IST program since their failure would render the parent component inoperable?

Response 5-2

These systems are not typically Code class and, therefore, are not included in ISI/IST programs, other than as augmented components. However, the section has been revised to discuss skid-mounted components that may be in a code class. The OM Committee is reviewing "skid-mounted" components (see Section 3.4). Also, see Regulatory Guide 1.26 for guidance on the code classification of components. Such components may be included in the IST program for tracking and scheduling purposes, noting if the testing is of the major component and not the pump or valve individually.

Comment 5-3

Another issue that should be addressed concerns instrument inaccuracies. For example, technical specifications or the safety analysis report requires a pump to produce 1000 gpm at 500 psid (design), but the IST reference values are 1000 gpm (fixed) and 550 psid. The low end of the acceptable range for differential pressure from OM-6 (0.90) would be 495 psid, although conservatively set at 500 psid. Now if this test revealed the pump was operable and met IST requirements, and the 2-percent instrument inaccuracies were taken into account for flow and differential, the pump could be creating less than the required volume. In this example, should the instrument accuracies be taken into account or should they have been incorporated when the design numbers were calculated?

Response 5-3

Limits in the safety analysis must be considered when writing pump test procedures. The requirements for inservice testing are broadly written. If specific plant limits are more conservative, they are the absolute "operability" limits for meeting the licensing basis of the plant and may need to be used with adequate pump performance for IST acceptance criteria. For example, see Section 5.2, item (5) of the elements listed for using pump curves. The value as read would be used if it was obtained using instruments that

meet the accuracy requirements for IST data. If a licensee is attempting to perform a critical test, more accurate instruments may be necessary; however, the value recorded would be the value read if the accuracy of the instruments met the specified accuracy. Only when instruments are used that cannot meet the specified accuracy for a test would an adjustment be necessary to meet Code requirements. Design analyses most likely do not account for instrument accuracy in obtaining readings; however, when the pump is selected, the designer generally selects from a catalog of available sizes and chooses one with margin above the analyses numbers. The "comprehensive pump testing" approach recently approved for incorporation into the OM Code (OMc-1994 Addenda) specifies an instrument accuracy of 0.5 percent for differential pressure, but continues to specify 2 percent for flow rate instruments.

Section 5.2, "Use of Variable Reference Values for Flow Rate and Differential Pressure During Pump Testing"

Comment 5.2-1

In the use of pump curves, the recommendation includes guidance for relief to "construct each curve with a minimum of five points." We disagree with the need for five points because it does not differentiate between the amount of pump curve used. For example, five points would be appropriate for a curve encompassing the entire pump operating range, but three points are sufficient for a curve encompassing five percent of the pump operating range. What is the basis for five points?

Response 5.2-1

The guidance in the recommendation will not cover all cases. As noted, the five points are more appropriate for a large range on the pump curve. When testing over a more narrow range and thus plotting fewer points, the licensee could state the number of points in the relief request. An explanation would help NRC review the relief request and preclude questions.

Comment 5.2-2

Element (4) of the recommendation states that the curve be constructed in a range as close as practicable to design basis flow rates. Sometimes the design basis flow rate is in the "flat" portion of the curve. , Constructing the range as close as practicable to the point of maximum hydraulic efficiency would be more meaningful than using the design basis flow rate.

Response 5.2-2

Most pumps are selected for the design flow to be close to the best efficiency point of the curve. For pumps that do not appear to fit the recommendation, a relief request could explain the basis for the specific pump tests and use of curves for establishing acceptance criteria. The recommendation is for guidance rather than to establish restrictions.

Comment 5.2-3

Element (7) refers to revalidating the previous curve by doing an inservice test. If it is determined that the maintenance activity should not significantly affect the reference curve, is one point adequate to revalidate the curve? Also, if a new reference curve needs to be plotted because of maintenance, does the entire curve need to be reverified or only the portion of the curve that is used in the test procedure?

Response 5.2-3

"Should not" versus "could not" may be the determining factor for determining the number of points needed to reverify the curve. The owner would have to make the determination based on the type and extent of maintenance and document the basis for using a single point. Plant conditions may preclude more than one point until a plant shutdown, for example, which would be an acceptable basis for returning a pump to service based on reverification of a single point on the curve, with additional points verified at the next planned shutdown. For post-maintenance and other testing, only the portion of the curve used in the test procedure needs to be reverified for inservice testing. If a major modification or repair/replacement is performed on the pump, a design-basis (startup type) test may be necessary before placing the pump into service. Such a test could also verify the pump curve for IST.

Comment 5.2-4

The example given references an acceptable operating range of 0.93 - 1.02 times the pump curve value. These are IWP ranges. If OM-6 is used, can the OM-6 range of 0.9 - 1.1 times the pump curve value be used?

Response 5.2-4

As noted in the recommendation, the allowable ranges for the pump curve must be consistent with Table IWP-3100-2 or Table 3b of OM-6, as appropriate for the requirements used for pump testing. The acceptable ranges for various types of pumps listed in Table 3b of OM-6 are not 0.9 - 1.1 for all pump types.

Section 5.3, "Allowable Variance from Reference Points and Fixed-Resistance Systems"

Comment 5.3-1

Paragraph 5.2(c) of OM-6 specifies that, if the pump is in a system in which the resistance cannot be varied, the "flow rate and pressure shall be determined and compared to their respective reference values." Section 5.3 of NUREG-1482 also states that certain designs do not allow for the licensee to set the flow to an exact value because of limitations in the instruments and controls for maintaining steady flow. Diesel fuel transfer pumps at WNP-2 do not have inline flow meters. The pump flow rate is determined by measuring volume of fluid pumped and dividing by the corresponding pump run time. A clamp-on flowmeter will not accurately measure the flowrate in a repeatable manner because the of a low flowrate and lack of time available to set up the instrument with the pump running. Pump discharge piping has a manual discharge isolation and day tank inlet isolation valves, which are always fully open.

If system resistance is based on the system lineup remains constant from test to test, the flowrate would normally remain constant. Since the flowrate is calculated based on the change in the tank level during the pump run, any adjustment of flow rate with the globe valve will be meaningless. Thus, the only prudent choice is to run the test with both valves fully open, by maintaining the system at a constant resistance. The system design and lack of inline flow meters indicate that this situation meets the intent of paragraph 5.2(c) of OM-6, which allows that "where system resistance cannot be varied, flowrate and pressure shall be determined and compared to their respective reference values." Section 5.3

of the draft NUREG-series report and Question Group 49 include similar guidance. Please comment.

Response 5.3-1

In NUREG/CP-0111, John Zudans discussed the differences between IWP and OM-6. For the fixed resistance discussed in paragraph 5.2(c) of OM-10, the change is described as an "enhancement to current standard" not addressed in IWP. Zudans also noted that paragraphs 5.2 (b) and (c) of OM-10 allow determination of differential pressure or flow rate, whereas IWP implies these quantities must be measured. He stated that the change was to "allow determination when instrumentation has not been installed or is impractical to install." If the testing can be performed with the system at a fixed resistance, paragraph 5.2(c) of OM-10 would permit the use of change in tank level over time, which can be used to further verify a fixed resistance. Factors that could affect the resistance of the system must be controlled to the extent practical to ensure repeatable conditions (e.g., level of tank at the beginning of the test, alignment of valves not in the direct flow path). Paragraph 5.2(c) clarifies an issue not addressed in IWP, though not prohibited by IWP; therefore, the use of paragraph 5.2(c) for fixed resistance systems would be acceptable without further NRC approval.

Comment 5.3-2

In the discussion of establishing a tolerance, establishing the independent reference value variable is inconsistent with the discussion related to the precision to which readings are to be taken. It is easily conceivable that reading a gauge to 2 percent is not practical. By the same token, in some instances, allowing a deviation of $\pm$ 2 percent would allow test personnel to effectively expand the acceptable range significantly. For this reason, the Commission should reconsider the policy that is negative with respect to using pump curves for pump acceptance criteria.

Response 5.3-2

The recommendation was written to reflect concerns of several NRC inspectors in attempting to deal with situations where licensees specify a range of values rather than a single reference value. The recommendation attempts to allow some band around the reference value that will continue to give repeatable results. Readability of the gauges is an important aspect of the recommendation, but if the gauges cannot be read to $\pm$ 2 percent, and a single reference value cannot be achieved, the licensee may justify an alternative and submit a request for relief. If the OM Committee addresses this situation, the recommendation will no longer be necessary.

Comment 5.3-3

We disagree with establishing a $\pm$ 2-percent allowance variance and requesting relief for any variance greater than 2 percent. Licensees should be able to establish and justify a range for a reference value. For example, a pump that operates on recirculation by an automatic control valve may represent the flat part of the pump curve. Monitoring at any value higher than 500 gpm and within the range would provide improved ability to monitor for degradation.

Response 5.3-3

This recommendation addresses the problem that the code discusses only a reference value. In reviewing IST during inspections, inspectors found cases where a plant used a range for the set reference value. The OM Committee addressed the use of ranges in response to Interpretation 92-6 (see Section 5.2) stating the code is not met. The example

given does not appear to meet the code requirements.

