50-336/389

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

29 AUG 1988

Mr. Thomas F. Hoyle, Chairman
ASME Operations and Maintenance (O&M)
Working Group on Inservice Testing of
Pumps and Valves
Washington Public Power Supply System
300 George Washington Way
Richland, Washington 99352

Dear Mr. Hoyle:

As you are well aware 10 CFR 50.55a(g) requires that certain pumps and valves be designed to enable inservice testing and requires that testing be performed to assess operational readiness in accordance with the Section XI requirements of ASME Boiler and Pressure Vessel Code. All LWR licensees have submitted an inservice testing (IST) program for pumps and valves pursuant to 10 CFR 50.55a(g). All IST programs contain numerous requests for relief from various Code requirements. In addition, the surveillance requirements of technical specification (T.S.) 4.0.5 for most plants states that this testing of pumps and valves must be performed in accordance with Section XI except where specific written relief has been granted by the NRC.

NRC staff have developed the enclosed generic letter to clarify the status of the large number of unreviewed IST programs with respect to the T.S. requirements and to remedy a variety of generic IST problems.

This generic letter constitutes the required approval for implementation of the IST programs on an interim basis provided licensees amend their programs and implementing procedures to address the generic deficiencies in the supplement to the generic letter. The information in the supplement consists of established NRC positions or interpretations of ASME Code requirements that have been communicated over a long period of time to licensees in IST working meetings, SERs, and inspection reports.

We are requesting that this generic letter be reviewed by members of the Working Group (WG) and discussed at the September WG meeting. This letter is being sent to you since the O&M WG on pumps and valves is the only group with cognizance of pump and valve testing that can provide the NRC with feedback from the industry.

We are specifically interested in the group's input on the feasibility of the approach in the generic letter and the viability of the schedule contained therein. We request that any comments regarding changes to the letter be accompanied by recommended alternatives. I will be present at this meeting to discuss the generic letter and to answer questions from the members.

OF03
1/1

It is our understanding that a consolidated set of comments could be obtained as part of the meeting minutes within a couple of weeks of the meeting.

If you have any questions on the generic letter prior to the WG meeting please contact Ted Sullivan (on 492-0901) or myself (on 492-0902).

Sincerely,

Ledyard B. Marsh, Chief
Mechanical Engineering Branch
Division of Engineering & Systems Technology
Office of Nuclear Reactor Regulation

Enclosure: Generic Letter

cc: John J. Zudans, Vice Chairperson
ASME O&M WG on IST of Pumps & Valves
Florida Power and Light Company
P. O. Box 4000
Juno Beach, Florida 33408-0420

Robert I. Parry, Secretary
ASME O&M WG on IST of Pumps & Valves
Stone & Webster Engineering Corporation
MS 245/8
245 Summer Street
Boston, Massachusetts 02107

Distribution
Central files
LShao
JRichardson
HShaw
JHuang
RLi
KDempsey
TMcLellan
ESullivan
Sullivan CHRON
LBMarsh
PDR

EMEB:DEST
ESullivan:dd
08/29/88

EMEB:DEST
LBMarsh
08/29/88

ENCLOSURE 1

To.: All holders of light water reactor operating licenses and construction permits

Gentlemen:

SUBJECT: INSERVICE TESTING FOR PUMPS AND VALVES

BACKGROUND

Paragraph 50.55a(g) of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that certain pumps and valves be designed to enable inservice testing and requires that testing be performed to assess operational readiness in accordance with the Section XI requirements of ASME Boiler and Pressure Vessel Code. The editions and addenda applicable to IST program intervals are outlined in 10 CFR 50.55a(g)(4). If the licensee determines that conformance with certain code requirements is impractical or if conformance to the Code would cause unreasonable hardship without a compensating increase in safety, 10 CFR 50.55a allows the licensee to request relief from the Code by notifying the Commission and submitting information to support this determination. Following the evaluation of this information, the Commission may grant relief and may impose alternative requirements.

LWR licensees have submitted an inservice testing (IST) program for pumps and valves pursuant to 10 CFR 50.55a(g). All IST programs contain requests for relief from various Code requirements. In addition, the surveillance requirements of technical specification (T.S.) 4.0.5 for most plants states that this testing of pumps and valves must be performed in accordance with Section XI except where specific written relief has been granted by the Commission.