Comment 5.3-4

If a total tolerance of less that ± 2 percent of the reference value is achievable, relief is not required; however, in using this guidance, the variance and the method for establishing the variance must be documented in the IST program. Must the method be documented in IST program submittal to the NRC, or does "IST program" refer to the whole documented program of which the submittal is just a portion? The variance around the reference value can change because of new instruments, improved flow control, or different flow paths. The variance around the reference value is a level of program detail that should not be included in the IST program submittal. However, the variances are described in the IST program documents residing at the stations, and these documents are available for audits.

Response 5.3-4

The document submitted to the NRC need only state your intent to use the recommendation at your plant (e.g., "Recommendation 5.2 of NUREG-1482 is used for the tests conducted on pumps for which the reference value "point" is not achievable"). The details and specific values may be in the test procedures or other IST program documents that are appropriate to implement the recommendation.

Section 5.4, "Monitoring Pump Vibration in Accord with OM-6"

Comment 5.4-1

OM-6 separates all positive displacement pumps from centrifugal pumps in the tables which give the acceptable ranges for hydraulic performance; however, the mechanical vibration surveillance criteria therein distinguish only the difference between reciprocating pumps and centrifugal pumps. No section within the NUREG-series report gives guidance for the vibration performance characteristics of other types of positive displacement pumps (i.e., gear, screw, etc.). Must licensees cap the alert and action ranges for these types of pumps at 0.325 and 0.70 inches per second respectively. Can 2.5 and 6 times the reference values be unlimited? Do utilities have the latitude for interpretation through relief requests?

Response 5.4-1

The NRC has received relief requests for pumps of types not addressed in OM-6. The question could be addressed to the OM Committee.

Comment 5.4-2

Section 5.4 discusses the OM-6 requirements that the frequency response range of the vibration-measuring transducers and their display system be from one-third minimum pump shaft rotational speed to at least 1000 Hz. The minimum speed for the liquid poison pumps at Nine Mile Point 1 and 2 is 360 rpm, or 6 Hz. Obtaining certifiable calibrations at pump shaft rotational speeds of 2 Hz using the more up-to-date equipment available can be difficult. Therefore, to obtain a certifiable calibration as prescribed by OM-6 requires the

use of less up-to-date and more time and labor-intensive equipment. Niagara Mohawk recommends that the NRC allow relief to limit the frequency response range for low speed pumps to a range of 3 to 1000 Hz. This would allow the use of more up-to-date and economical equipment available to the industry.

Response 5.4-2

The NRC cannot "rewrite" the Code through a recommendation. The OM Committee is addressing slow speed pumps. Currently, a relief request must be submitted when it is impractical to meet the frequency response range. The basis for relief should discuss the type of pump, type of bearings, whether the pump or bearings are subject to failures that would be indicated at less than the running speed, and the specific problems experienced with the calibration process.

Comment 5.4-3

Paragraph 4.6.1.6 of OM-6 requires that the frequency response range of the vibration-measuring instruments be from one-third minimum pump shaft rotational speed to at least 1000 Hz. A generic problem exists in that the specified required lower limit of response range for vibration equipment cannot be met by equipment in use today. This situation typically applies to reciprocating charging pumps (PWR) and standby liquid control pumps (BWR). It would be helpful if this topic was addressed in the NUREG-series report. It was not discussed when OM-6 was developed. WNP-2 has standby liquid control pumps that turn at 370 rpm, or 6.16 Hz. One-third shaft speed is 2.05 Hz. Instruments that can read 2 Hz may be available, but this frequency is less than what is traceable to the National Bureau of Standards for calibration. Although licensees could implement an expensive program for obtaining a vibration instrument that is traceable to the National Bureau of Standards, such a cumbersome process would add nothing to the vibration data presently obtained from the standby liquid control pumps using CSI 335 accelerometers, which are calibrated down to 6 Hz. This frequency will capture the pump rotating frequency, which is the main frequency of interest for these pumps.

The following technical assessment is based on a qualitative roto-dynamic evaluation of the standby liquid control pumps. NRC does not require subsynchronous vibration data on select slow speed reciprocating machines (1000 rpm or less) with short shafts that are supported on frictionless bearings. In general, subsynchronous vibrations are attributable to three causes: (1) shaft rubs, (2) fluid whirl in a journal bearing, and (3) axial instability caused by improper axial positioning of the rotor or incorrect "A" gap in a centrifugal pump. Other causes of subsynchronous vibration include bolts, cage problems in frictionless bearings, and electrical surges; however these either do not apply or are preceded by an indication at a higher frequency. Items 2 and 3 do not apply for a reciprocating machine supported on frictionless bearings because a shaft rub in a short shafted machine supported on frictionless bearing would require a failure of one of the frictionless bearings. The short shaft and slow speed implies that the machine operates below its first critical speed. Therefore, it behaves as a rigid member and will deform in such a way as to take up clearances and allow contact between station and rotor. Thus, the only mechanism for contact is a bearing failure, and therefore shaft rub will always be preceded by a bearing failure.

Frictionless bearings proceed towards failure in stages, displaying rotor patterns for identification. The patterns occur at a multiple of running speed, such as 3.25 running speed for a typical outer race defect. This multiple

will repeat harmonically depending on the severity of the problem. Thus, the subsynchronous region of the frequency spectrum for such a slow speed machine would add nothing to the data needed to find the problem early. The standby liquid control pumps at WNP-2 are slow speed, short shafted, pumps supported on frictionless bearings and driven by a 4.8:1 gear train. The spectral vibration data shows another vibration in the subsynchronous region. All of the vibration indications, none of which reveals a problem, are in the higher frequency range. Subsynchronous data for these machines is of little use, and the low frequency requirements of subparagraph 4.6.1.6 of OM-6 do not add to the quality of the vibration data from the pumps.

Response 5.4-3

See Response 5.4-2 above. Apparently, the code committee did not establish the frequency response range for all types of pumps. When the requirements appear to be impractical, the licensee may request relief.

Comment 5.4-4

For pumps with very low vibration readings (e.g., 0.025 in/sec), can higher acceptable limits be established at higher than 2.5 and 6 times the reference values? Have relief requests been granted for smooth-running pumps ?

Response 5.4-4

NRC has granted relief for using a minimum reference value for smooth-running pumps, while maintaining the 2.5 V_r as an alert limit and 6.0 V_r as the required action range. The OM Committee is considering a code case to address smooth-running pumps. In granting the relief, the staff stated that when the OM Committee has addressed the issue, the relief request must be modified to be consistent with the new requirements.

Comment 5.4-5

We will incorporate OM-6 into our IST program in October 1994. We have two HPSI pumps that are acceptable by our present program, but are in the required action range by OM-6. What can we do now to address this condition? Should we write a relief request?

Response 5.4-5

Your question indicates you are comparing the values of velocity with those of displacement. Because velocity measurements are a better overall indication of the condition of a pump than displacement measurements, and the limits of OM-6 are set at values that may represent degradation of a pump, you would need to determine why the vibration is in the required action range. Footnote 1 of OM-6 may be useful in your assessment. The staff has approved relief requests that increased the alert limit for pumps that have high vibration, but long-term relief has not be granted for exceeding the required action limits. OM-6 allows use of either velocity or displacement, though velocity is recommended for pumps that rotate at greater than 600 rpm. If the code requirements cannot be met, a relief request would be necessary to comply with 10 CFR 50.55a.

Comment 5.4-6

We have a group of pumps with reference vibration values close to 0.325 inches per second. These pumps are often in the alert range, but maintenance and vibration spectral

analysis shows acceptable pump performance. Can we state that we will monitor vibrations closely through the use of spectrum analysis and use engineering judgment for acceptable vibration limits and continue quarterly testing? We plan to use guidelines from the Hydraulic Institute.

Response 5.4-6

Your proposal would require a relief request. The OM Committee is considering the use of spectral analyses for exiting the increased frequency required when a pump is in an alert range as you have proposed.

Comment 5.4-7

If a pump, while operating acceptably, normally exceeds the absolute alert limit of 0.325 inches per second in OM-6, can a new limit be established at a higher level following engineering analysis?

Response 5.4-7

Your proposal would require relief from the requirements of OM-6 and must be justified. Relief has been granted in some cases to raise the alert limit.

Comment 5.4-8

Section 5.4 states that vibration instruments in the low-frequency response range are commercially available. We obtained the best accelerometer standard we could find, calibrated by the National Institute of Standards and Testing down to 1 Hz at 0.07gs. The reference values for our charging pumps (running speed 3.3 Hz) are around 0.5 mils (approximately 0.0002 gs at this speed). This acceleration is far below the calibrated range for our standard. Thus it does not appear that vibration instruments calibrated in the ranges required for low-frequency applications are yet commercially available.

Response 5.4-8

The recommendation has been modified for the very slow speed pumps used at some nuclear power plants. The OM Committee is assessing changes to address the unavailability of vibration instruments that can meet these requirements and to address the consideration that not all pump types need to be monitored at frequencies less that running speed. The unavailability of instruments may be a major element in justifying relief when the code requirements cannot be met.

Comment 5.4-9

Editions of Section XI before the 1988 Addenda required that vibration be "read" in peak-to-peak. This could be interpreted to mean that it is acceptable to measure root-mean-square (rms), convert it to peak-to-peak, and read it as peak-to-peak. OM-6 removed this ambiguity and requires vibration to be measured in peak or peak-to-peak. Newer digital equipments measure directly in peak. The NRC mandated 10-year updates of the ISI and IST programs to reflects the need for licensees to incorporate new technologies which have been incorporated into the codes and standards. However, there is continuing debate with the OM Committee on whether the use of rms measurements is acceptable for determining the operational readiness of pumps. The OM Committee recently responded to an inquiry (File OMI 94-2) and explained that the the OM Code (and OM-6) allows vibration to be measured in rms and mathematically converted to peak readings. Readers are cautioned that the code vibration acceptance criteria are in peak or peak-to-peak units and that the use of rms, without a mathematical conversion, are not acceptable.

Response 5.4-9

This is an important issue. Licensees who use rms values for recording data must adjust the limits of OM-6, or convert the data to peak values.

Comment 5.4-10

The vibration acceptance criteria in OM-6 are not clearly stated (i.e., $2V_r$ to $6V_r$ and 0.325 ips alert limit, 0.7 ips required action limit), and it is not clear if these values are for full-flow testing or minimum flow testing, where vibration levels typically increase because of flow noise.

Response 5.4-10

Such issues would have to be clarified by the OM Committee. The limits currently apply at the test conditions for IST.

Comment 5.4-11

OM-6, Table 6100-1, has a more narrow acceptance band for "vertical line shaft pumps" (0.93 vs. 0.90). The basis for this narrow band should be explained. No apparent increase in safety margin is obtained when such pumps are analyzed for degradation of 10 percent or greater.

Response 5.4-11

The change was made by the O&M Committee. John J. Zudans's paper, "Introduction to ASME/ANSI OMA-1988A, Page 6 - `Inservice Testing of Pumps in Light-Water Reactor Power Plants' and Technical Differences Between Part 6 and ASME Section XI, Subsection IWP," from NUREG/CP-0111, it is stated that the hydraulic acceptance criteria for vertical line shaft pumps and positive displacement pumps were made more stringent because "there are inherent deficiencies in vibration testing and degradation will be identified sooner through changes in hydraulic parameters."

Section 5.5, "Pump Flow Rate and Differential Pressure Instruments"

Comment 5.5-1

The discussion in this section brings to light a key issue but does not go far enough. Other issues related to instrumentation should be addressed:

(a) When measuring suction and discharge pressure that are subsequently used to derive differential pressure, the accuracy requirements should be applied to the final result (differential pressure) and not to the individual readings. This is specifically directed to the suction pressure reading where accuracy is relatively unimportant.

(b) The code accuracy requirement should be focused on the accuracy of the reading and not arbitrarily on the instrument. The discussion in this document seems to be going in this direction — why not the Code?

Response 5.5-1

The additional issues could be directed to the OM Committee for changes to the OM Code. The NRC may grant relief for an individual situation at a specific plant. A number of relief requests have been received for the range of suction pressure gauges.

Comment 5.5-2

Compliance with the digital accuracy standards may be impractical if a digital instrument replaces an analog instrument. Although the requirement may improve accuracy, other (existing) components in the instrument loop may render it unattainable without upgrading the entire circuit.

Response 5.5-2

Relief could be requested based on the impracticality in the existing instruments; however, the broader concern would require a change to OM-6.

Comment 5.5-3

The discussion of the absolute accuracy requirements for flow loop instrumentation is correct regarding repeatability, which is the basic assumption of the code; however, when the Commission imposes other demands on the test program where absolute values are important, it is no longer valid. This is especially true when test data is used to verify "acceptable pump operation" or compliance with the plant technical specifications or assumptions used in plant safety analyses.

Response 5.5-3

The comment is correct for operability issues outside the area of inservice testing. IST is to monitor for degrading conditions and is not a design basis verification test. It may verify that a component functions at a specific, repeatable condition, at a point in time. It does not ensure that a component will function under ***accident conditions***. If supplemental testing is performed to verify design basis capability, more accurate instruments may be necessary, or the licensee could make adjustments for known inaccuracies of the instruments.

Comment 5.5-4

The recommendation in 5.5.2 for applying OM-6 requirements to digital instruments is not a requirement.

Response 5.5-4

The second sentence has been modified to state that it is recommended that the requirements in OM-6 for digital instruments apply when using such instruments for IST.

Comment 5.5-5

Why is replacement or installation of additional instrumentation not considered a backfit?

Response 5.5-5

The response to Question 105 in Appendix A addresses this comment. Typically, if an equivalent means of determining the "measured" parameter is available, installation of a permanent instrument would not be required.

Comment 5.5-6

Does the guidance in Section 5.5.4 on the loop accuracy calibration of analog instruments apply to digital as well? Must factors such as drift, readability, temperature effects, humidity effects, and the accuracy of the device used to calibrate the instrument be considered when determining if instrument accuracies meet the requirements of IWP and OM-6?

Response 5.5-6

The referenced code inquiry discussed in Section 5.5.4 states that it applies to analog instruments. The question on factors to consider in determining instrument accuracy needs to be directed to the OM Committee.

Comment 5.5-7

Section 5.5.4 addresses flow device elements and the interpretation concerning not including certain items in the loop accuracy calculation. How are digital flow instruments, where the "flow element" is the pipe and ultrasound (e.g., Controlotron) or other such technology, to be characterized? Would only the loop accuracy of the computer (processing unit) need be addressed?

Response 5.5-7

This question would need to be addressed to the OM Committee. However, it seems to be industry practice to account for the accuracy of the measuring device and the installation requirements for ensuring the accuracy of the reading (e.g., length of pipe runs).

Comment 5.5-8

In the report, NRC discusses the range and accuracy of both analog and digital instruments. It is unclear whether computer points or printouts can be used to meet the necessary instrument requirements and if additional requirements are associated with the use of the computer.

Response 5.5-8

Some plants do use computer points to record test data for IST. If the requirements of the code are unclear, questions could be addressed to the OM Committee.

Comment 5.5-9

In safety evaluation reports for some utilities, the NRC has stated that an analog instrument with an accuracy of $\pm$ 2 percent of full-scale is in effect accurate to $\pm$ 6 percent at 1/3 of range. The draft NUREG-series report seems to imply that analog instruments are required to be accurate to $\pm$ 2 percent at the reference values (2 percent at 1/3 range). This requirement needs to be clarified, as the draft report seems to be in conflict with past positions.

Response 5.5-9

There does not appear to be a conflict in Section 5.5.1, which discusses the maximum inaccuracy of the reading that could be obtained using the code requirements for $\pm$ 2-percent full-scale, with a full scale of up to 3 times the reference value. Perhaps the confusion was with the statement of Section 5.5 listing the three accuracy statements from OM-10. The sentence has been reformatted to eliminate confusion.

Comment 5.5-10

IWP (1986 Edition and earlier) does not specify requirements for digital equipment. If a licensee uses IWP (1986 Edition or earlier) and not OM-6, may the licensee develop internal guidance for use without a request for relief?

Response 5.5-10

An inquiry could be submitted to the OM Committee for clarification. When a requirement not in earlier editions of the Code is included in a later edition, it is presumed that if an inquiry were submitted to the Code Committee (Section XI or OM), the response would be consistent with the requirements in the later edition. However, IWV (1986 Edition and earlier) does not state that the requirements for instruments apply only to analog instruments. Therefore, if the requirements of IWV can be met for both

digital and analog instruments, no relief would be required to continue to apply the requirements of IWV. A program not in conformance with either IWV (1986 Edition or earlier) or OM-10 (which is more conservative than IWV) would require relief or approval of an alternative. Digital instruments are generally calibrated within a percentage of reading.

Section 5.6, "Operability Limits of Pumps"

Comment 5.6-1

Add the word ***not*** to the second sentence: "the OM-6 Working Group ... limits of the appropriate table could ***not*** be met."

Response 5.6-1

Change made as noted.

Comment 5.6-2

It appears that OM-6 eliminates the option to perform an operability analysis to determine if a pump exceeding the action limit can still perform its safety function (reference Section XI, 1983 Edition, paragraph IWP-3230, "Corrective Action"). This option allowed the continued operation of pumps that have a large margin between minimum system flow-DP requirements and the 10-percent degraded limit. That is, once these pumps hit the low action limit, a significant margin existed between that limit and the minimum operability limit required of that pump. This offers considerable economic and scheduling advantages without affecting the safety-related function of the pump. Such pumps as the boric acid transfer pumps, essential service water pumps, and emergency diesel jacket water pumps have margins that allow for continued operation once the low action limit is reached. OM-6 should retain that alternative, or the NUREG-series report should allow for such analysis. Otherwise, code relief requests will be required for extended allowable ranges to capitalize on such margin.

Response 5.6-2

This issue is addressed in Section 5.6 of the NUREG-series report. The intent of the OM-6 changes was discussed in NUREG/CP-0111, pages 45 and 46. Analysis continues to be acceptable, but must be applied in a different manner than allowed in IWV-3230. The analysis may now necessitate changes to the reference values of the pump. New reference values must be justified in a manner that ensures the pump is capable of fulfilling its safety function.

Comment 5.6-3

Does Section 5.6 allow an expanded range of 0.89 — 1.03 for differential pressure measurements?

Response 5.6-3

The range of 0.89 — 1.03 stated in the basis for recommendation is an example from the interpretation.

Comment 5.6-4

If a pump is declared inoperable and an LCO entered because of test data in the action range, can an analysis be used to exit the LCO if the analysis demonstrates that the pump is capable of performing its safety function in the degraded condition? Can this be done without baselining the pump as required by IWP-3230(c)?