To.: All holders of light water reactor operating licenses
and construction permits

Gentlemen:

SUBJECT: INSERVICE TESTING FOR PUMPS AND VALVES

BACKGROUND

Paragraph 50.55a(g) of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that certain pumps and valves be designed to enable inservice testing and requires that testing be performed to assess operational readiness in accordance with the Section XI requirements of ASME Boiler and Pressure Vessel Code. The editions and addenda applicable to IST program intervals are outlined in 10 CFR 50.55a(g)(4). If the licensee determines that conformance with certain code requirements is impractical or if conformance to the Code would cause unreasonable hardship without a compensating increase in safety, 10 CFR 50.55a allows the licensee to request relief from the Code by notifying the Commission and submitting information to support this determination. Following the evaluation of this information, the Commission may grant relief and may impose alternative requirements.

LWR licensees have submitted an inservice testing (IST) program for pumps and valves pursuant to 10 CFR 50.55a(g). All IST programs contain requests for relief from various Code requirements. In addition, the surveillance requirements of technical specification (T.S.) 4.0.5 for most plants states that this testing of pumps and valves must be performed in accordance with Section XI except where specific written relief has been granted by the Commission.

Because of the general nature of the IST sections of the ASME Code and the difficulty in complying with all the Code requirements, utilities frequently revise their programs as more experience with IST is acquired. Programs at most plants are revised several times during the ten year interval between the program updates required by 10 CFR 50.55a. This trend appears to be continuing even after the programs are updated at the end of the first ten year interval. The frequency of program revisions during an interval results in the need for frequent review of licensee's proposed relief from the ASME Section XI requirements and additional interaction with utilities before a Safety Evaluation Report (SER) can be issued.

Through reviews and inspections, the NRC staff has identified a number of generic areas that effect plant safety and have frequently appeared as programatic weakness in past IST or other NRC inspections. In order to remedy these generic IST problems, clarify the status of current programs with respect to the T.S. requirement, and to alleviate the problem with respect to review of program revisions, the NRC has established the following policy and guidance.

NRC GUIDANCE ON IST PROBLEMS AND FOR IMPLEMENTATION OF IST PROGRAM/REVISIONS

A. IST Problems

Together with the Technical Specification requirements, IST Programs are intended to ensure the operational readiness of safety related pumps and valves. NRC staff has reviewed and has under review a number of licensee's IST programs and relief requests. Based on the review of these programs, and on recent IST inspections, the staff has identified a number of generic deficiencies that affect plant safety. These weaknesses impact the basic objective of the IST requirements. Supplement 1 to this Generic Letter describes these deficiencies and the staff's positions. Supplement 1 does not contain new requirments, but provides the staff's positions on how the ASME Code can be met or provides acceptable alternatives in accordance with 10 CFR 50.55a.

In addition to the generic deficiencies in Supplement 1, the staff has concerns regarding the operability of motor operated valve actuators. These concerns are being addressed by Bulletin 85-03, dated November 15, 1985, Bulletin 85-03, Supplement 1, dated April 27, 1988, and Generic Issue II.E.6.1, "In-Situ Testing of Valves."

B. Programs Currently Under Review

For utilities that have not received a SER for the currently submitted IST program revision, this letter constitutes the required approval for implementation of the IST program on an interim basis provided you have reviewed your program and amended it as necessary to provide compliance with the positions in Supplement 1.

Based on the staff's experience the positions contained in Supplement 1 can be implemented at all plants. However, should licensees be unable to comply with a position because of design considerations or personnel hazard, as opposed to inconvenience, alternative testing that fulfills the basic test objective of detecting component degradation will be allowed only if individually evaluated by the licensee and the plant safety review committee (or equivalent). When evaluating alternatives to the basic test requirements, licensees must consider the following:

- ° Maintenance history of the individual (specific) component,
- ° Maintenance history of related components in a similar environment,
- ° Component vendor records of degradation at other facilities, and
- ° Records from other utilities of degradation of the same or like component.

A lack of service experience or test results is not sufficient to justify deviation from the staff positions. Deviations from the staff positions will not be considered acceptable unless the above data is sufficient to justify the adequacy of the proposed alternative testing for detecting degradation and ensuring continued operability. Justification for deviations from the staff positions must be documented in relief requests in the IST programs.

All IST programs and implementating procedures must be amended, as necessary, to conform with the position in Supplement 1. Licensees are requested to review their IST programs and implementation procedures against the positions delineated in Supplement 1 and within six months of the date of this letter certify in writing that they comply with the stated positions. In all cases where changes to the IST programs results in additional relief requests, changes to relief request, or changes in the scope of testing, the revised IST program must be submitted to the NRC along with the certification. Interim approval is granted for these programs provided the programs are consistent with the positions taken in Supplement 1. In cases where some deviations need to be taken from specific positions in Supplement 1, the interim approval is granted provided: 1) the adequacy of the proposed alternative testing for detecting degradation is justified as discussed above and 2) the program is consistent with the remainder of the positions in Supplement 1. The NRC will conduct inspections and/or audits to determine licensee's compliance.