Response 5.6-4

IWP-3230(c) discusses an analysis to demonstrate that the unacceptable condition

does not impair pump operability and that the pump will still fulfill its function. IWP-3230(c) states that a new set of reference values shall be established after such analysis. If the licensee elects to maintain the current reference values rather than establish new reference values, the evaluation must include the reason and the basis for the acceptability of retaining the previous reference values. OM-6 does not include provisions for performing an analysis; however, members of the OM Committee Working Group on Pumps stated that future editions of the OM Code may address analysis as corrective action. GL 91-18 includes guidance for the use of analysis for such conditions (see Section 7 herein).

Comment 5.6-5

We have several pumps that do not have sufficient margin to be considered capable of performing their design-basis safety function to the action limits of IWP or OM-6. For example, the reference value of a pump may be 1000 gpm, with a minimum design-basis flow requirement of 930 gpm. We realize that we cannot allow degradation below the design-basis capability limits and need to adjust the limits for IST. May we eliminate the "alert" limit for some of the pumps and have the "required action limit" at, for example, 93 percent of the reference value rather than the allowed 90 percent of the reference value? Similarly, may we, for example, raise the "alert" limit from 93 to 95 percent of the reference value, with a "required action limit" of 93 percent of the reference value?

Response 5.6-5

When a pump does not have sufficient margin, adjustment of the acceptable limits may needed to account for the design and licensing basis requirements. NRC approval is not necessary because these adjustments are more conservative than the Code.

COMMENTS ON SECTION 6, "REVISED STANDARD TECHNICAL SPECIFICATIONS"

This section has changed from the draft report that was issued for public comment. In the draft report, the staff stated that that 10 CFR 50.55a did not requre an NRC evaluation of an impracticality determination before the licensee could be considered in compliance; however, NRC has concluded that it must first grant the relief before the licensee can be considered to be in compliance with the regulatory requirements. The staff discusses the operability of components during the period from when a code requirement is found impractical until the licensee receives a safety evaluation from NRC. The guidance in Generic Letter 91-18 applies during that period of time.

Section 6.2, "History"

Comment 6.2-1

Paragraphs 4.2.1.2(f) and 4.3.2.2(f) of OM-10 state that exercising power-operated valves and check valves during cold shutdown "is not required if the time period since the previous full-stroke exercise is less than 3 months." Section 6.2 of the NUREG-series report further defines quarterly as being 92 days and recommends incorporation of this definition into technical specifications. Since standard technical specifications also contain a statement allowing extension of the testing intervals up to 25 percent, does this imply that cold shutdown exercising need not be performed if exercising has been completed within the last 115 days rather than 92 days?

Response 6.2-1

No. The basis for the technical specifications that allow the 25-percent extension addresses the comment. The extension is for surveillance scheduling and considers plant operating conditions that may not be suitable for conducting the surveillance (e.g., transient conditions or other ongoing surveillance or maintenance activities). The 25-percent extension is not to be used repeatedly merely as an operational convenience to extend surveillance intervals beyond those specified.

Comment 6.2-2

The revised standard technical specifications discuss test frequencies and surveillance requirements for IST. Tolerances and grace periods such as $\pm$ 25 percent of due date should be specified. Any tolerance that is applicable during "increased frequencies" should be stated.

Response 6.2-2

As noted in Response 6.2-1, the 25-percent tolerance is not to be used as a convenience. The tolerance would apply to increased frequencies the same way that it applies to regular frequencies as specified in TS 3.0.2 and 4.0.2.

6.3, "Discussion"

Comment 6.3-1

In the discussion of 10 CFR 50.55a(3)(i) and (ii), the document states that when an alternate method is requested, approval from the NRC

is required before implementing the alternate method of testing. IWA-2240 of Section XI implies that prior approval from the NRC is not required as long as the authorized nuclear inspector concurs. IWA-2240 states that "alternative examination methods, a combination of methods, or newly developed techniques may be substitutes for the methods specified in this Division, provided the Inspector is satisfied that the results are demonstrated to be equivalent or superior to those of the specified method." Please clarify when IWA-2240 may be applied to alternative testing and exams.

Response 6.3-1

IWA-2240 does not apply to inservice testing. NUREG-1482 does not apply to inservice inspection. Examination methods which are specified in Tables IWB-, IWC-, IWD-, IWE-, and IWF-2500-1 of IWA-2200 (1983 Edition). *Examination* is defined in Article IWA-2000 (1983 Edition) as denoting the performance of all visual observation and nondestructive testing, such as radiography, ultrasonic, eddy current, liquid penetrant, and magnetic particle methods.

Comment 6.3-2

Section 6 recommends that licensees change their TS to incorporate the revised STS for IST programs. TS 5.7.2.12 of the revised STS was given along with the basis for the change. In a separate correspondence from the NRC on October 25, 1993, "Content of Standard Technical Specifications, Section 5.0, Administrative Controls," from William T. Russell, Associate Director for Inspection and Technical Assessment, Office of Nuclear Reactor Regulation, NRC sent a marked version of the revised STS, Section 5.7.2.12. Will the final version of Section 6 of the NUREG-series report recommend working as provided in the October 25, 1992, letter?

Response 6.3-2

The revision to the administrative section of the revised STS may be issued while the final NUREG-series report is being prepared. A licensee may follow the most current version of that section of the related revised STS as recommended in the report. If the requirements are removed from the revised STS, a licensee may request to remove the affected paragraphs from TS in accordance with the revised STS.

Comment 6.3-3

Section 6.3 discusses implementation of relief requests for impractical requirements following a change to TS, if necessary. Is review by the plant safety committee a requirement for such implementation? If so, where can the requirement be found? The approvals needed to implement a relief request before obtaining NRC approval should be revised to "approval by the plant staff according to plant administrative policies." The general term "plant administrative policies" is broad enough to include a plant safety committee review and a 10 CFR 50.59 review. The amount and levels of review necessary should be left to the licensee's discretion and not dictated by a NUREG-series report, which contains recommendations for voluntary use.

Response 6.3-3

The guidance in the draft recommendation was not based on specific requirements of the regulations. When a test is found to be impractical, the licensee has the responsiblity to make the determination with reviews by the appropriate management and safety

committeess as deemed necessary. The guidance of Generic Letter 91-18 applies for operability of the component during an interim period between the time such a plant condition has been identified and the time that the NRC issues a safety evaluation. The licensee may establish a review process that ensures that the individuals, group, or groups responsible for safety are included in the review process. The review process established for changes, tests, and experiments under 10 CFR 50.59 may be acceptable to review these relief requests.

COMMENTS ON SECTION 7, "IDENTIFICATION OF CODE NONCOMPLIANCE"

Comment 7-1

Is it the intent to require "immediate" testing for components discovered during design basis reviews or plant modifications? Can the Commission give a time span for implementing IST testing for newly added components.

Response 7-1

A discussion on design bases reviews has been added to Section 7 to address this comment.

Comment 7-2

Add guidance in this section to address certain other additions of components to a plant IST program, such as when the components formerly did not clearly fall within the scope of Code requirements, but the licensee has elected to add the component to the IST program because of a modification, revised interpretation, or philosophy change. Engineering analysis or other types of testing could be used for program additions in this category in lieu of Section XI testing to justify operability of the components before they are added to the IST program. Operability would later be determined through normally scheduled testing. In other words, the licensee should be able to assume operability for certain categories of components newly added to the IST program without invoking the guidance in GL 91-18 for a grace period until the next scheduled IST program testing is completed. In the discussion on noncompliance situations, the staff discusses what it believes should be done when a licensee finds components that should be in the IST program but are not. In most cases, if testing is required, the component would be in violation of TS 4.0.5 or equivalent, and should be declared inoperable. The staff goes half way, and states that simply failure to perform an IST should not cause a forced shutdown, but believes that a Temporary Waiver of Compliance or other exigent relief from ASME code requirements is necessary. Exigent relief from ASME code may be required if the testing is already in noncompliance, but a Temporary Waiver of Compliance should not be necessary if, consistent with the discussion in the NUREG-series report, other tests or operational performance data reviews show that the system is operable. This would also be consistent with the comments on GL 91-18.

Response 7-2

The IST guidelines do not supersede existing NRC guidance. GL 91-18 gives guidance on resolving degraded and nonconforming conditions. It defines a "code noncompliance" for IST as either a missed surveillance test or the identification of a component that must be added to the IST program, and either of these represent a nonconforming condition. That is, the "qualification" of the system, subsystem, or component (SSC) is being called into question. A nonconforming condition that deals with the qualification of a component must be dealt with at a level of quality and safety commensurate with the safety function of the component. To resolve the qualification issue, the licensee may prepare a "justification for continued operation," while taking corrective action. Corrective action may include processing a request for code relief or preparing a cold shutdown or refueling outage justification.

The "operability" of the component is a separate issue. If a licensee determines that a component is inoperable because of a nonconforming condition, the requirements of technical specification limiting conditions for operation must be met. At that time, a licensee may determine that testing is not in the best interest of safety and seek enforcement discretion from the NRC.

To continue to follow the GL 91-18 guidance for nonconforming conditions while doing a design bases review, the licensee may write a "justification for continued operation" for the design bases review that would describe (1) the process for doing the programmatic review, (2) the actions to be taken upon finding a component or test that was not previously in the IST program, (3) the schedule for performing any testing needed. This description and justification for continued operability for the design bases review process would not apply to nonconformances found outside such a process.

Comments on Appendix A, Positions, Questions, Responses, and Current Considerations Regarding Generic Letter 89-04

Question Group 7

Comment

The response to Question 7 under Position 1 of GL 89-04 seems to suggest that criteria for check valves be developed in order to detect degradation. However, the Code neither specified, as in a manner similar to pumps and power operated valves, nor mentioned developing flow criteria for detecting check valve degradation. Furthermore, GL 89-04 states "A check valve's full stroke to the open position may be verified by passing the maximum required accident condition flow through the valve. This is considered by the staff as an acceptable full stroke." Is it the NRC's position that the imposition of flow criteria to detect check valve degradation is a requirement for an acceptable full-stroke exercise, and if so, is this a change in the NRC's position as stated in GL 89-04?

Response

The response to Question 7 implies that the test be conducted in a manner that is repeatable and with specified acceptance criteria, perhaps based on passing a measured flow of a certain value. To verify passing accident flow implies an acceptance criterion based on a measured flow, but may also be met in alternative ways such as by monitoring a change in tank level. The NRC's response to Question 7 addresses questions on flow rate measurements. The intent of the code and GL 89-04 is to monitor pumps and valves for degrading conditions. Current OM Committee activities on check valves may address your comment more fully.

Position 2

Comment A2-1

Position 2 discusses valve disassembly as an alternative to valve full-flow testing. It states that a partial-flow test is expected to be performed following reassembly. What do we do for valves that cannot be partial-flow tested?

Response A2-1

The position states that if possible, partial valve stroking must be performed quarterly, during cold shutdowns, or after reassembly. If the check valves cannot be partially stroked, that situation should be stated in the documentation for using Position 2 as an alternative.

Comment A2-2

Some utilities have grouped valves from different units for implementing Position 2 as an alternative to full-stroke exercising with flow and may now begin to group valves for nonintrusive testing. If there is a problem with the sample valve, all valves must be tested during the same outage. In the case of two units, should the other unit(s) be shut down immediately to examine the remaining valves in

the group or can the examination be deferred until the next refueling outage?

Response A2-2

Guidance for grouping valves from two or more units has been added to Section 4.1.

Comment A2-3

The NRC should make a stronger recommendation on the use of nonintrusive testing over disassembly and inspection, and the benefits that could be realized by the utilities. There should be some incentive for performing this testing.

Response A2-3

Through participation in the Nuclear Industry Check Valve Users' Group (NIC), the industry has seen the benefits in costs savings and personnel exposure. Licensees have the option to disassemble and inspect when full flow cannot be measured or attained as allowed by the NRC through Position 2, and the OM Committee through OM-10. Operations and maintenance costs may be adequate incentive for licensees to implement nonintrusive testing where such costs savings can be realized. The NRC recently distributed a report to all PWR licensees on a utility survey by Oak Ridge National Laboratory (ORNL/NRC/LTR-94/04). The report states the benefits of performing nonintrusive testing of these valves.

Question Group 11

Comment

It is stated that the previous response to this question is valid even though the code does not require an evaluation of practicality to substitute disassembly for other methods of exercising. Indeed, if this is NRC policy, exception should be taken in accord with 10 CFR 50.55a; otherwise, this option should be available.

Response

NRC made no modification to the applicable section of OM-10 when it issued the rule incorporating the 1989 Edition of Section XI, and by reference, OM-10. The recommendation is for good practice purposes only and does not have the force of either the regulation or the code; therefore, the option is available as stated in OM-10.

Question Group 13

Comment

The "Current Considerations" section for question 13 does not appear to be related to the question.

Response

The section has been deleted.

Question Group 14

Comment

The statements in Section 3.1.2, and the response to Question 14 of GL 89-04, Position 2, imply that it may be inappropriate to use LCO hours for maintenance activities when alternatives to the LCO may exist. Does this mean that periodic maintenance programs, in which a safety-related component may be removed from service for extensive maintenance (e.g., motor replacement, overhaul, etc.), is not allowed except during periods in which the LCO would not be applicable?

Response

The NRC has issued guidance on entering LCO to perform maintenance in GL 91-18 and in NRC Inspection Manual, Part 9900.

Question Group 20

Comment

Position 2 allows disassembly of one valve in a four-valve sample group at every refueling outage (18-month refuel cycle). Can the disassembly frequency be increased to once every fourth refueling outage for a one-valve group and to once every other refueling outage for a two-valve group? Is relief required for this frequency or is justification using the criteria in Position 2 to document this disassembly schedule required?

Response

The frequencies discussed may be acceptable using Position 2 if conditions of "extreme hardship" apply. The justification for an extreme hardship must be documented in the IST program or supporting documentation referenced in the program documents. If the guidance in Position 2 is not met, a relief request may be submitted on other justification that would be reviewed and evaluated individually.

Question Group 26

Comment

In the context of "other means," is verification of check valve closure by audible confirmation of check valve "slam" an acceptable means?

Response

See new Section 4.1.3 for guidance on this method.

Question Group 27

Comment

The "Current Considerations" section should state that the inclusion of PIVs [pressure-indicating valves] and verification of closure are not required by 10 CFR 50.55a or the ASME Code.

Response

The basis for this comment is not clear. If the valves have been included in the safety analysis report (SAR) as capable of closing to provide reactor coolant pressure boundary isolation at a high/low pressure interface, they are required to close and are within the scope of 10 CFR 50.55a. The statement suggested in the comment may mislead a licensee into believing these valves are not required to be verified closed.

Question Group 33

Comment

The "Current Considerations" section should be clarified. A licensee need only use the reference value "multipliers" in OM-10 for establishing limiting values if it committed to OM-10. Otherwise the original guidance to have the justification available on site is still valid.

Response

The phrase "when the testing is conducted per OM-10" was added to the section. See the

comments on Section 4.2.7.

Position 9 - Current Considerations

Comment

We have three high-pressure safety injection pumps that are tested quarterly on minimum recirculation and full-flow tested during refueling outages. The technical specifications require two of the three pumps to be operable for power operations. Recently, one of the three pumps had indications of degrading hydraulic conditions during quarterly testing and was scheduled for rebuild during the refueling outage. During the outage, a second pump, which had no indications of degrading hydraulic or mechanical conditions on quarterly tests, demonstrated excessive vibration at full-flow test conditions. The third pump demonstrated acceptable operation during both the quarterly and full-flow tests. Parts were ordered, but not received, to rebuild the second pump during the outage. At the end of the outage, two pumps were operable and the plant could proceed to operating conditions. The other pump was rebuilt during power operating conditions after receiving the appropriate parts. Because we could not perform the full-flow test, we performed the minimum flow test, evaluated the results, and declared the pump operable. Full-flow testing will be performed during the next refueling outage. Such actions are not discussed in Position 9, but we believe these actions are appropriate because minimum flow testing met the Code requirements before NRC issued Position 9. This position is used at our plant for these pumps because flow-measuring instruments are not installed in the recirculation lines.

Response

When testing using the guidance in Position 9, if a pump is in the alert or required action range, it is recommended that efforts be made to take corrective actions during the outage and repeat the test after maintenance. When corrective actions cannot be taken during the outage (e.g., a pump needs to be rebuilt, but parts are not available), or when a pump is repaired during power operations, testing to the extent practical during power operations must be conducted in accordance with the code requirements, after taking corrective actions, and before returning the pump to service. The results could be evaluated and compared to historical results of both the quarterly testing on minimum recirculation and the full- or substantial-flow testing performed during outages for greater assurance. The full-flow testing must be conducted at the first opportunity when plant conditions permit.

Question Group 61

Comment

In response to Question 61, the NRC requests that IST programs be re-submitted each time they are revised. The reason given for this request is that "it is needed to prepare for IST inspections and to assist in the review of relief requests." It has been the experience of some utilities that the inspectors and/or reviewers do not use the docketed copy of the program for these purposes. Submittal preparation and review become needless administrative exercises with no apparent benefit. Substantial review costs are involved as was the case for program submittal under the original GL 89-04.

Response

To reduce the paperwork burden on licensees, NRC supports limiting submittals of programs such as IST unless a number of relief requests or alternatives are proposed, such as when a major provision is revised. However, it is expected that licensees will update the IST

program document periodically to reflect changes made to the plant or to the program, as necessary, and maintain the document on site for NRC review. If the staff needs a copy, it will make a special request.

Question Group 70

Comment

Does the response to Question 70 of GL 89-04 under "Other Questions" imply that approved relief requests must be resubmitted for review and approval for subsequent 10-year programs?

Response

Yes.

Question Group 112

Comment

The idea of trending test data has been discussed in IST symposiums and OM meetings; however, it was not addressed in the NUREG-series report. What is the current NRC consideration on this issue? In this reviewer's opinion, trending may produce some beneficial predictive information, but considering the volume of IST data collected, manual trending by reviewing data plots of all of the data is not practical. For one of our two unit stations, over 1800 flow, pressure, vibration, stroke time, and leakage data points are collected.

Response

The OM Committees are processing several revisions to the OM Code that address trending for pumps and valves. Though trending is not required for IST, the NRC continues to believe that trending is a useful tool for various reasons. For example, with the movement toward performance based testing (e.g., local-leak rate testing, check valves), data will soon be more important for future uses.