As stated above this interim approval is based upon each utility's compliance with the positions in Supplement 1. Compliance with these positions should provide reasonable assurance of the operational readiness of safety-related pumps and valves. However, the staff is conducting more thorough reviews to ensure that the IST programs are in accordance with all the Code requirements, contain appropriately justified relief requests, and do include all safety-related pumps and valves. These reviews may indicate the need for the NRC to modify its interim approval. Licensees will be notified if changes from those provided by this interim approval are required based on reviews or inspections of IST programs. Of particular interest during inspections will be conformance with the positions in Supplement 1. Enforcement action may be taken in cases where programs and procedures do not comply with this interim approval.

C. Program With Completed Reviews

If the staff has completed its review of the IST program and issued its SER, the program, if unchanged, is approved for long term implementation. The relief requests that were approved in the SER may be implemented, and those that were denied may not. The technical positions found in Supplement 1 of this generic letter were used by the staff in recent reviews of IST programs. Thus, for licensees who have received a staff SER for their IST program, and have not revised their IST program since the staff's SER, no specific action is required by this generic letter.

If however, licensees have modified or plan to modify their IST program beyond that which was the basis for the staff's SER, then the licensee should review their IST programs against the positions found in Supplement 1. The actions and requirements for those licensees are the same as those described in paragraph B above.

D. Program Updates/Revisions

Pursuant to 10 CFR 50.55a at the end of each ten-year IST program interval, licensees submit an updated program for the next ten-year interval so that the staff can ensure that the program meets the requirements of 10 CFR 50.55a. Periodically within a given ten-year interval licensees submit revisions to their programs. The terms that constitute interim approval which are contained in Part B of this letter are applicable to updated and revised programs. In addition, the program must also comply with positions in any applicable SER issued by NRC on a previously approved implemented IST program.

The policy delineated in this generic letter is effective immediately.

Frank J. Miraglia, Associate Director
for Projects
Office of Nuclear Reactor Regulation

SUPPLEMENT 1
POTENTIAL GENERIC DEFICIENCIES RELATED TO
IST PROGRAMS AND PROCEDURES

1. Inclusion of safety-related pumps and valves in the IST programs.

It is the staff's position that 10 CFR 50.55a(g) requires pumps and valves that perform a safety-related function to be includ the IST program and tested in accordance with the ASME Code, Sect I. Examples of safety-related pumps and valves that are frequently erroneously omitted from IST programs are:

a. valves in emergency diesel generator air start systems.
b. valves in diesel generator cooling water systems.
c. pumps and valves in fuel oil transfer systems for emergency diesel generators.
d. BWR scram system valves.
e. control room chilled water system pumps and valves.
f. spent fuel pool cooling system pumps and valves
g. accumulator motor operated isolation valves, or accumulator vent valves.
h. auxiliary pressurizer spray system valves.
i. boric acid transfer pumps.
j. valves in the emergency boration flow path.
k. control valves that have a required fail-safe position.
l. RCIC pumps and valves

Note:

It should be recognized that the above examples of pumps and valves are not safety-related for all plants. However, a review should be made to ensure that all safety-related pumps and valves are being tested through the IST program.

2. 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 part-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.

The only practical alternative known to the staff of full-stroke exercising of check valves to the open position is stated in position 3.

3. 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 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. Partial valve stroking quarterly or during cold shutdowns should be performed in all cases where this is possible.

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, a relief request must be included in the IST program.

c. Where the licensee demonstrates 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. 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 refueling outage, until the entire group has been tested. If the disassembled valve's full-stroke capability is in question, 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 diassembly 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 eight years.

Extension of the valve disassembly/inspection interval from that allowed by the Code (quarterly or cold shutdown frequency) to once every six 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. NRC relief to extend the valve disassembly/inspection interval to one valve every other refueling outage or expansion of the group size above four valves will only be considered in cases of <u>extreme</u> hardship where the extension is supported by actual in-plant data from previous testing.

In order to support this extension licensees must develop the following information:

a. Disassemble and inspect each applicable valve 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.

4. Back Flow Testing of Check Valves.

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 disks travel to the seats 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, or by other postive means.

Examples of check valves that perform a safety function in the closed position that are frequently erroneously omitted from IST programs 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

5. Pressure Isolation Valves

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. 10 CFR 50.2 contains the definition of the RCPB. In most cases PIVs are within the reactor coolant pressure boundary (RCPB). In a few cases the staff has allowed individual licensees to consider a valve in an interfacing high pressure Class 2 pipe as a PIV.