GENERAL COMMENTS ON OTHER ISSUES

Relief Requests

Comment 1

It is unclear as to which class of NRC policy requires submittal of a request for relief. It would be helpful if the document provided a summary of policies set forth with an indication of the requirement for submitting a relief request.

Response 1

A relief request needs to be submitted if the alternative to the Code requirements is not in one of the following categories: (1) the alternative conforms to the guidance of Positions 1, 2, 6, 7, 9, or 10 of Attachment 1 of GL 89-04 and such conformance is documented in the IST Program; (2) the alternative conforms to the guidance included in Sections 3.1.1, 3.3.2, 4.1.4, 4.2.5, 4.2.7, 4.3.3, 4.3.4, 4.4.3, 4.4.5, 5.1.2, 5.3, 5.4, 5.7, or 5.8 of the NUREG-series report as endorsed by GL 89-04, Supplement 1, and such conformance is stated in the IST program; (3) the alternative conforms with a Code Case endorsed in Regulatory Guide 1.147 with the application of the specific Code Case listed in the IST program; or (4) the alternative is addressed and allowed by specific regulations in 10 CFR 50.55a.

Comment 2

Guidance on the appropriate action to be followed while a relief request is being processed is found in three locations, and it is confusing and possibly conflicting. The guidance in contained in Section 2.5, "Relief Requests and Proposed Alternatives," Section 6.3, "Revised Standard Technical Specifications," and Section 7, "Identification of Code Noncompliance." Section 2.5 states "For those requirements which have been determined to be clearly impractical, the licensee may implement the proposed alternative testing while the NRC is reviewing the relief request (see Section 6)." Section 6.3 discusses using 10 CFR 50.59 as a mechanism for continued operation when a Code requirement is impractical and a code relief request is being processed, providing Technical Specification (TS) 4.0.5 has been revised as recommended in Section 6. Section 7, on the other hand, discusses the need to obtain a Temporary Waiver of Compliance when a Code noncompliance exists and NRC approval of a relief request cannot be obtained within the allowable TS action time period. The NRC position should be clearly delineated and placed in a single, separately identified section of the NUREG-series report.

Response 2

Section 2.5 describes the process for submitting a relief request. Section 6 clarifies the conflict between technical specifications and the regulatory requirements and is not "a mechanism for continued operation" as noted in the comment; however, Section 6 may be useful for situations when the operability of equipment is not in question. Section 7 relates to unexpected conditions that arise where the operability of equipment could be in question. It would be inappropriate to state a single policy that would apply in all situations that may indicate a relief request is necessary .

IST Program Plan

Comment

There is some ambiguity as to the title of the program submittal. It is referred to as the "IST program document," "IST Program," and "IST submittal." It is recommended that the Section XI terminology (Program Plan/Schedule) be used when referring to the program documentation.

Response

The "IST Program Plan/Schedule" consists of several different documents including the IST submittal to the NRC, the administrative procedures that establish how the requirements are to be implemented, the test procedures, and the test reports. All such documents constitute the "IST Program." Section 2.4 describes a document that could be submitted to the NRC listing all components included in the program.

Preservice Testing Requirements

Comment

Section 50.55a discusses inservice testing requirements of only pumps and valves. OM-6 and OM-10 have both preservice test requirements and inservice test requirements. Do preservice requirements need to be met even though not addressed by 10 CFR 50.55a?

Response

Preservice test requirements are an integral part of an inservice testing program, especially in establishing baseline (reference) values for components. The preservice period is the period after completion of construction activities and before first electrical generation by nuclear heat. Therefore, the period does not apply to operating plants. Testing that establishes an initial baseline for components installed in an operating plant is necessary to implement the requirements for inservice testing. For example, if a third train of service water was added to a plant, initial testing would be done before placing the system in service.

Definitions

Comment 1

The term *operational readiness* is used in numerous locations within the draft NUREG-series report. Is there now a definition for *operational readiness* and has the conflict between this term and technical specification *operability* been resolved?

Response 1

The term *operational readiness* is used in the code. It is defined in IWA-9000 of the 1986 Edition of Section XI as the ability of a component or system to perform its intended function when required. The technical specifications define *operability* to include the capability of all necessary attendant instruments, controls, power, cooling or seal water, lubrication or other auxiliary equipment to support the component. IST may not test each of these support functions in a manner that ensures operability. For example, a valve may be stroked locally rather than from the initiation point of an engineered safeguards signal. For IST purposes, the limiting stroke time for such a valve may have to account for the actual delay in an initiating signal for accident response. Guidance on operability is given in GL 91-18 and in Part 9900 of the NRC "Inspection and Enforcement Manual."

Comment 2

Could the Commission provide a clear definition of *maintenance activities* for valves that require post-maintenance testing?

Response 2

No. It is recommended that this question that be addressed to the OM Committee. However, examples are included in the code, and the licensee has the responsibility for determining if the activity "could affect the valve's performance."

Analysis as Corrective Action

Comment

IWP-3230(c) allows analysis as corrective action, but IWV (1986 Edition or earlier) does not provide for analysis as corrective action. Conversely, OM-10 provides for analysis as corrective action, but OM-6 is silent. When can an engineering analysis be used as corrective action?

Response

The use of analysis is discussed in other responses, but it is usually appropriate that a condition be analyzed for assurance that design-basis safety limits are met. Generic Letter 91-18 also gives guidance on actions to take that include justification for continued operation.

Letters Received Submitting Public Comments on Draft NUREG-1492

Organization	Date (1994)
Brookhaven National Laboratory	March 1
Brookhaven National Laboratory	March 21
Commonwealth Edison	March 9
Entergy Operations, Inc.	March 14
Idaho National Engineering Laboratory	March 9
Korea Institute of Nuclear Safety	March 14
Niagara Mohawk Power Corporation	January 28
Nuclear Management and Resources Council	March 10
Omaha Public Power District	February 18
Pacific Gas and Electric Company	January 14
PECO Energy Company	March 10
State of Illinois Department of Nuclear Safety	March 3
VECTRA Technologies, Inc.	February 17

Meeting Attendees
Public Meeting On Draft NUREG-1482
February 2 - 3, 1994

Name	Telephone Number
Andre N. Anderson, Engineer Duke Power Company, General Office Post Office Box 1006 EC0713 Charlotte, NC 28201-1006	(704) 382-5553
John Arhar, Licensing Engineer Pacific Gas & Electric (Diablo Canyon) 333 Market Street, Room 1068 San Francisco, CA	(415) 973-9691
Richard Balzano, Engineer North Atlantic Energy Services (Seabrook Station) Post Office 300 Seabrook, NH	(603) 474-2923

Joe Barlok, Senior IST Engineer
Indian Point Unit 2
Broadway & Bleakley
Buchanan, NY 10511
(914) 734-5325

Jim Barron, Supv. Test Performance
Davis Besse (Toledo Edison)
5501 N. State, Rt. 2
Mail Stop 1056
Oak Harbor, OH 43449
(419) 321-8219

D. Bruce Black, Sr. Nuclear Results Eng.
Florida Power (Crystal River Unit 3)
15760 W. Power Line Street
Crystal River FL 34426
(904) 563-4479

R. Borsum, BWNT
Suite 525
1700 Rockville Pike
Rockville, MD 20852
(301) 230-2100

Byron Bradley, Sr. Performance Eng.
Indian Michigan Power
One Cook Place
Bridgman, MI 49106
(616) 465-5901/1586

Joe Brozonis, IST Engineer
PECo Energy Company
965 Chester Brook Blvd.
63C-9
Wayne, PA 19087-5691
(610) 640-6388

C. J. Campbell, IST Coordinator
PBAPS - PECo Company
RDI
Delta, PA 17314
(717) 456-7014/4818

Dennis Carlson, Tech Support Engineer
Northern States Power (Prairie Island)
1717 Wakonade Dr E
Welch, MN 55089
(612) 388-1121/4473

Dean Carstens, Prod. Engineer
Northern States Power (Monticello)
(612) 295-1259

Loretta V. Cecilia, Nuclear Project Engineer
FPC/Crystal River Unit 3
Power Line Rd (NAZI)
Crystal River, FL 34426
(904) 563-4546

Paul Cervenka, Plant Engineer
GPU Nuclear (Oyster Creek)
Post Box 388
Forked River, NJ
(609) 971-4894

Jerry McClanahan, IST Specialist
Tennessee Valley Authority
LP4F Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801
(615) 751-3830

David G. Collins, Performance Engineer
New York Power Authority (Indian Point 3)
P.O. Box 215
Buchanan, NY 10511
(914) 736-8958

David Constance, Shift Technical Advisor
Entergy Operations, Inc. (Waterford 3)
P.O. Box B
Killona, LA 70066
(504) 464-3305

Carl B. Corbin, Sr. Licensing Engineer
TV Electric/Comanche Peak
Skyway Tower
400 Olive Street L.B. 81
Dallas, TX 75201
(214) 812-8859

Paul A. Croy, Sr. Engineer
So. Cal. Edison (San Onofre Station)
P.O. Box 128
San Cemente, CA 92674-0128
(714) 368-6386

John Dore, Chief Engineer
United Energy Services Corp.
1210 Chestnut St.
Reading, PA 19602
(610) 376-6315

Jim Eaton, Sr. Project Manager (202) 872-1280
NUMARC
1776 I Street, N.W.
Suite 300
Washington, D.C. 20006

Mark R. Ebel, Section XI Coordinator (512) 972-7744
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

M. Ali Egap, IST Program Manager (315) 428-7314
Niagara Mohawk Power Corp.
301 Plainfield Road
Syracuse, NY 13212

Richard M. Emrath, Manager, Codes & ISI Section (615) 751-3669
Tennessee Valley Authority/Corporate Engineering
Lookout Place 4F
1101 Market St.
Chattanooga, TN 37402-2801

Mike Estes, CAPOG Member (402) 825-5236
NPPD/Cooper Nuclear Station
P.O. Box 95
Brownville, NE 68321

Kevin L. Glandon, Sr. Engineer (205) 877-7801
Southern Nuclear
40 Inverness Center Parkway
P.O. Box 1295
Birmingham, AL 35201

Warren J. Hall, Manager (202) 872-1280
NUMARC
1776 Eye Street, N.W.
Suite 300
Washington, D.C. 20006

Jon Hallem, Sr. Manager (407) 465-3550/3086
FPL (St. Lucie)
P.O. Box 128
Ft. Pierce, FL 34954

Bernard R. Hao, Mechanical Engineer (703) 425-7743
Hao Engineering Inc.
10913 Hampton, Rd.
FairFax Station, VA 22309

John Heffner, Production Engineer (704) 875-4093
Duke Power Co. (McGuire Nuclear Station)
12700 Hagens Ferry Rd.
Huntersville, NC 28078

Robert Hollingsworth (415) 973-9702
Pacific Gas & Electric (Diablo Canyon)

Ron Jacobstein, Consulting Engineer (407) 225-2731
Technical Services for Energy
2370 N.E. Ocean Blvd.
Suite 304A
Stuart, FL 34996

F. Jape (404) 331-4178
U.S. Nuclear Regulatory Commission
Region II

Dale Jones, Manager, ISI/IST (708) 778-4312
VECTRA
215 Shuman Blvd.
Suite 200
Naperville, IL 60563

M. T. Kalman, Manager, Mech. Design (301) 258-8582
NUS Corp.
910 Clopper Rd.
Gaithersburg, MD 20878

Frank Kaminski, IST Engineer (609) 339-2024
PSE&G (Salem Generating Station)
P.O. Box 236
Salem Station M/C S02
Hancocks Bridge, NJ 08038

Doug Kerr, Sr. Engineer
Virginia Power (North Anna)
P.O. Box 402
Scobn Bldg.
Mineral, VA 23117
(903) 894-2296

John Kin, Sr. Staff Engineer
Virginia Power
Innsbrook Tech Center
5000 Dominion Blvd.
Glen Allen, VA 23060
(804) 273-2122

M. R. Knight, Licensing Engineer
GPU Nuclear (TMI)
P.O. Box 480
Middletown, PA 17057
(717) 948-9554

Harold Lefkowite, Systems Engineer
Duke Power Co. (Oconee)
(803) 885-3445

Brian P. Lindenlaub, IST Pump & Valve Engineer
Arizona Public Service (Palo Verde Nuclear Generating Station)
P.O. Box 52034, M/S 7545
Phoenix, AZ 85072-2034
(602) 393-5251

W. C. Liu, Project Manager, ME
U.S. Nuclear Regulation Commission
Washington D.C. 20555
(301) 492-3822

Charles W. Martin, ISI Engineer
Connecticut Yankee Atomic Power Co.
(Haddam Neck Plant)
362 Injon Hollow Road
E. Hampton, CT 06424
(203) 267-3698

R. B. Mays, Codes & Standards Eng. Supv.
TU Electric
P.O. Box 1002
Glen Rose, TX 76043
(817) 897-6816

Greg Nogrady, Engineer
AEPSC (Cook Nuclear Plant)
One Riverside Plaza - Nuclear Engineering
Columbus, OH 43215
(614) 223-1923

Howard Onorato, Senior Staff Engineer
Public Service Electric & Gas Company
P.O. Box 236
Hancocks Bridge, NJ 08038
(609) 339-1488

Robert I. Parry, Project Manager
North Atlantic Energy Services Corp.
P.O. Box 300
Seabrook, NH 03874
(603) 474-9521/2550

Joel Page, Task Manager
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
(301) 492-3941

Brian J. Payne, Component Engineer
PECO Energy (Limerick Station)
P.O. Box 2300
Pottstown, PA 19464
(215) 327-1200/3795

Lee Parris, Senior Staff Engineer
Public Service Electric & Gas Co. (Hope Creek)
P.O. Box 236, MC N32
Hancocks Bridge, NJ 08038
(609) 339-5344

Christopher Pendleton, Senior Engineer
Pacific Gas & Electric (Diablo Canyon)
P.O. Box 56
Avila Beach, CA 93424
(805) 545-3628

Norm Peterson, Sr. Engineer-Licensing
Toledo Edison (Davis-Besse)
300 Madison Avenue
Toledo, OH 43652
(419) 321-8450

Antony A. Pfeffer, Licensing Engineer
Bechtel/Search Licensing
9801 Washington Blvd. 1C3 (R)
Gaithersburg, MD 20878-5356
(301) 417-8816

B. J. Puckett, Project Specialist
Illinois Power Company (Clinton Power Station)
P.O. Box 678
Clinton, IL 61727
(217) 935-8881/3044

Tom Raidy, Licensing Engineer
SCE (San Onofre)
23 Parker Street
Irvine, CA 92718
(714) 454-4565

Raj Rana, Lead ASME Programs
WPPS (WNP-2)
P.O. Box 968 (PE 27)
Richland, WA 99352
(509) 377-4313

Kevin Remington, System Performance Supv.
Florida Power And Light
P.O. Box 3088
Princeton, FL 33034
(305) 246-6528

Doug Ritter, IST Engineer
PP&L (Susquehanna SES)
P.O. Box 467
Berwick, PA 18603
(717) 542-3547

Michael Robinson, Engineer
EPRI
P.O. Box 985
Pinehurst, NC 28374
(910) 295-0313

C. W. Rowley, Consultant
The Wesley Corporation
P.O. Box 980
Cashiers, NC 28717
(704) 743-2925

Thomas Ruggiero, Senior Engineer
GPU - Nuclear
One Upper Pond Road
Parsippany, NJ 08083
(201) 316-7308

Vernon C. Ruppert, Jr., Nuclear Group Inst.
PECo Energy
RD #1 Box 208
Delta, PA 17314-9739
(717) 456-7014/4251

Joseph L. Sabiwa, Senior Program Engineer (508) 830-8030
Boston Edison Company (Pilgrim Station)
Rockhill Road
Plymouth, MA 02360

Rocky A. Schultz, Senior Mechanical Engineer (402) 825-5675
Nebraska Public Power (Cooper Nuclear Station)
P.O. Box 98
Brownville, NE 68321

Randall S. Smith, Senior Lead Engineer (501) 964-8926
Entergy Operations Inc. (Arkansas Nuclear One)
Rt. 3 Box 137G
Russellville, AR 72801

David C. Stadler, Senior Engineer ISI (919) 362-2199
Carolina Power & Light (Shearon Harris NPP)
Harris Nuclear Project - Zone 4
P.O. Box 165
New Hill, NC 27562-0165

Brad Stockton, Principle Consultant (708) 778-4252
Vectra Technologies, Inc.
215 Shuman Blvd.
Suite 200
Naperville, IL 60563

Dennis Swann, Supervisor, Engineer (205) 868-5788
Southern Nuclear Operating Company
P.O. Box 1295
Birmingham, AL 35201

Robert G. Vasey, Senior Engineer (614) 223-2035
American Electric Power
1 Riverdale Plaza
Columbus, OH 43215

Joann H. West, IST Coordinator (412) 393-7552
Duquesne Light (Beaver Valley)
P.O. Box 4
Shippingport, PA 15077

Don Zebrauskas, IST Engineer
Commonwealth Edison
1400 Opus Place
Suite 400
Downers Grove, IL 60515

(708) 663-7377

APPENDIX H

GENERIC LETTER 89-04, SUPPLEMENT 1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

April 4, 1995

NRC GENERIC LETTER 89-04, SUPPLEMENT 1: GUIDANCE ON DEVELOPING ACCEPTABLE INSERVICE TESTING PROGRAMS

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter to notify addressees that it is issuing NUREG-1482, "Guidelines for Inservice Testing Programs at Nuclear Power Plants." NUREG-1482 contains recommendations that addressees may follow in developing and implementing inservice testing programs and includes the positions from Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," supplemented with current considerations for using these positions.

Description of Circumstances

NUREG-1482 describes historical and current perspectives on the regulatory requirements for inservice testing of pumps and valves in nuclear power plants. It includes information on the format and content for inservice testing programs and relief requests, examples of relief requests, clarification of issues described in information notices or other NRC letters on inservice testing, and current considerations for positions in GL 89-04. Many of the recommendations relate to issues that either are not addressed in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), were not considered in the development of the Code requirements, or have been identified at a group of plants that were built prior to the promulgation of requirements for inservice testing. Because the staff has received a number of similar relief requests, the general guidance will allow for greater efficiency in licensee preparation and the staff review of these submittals.

In Appendix G to the NUREG report, the staff responds to public comments received on the draft NUREG-1482 published in 1993. The information has also been incorporated into the text of the final NUREG as appropriate. Addressees may obtain copies of NUREG-1482 from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37802, Washington, D.C. 20013-7082.

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Discussion

Addressees may use NUREG-1482 as guidance for developing IST programs. The intent of the guidelines document is, in part, to provide the required "Commission approval" pursuant to 10 CFR 50.55a(f)(4)(iv) to allow licensees to implement portions, as listed in Attachment 1, of the 1989 Edition of the ASME Code incorporated in 10 CFR 50.55a(b) without further submittals of formal "relief requests." Other portions may be used in IST programs subject to receipt of specific Commission approval. No new staff interpretations are imposed on licensees. The remaining recommendations provide guidance on the information that should be included in relief requests and provide specific details for those requests that have generic applications.

Requested Information

Licensees who voluntarily choose to use the guidance in NUREG-1482 to make changes to their inservice testing programs may need to submit revised relief requests or program documents to NRC if such documents are affected. Use of the guidance does not necessarily require any information to be submitted.

Licensees who do not modify their inservice testing programs are not expected to submit any response to this generic letter.

Required Response

All addressees who voluntarily choose to use the guidance in NUREG-1482 to make changes to their inservice testing programs are required to submit a response to the previously requested information, if appropriate.

Address the required written reports to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended, and Section 50.54(f) of Title 10 of the *Code of Federal Regulations* (10 CFR 50.54(f)).

Backfit Discussion

This generic letter only requests applicable information under the provisions of 10 CFR 50.54(f) from addressees who voluntarily choose to use the guidance in NUREG-1482 to make changes to their inservice testing programs. Therefore, the staff has not performed a backfit analysis. The information requested is needed to evaluate voluntary changes to the inservice testing programs in response to the information in this generic letter.

The evaluation required by 10 CFR 50.54(f) to justify this information request is included in the preceding discussion.

Federal Register Notification

A notice of opportunity for public comment on this generic letter and the draft NUREG-1482 was published in the *Federal Register* (58 FR 65738) on

December 16, 1993. In Appendix G to the NUREG report, the staff responds to public comments received. The information has also been incorporated into the text of the final NUREG as appropriate.

Paperwork Reduction Act Statement

The voluntary information collections contained in this request are covered by the Office of Management and Budget clearance number 3150-0011, which expires July 31, 1997. The public reporting burden for this voluntary collection of information is estimated to average 40 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this voluntary collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0011), Office of Management and Budget, Washington, D.C. 20503.

Compliance with the following request for information is purely voluntary. The information would assist NRC in evaluating the cost and benefits of inservice testing program changes associated with this generic letter:

(1) the licensee staff time and costs to prepare any changes to the inservice testing program and

(2) an estimate of the long-term costs or savings accruing as a result of implementing any changes to the inservice testing program

If you have any questions about this matter, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

for Roy P. Zimmerman
Associate Director for Projects
Office of Nuclear Reactor Regulation

Technical contact: Patricia Campbell, NRR
301-415-1311

Lead Project Manager: Jacob Zimmerman, NRR
301-415-2426

Attachments:
1. Approved Code Editions, Addenda, or Portions Thereof
2. List of Recently Issued NRC Generic Letters

Approved Code Editions, Addenda, or Portions Thereof

Section 50.55a of Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a) defines the requirements for applying industry codes and standards to boiling or pressurized water-cooled nuclear power facilities. Each of these facilities is subject to the conditions in paragraphs (a), (f), and (g) of 10 CFR 50.55a for inservice inspection and inservice testing (IST). By rulemaking effective September 8, 1992 (see *Federal Register* Vol. 57, 34666), the U.S. Nuclear Regulatory Commission (NRC) established paragraph (f) to separate the IST requirements from the inservice inspection requirements in paragraph (g). The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI, Subsections IWP and IWV, specify the IST requirements for pumps and valves. The 1989 edition of Section XI was incorporated by reference into paragraph 50.55a(b) by the rulemaking effective September 8, 1992. The 1989 edition specifies that the rules for the IST of pumps and valves are stated in the ASME/ANSI Operations and Maintenance (OM) Standards, Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants." An exception to OM-10 was taken in the regulation related to leakage testing of containment isolation valves (see 10 CFR 50.55a (b)(2)(vii).

NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," discusses OM-6 and OM-10, which may be implemented by licensees pursuant to 10 CFR 50.55a (f)(4)(iv). NUREG-1482, through the staff's endorsement in the generic letter supplement, gives the requisite approval for 10 CFR 50.55a (f)(4)(iv) for updating an IST program to the requirements of OM-6 and OM-10 (and OM-1 through reference in OM-10) provided the licensee documents the use of OM-6 and OM-10 in the IST program. The NUREG, through the generic letter supplement per (f)(4)(iv), also gives approval to implement selected portions of OM-6 and OM-10 as discussed in the following sections of NUREG-1482:

3.1.1 Deferring Valve Testing to Cold Shutdown or Refueling Outage

3.3.2 Concurrent Intervals (in part)

4.1.4 Extension of Test Interval to Refueling Outage for Check Valves Verified Closed by Leak Testing

4.2.5 Verification of Remote Position Indication for Valves by Methods Other Than Direct Observation

4.2.7 Stroke Time Measurements Using Reference Values

4.3.3 Test Supervisor Qualifications

4.3.4 Frequency and Method of Testing Automatic Depressurization Valves in Boiling Water Reactors

4.4.3 Multiple Containment Isolation Valve Leak-Rate Testing

4.4.5 Leak-Rate Testing Using OM-10 Requirements

5.1.2 Continued Measurement of Parameters Deleted from OM-6

5.3 Allowable Variance from Reference (for fixed resistance systems)

5.4 Monitoring Pump Vibration Per OM-6

5.7 Use of OM-6 Table 3b Ranges for Hydraulic Parameters

5.8 Duration of Tests

LIST OF RECENTLY ISSUED GENERIC LETTERS

Generic Letter	Subject	Date of Issuance	Issued To
95-01	NRC STAFF TECHNICAL POSITION ON FIRE PROTECTION FOR FUEL CYCLE FACILITIES	01/26/95	ALL CURRENT LICENSEES & APPLICANTS FOR URANIUM CONVERSION & FUEL FABRICATION FACILITIES.
94-04	VOLUNTARY REPORTING OF ADDITIONAL OCCUPATIONAL RADIATION EXPOSURE DATA	09/02/94	ALL HOLDERS OF OLs OR CPs FOR NPRs, RADIOGRAPHY LICENSEES, FUEL PROCESSING LICENSEES, FABRICATING & REPROCESSING LICENSEES, MANUFACTURERS & DISTRIBUTORS OF BY-PRODUCT MAT'L, INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS, FACILITIES FOR LAND DISPOSAL OF LOW-LEVEL WASTE, & GEOLOGIC REPOSITORIES FOR HIGH-LEVEL WASTE.
94-03	INTERGRANULAR STRESS CORROSION CRACKING OF CORE SHROUDS IN BOILING WATER	07/22/94	ALL HOLDERS OF OLs OR CPs FOR BOILING WATER REACTORS EXCEPT FOR BIG ROCK POINT, WHICH DOES NOT HAVE A CORE SHROUD.
94-02	LONG-TERM SOLUTIONS AND UPGRADE OF INTERIM OPERATING RECOMMENDATIONS FOR THERMAL-HYDRAULIC INSTABILITIES IN BOILING WATER REACTORS	07/11/94	ALL HOLDERS OF OLs FOR BOILING WATER REACTORS EXCEPT BIG ROCK POINT
94-01	REMOVAL OF ACCELERATED TESTING AND SPECIAL REPORTING REQUIREMENTS FOR EMERGENCY DIESEL GENERATORS	05/31/94	ALL HOLDERS OF OLs FOR NPRs

OL = OPERATING LICENSE
CP = CONSTRUCTION PERMIT
NPR = NUCLEAR POWER REACTORS

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG-1482

2. TITLE AND SUBTITLE

Guidelines for Inservice Testing at Nuclear Power Plants

3. DATE REPORT PUBLISHED

MONTH: April | YEAR: 1995

4. FIN OR GRANT NUMBER

N/A

5. AUTHOR(S)

Patricia L. Campbell

6. TYPE OF REPORT

FINAL

7. PERIOD COVERED *(Inclusive Dates)*

8. PERFORMING ORGANIZATION – NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Division of Engineering, Mechanical Engineering Branch
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9. SPONSORING ORGANIZATION – NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

SAME AS ABOVE

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

In this report, the staff gives licensees guidelines for developing and implementing programs for the inservice testing of pumps and valves at commercial nuclear power plants. The report includes U.S. Nuclear Regulatory Commission (NRC) guidance and recommendations on inservice testing issues. The staff discusses the regulations, the components to be included in an inservice testing program, and the preparation and content of cold shutdown and refueling outage justifications and requests for relief from the American Society of Mechanical Engineers Code requirements. The staff also gives specific guidance on relief acceptable to the NRC and advises licensees in the use of this information for application at their facilities. The staff discusses the revised standard technical specifications for the inservce testing program requirements and gives guidance on the process a licensee may follow upon finding an instance of noncompliance with the Code.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Inservice Testing
IST
Generic Letter 89-04
GL 89-04
Valves
Pumps
Valve Testing
Pump Testing
ASME Code
ASME O&M
Relief Requests
OM-1
OM-10
Section XI
IWP
IWV
OM-6

13. AVAILABILITY STATEMENT

Unlimited

14. SECURITY CLASSIFICATION

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