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 and therefore are not leak testing any 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 bypasses containment. Event V refers to the scenario described for this event in the WASH-1400 study.

On April 20, 1981, NRC issued 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 technical specifications accodingly. 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 were inadequate to assure that these valves are individually leak tested and evaluated against the leakage limits specified in the T.S. and 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 (i.e., for one plant inspected, whenever primary pressure was within 100 psig of the system design pressure on the low pressure side of the check valve).

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

6. Limiting Values of Full-Stroke Times for Power Operated Valves

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) should 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 functional operating limits identified for the relevent valves in the plant Technical Specifications or Safety Analysis Report (SAR).

The primary reason for measuring the full-stroke times of power operated valves is to detect valve degradation. The function 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 position described below regarding limiting values of full-stroke time for power operated valves.

The limiting value of full-stroke time should be 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 limits 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 conservative enough that corrective action would be taken for a valve that may not perform its intended function.

When the functional operating limit for a valve identified in the plant Technical Specifications or SAR is less than the value established using the above guidelines, the appropriate Technical Specification or SAR limit should be used as the limiting value of full-stroke time. The limiting value of full-stroke time for a valve should not exceed a Technical Specification or SAR limit specified for that valve.

When the functional operating limit for a valve identified in the plant Technical Specifications or SAR is greater than the value established using the above guidelines then the limiting value of full-stroke time should be based on the above criteria instead of the plant Technical Specifications or SAR.

7. Stroke Time Measurements for Rapid-Acting Valves

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 the nearest second [IWV-3413(b)] and (c) If the stroke time increases 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.

Most plants have many power operated valves that normally stroke in 2 s or less and encounter difficulty in applying the 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 with a measured stroke time of 1.49 s during one test (rounded to 1 s), and a measured stroke time during the following test of 1.51 s (rounded to 2 s) 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 s, which is usually not indicative of significant valve degradation.

Power operated valves with normal stroke times of 2 s 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 s to these valves and, upon exceeding this limit, declares the valve inoperable and takes corrective action in accordance with IWV-3417(b).

Licensees are required to either comply with the Code stroke timing requirements or the staff's rapid-acting valve position stated above. Since this represents a deviation from the Code requirements, a relief request must be included in the IST program. This relief may be requested for any or all of the rapid-acting valves in the IST program.

The limits 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 conservative enough that corrective action would be taken for a valve that may not perform its intended function.

When the functional operating limit for a valve identified in the plant Technical Specifications or SAR is less than the value established using the above guidelines, the appropriate Technical Specification or SAR limit should be used as the limiting value of full-stroke time. The limiting value of full-stroke time for a valve should not exceed a Technical Specification or SAR limit specified for that valve.

When the functional operating limit for a valve identified in the plant Technical Specifications or SAR is greater than the value established using the above guidelines then the limiting value of full-stroke time should be based on the above criteria instead of the plant Technical Specifications or SAR.

8. <u>Frequency of Testing Individual Control Rod Scram Valves in Boiling Water Reactors</u>

BWRs are equipped with bottom-entry hydrualically 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 is made up 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 scram function of the control rods is a safety function for which credit is taken in the plant SAR. The NRC has determined that those 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 is granted.

The control rod drive system valves that typically 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. Exercising some of these valves quarterly during power operations could result in the rapid insertion of one or more control rods. This is undesirable because of the rapid reactivity transients to which the reactor core would be subjected.

Licensees should test all 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 as identified in the facility Technical Specification may be used as the valve testing frequency to minimize rapid reactivity transients and wear of the control rod drive mechanisms. Request for relief from the Section XI test frequency requirements for these valves must be included in the IST program, and the alternate test frequency should be clearly stated.

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, relief is not required; however, the licensee should clearly explain in their IST program how these valves are being verified in the closed position quarterly.

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 times as required by the Code may be impractical. Verifying that the associated control rod meets the scram insertion time limits defined in the plant Technical Specifications can be an acceptable alternate method of detecting degradation of these valves. If measuring the full-stroke times of these valves is impractical, a request for relief from the Section XI requirements to measure valve stroke time should be included in the IST program.

9. Pressurizer Power Operated Relief Valve (PORV) Testing for Low Temperature Overpressure Protection

Pressurizer PORVs perform a safety function at most PWRs to prevent overpressurization of the RCS when it is at low temperature. These PORVs should be included in the IST program as Category B active valves and should be tested during cold shutdowns and refueling outages rather than exercised during refueling outages only.

Since the PORVs have shown a high probability of sticking open and are not needed for overpressure protection during power operation, the NRC has conlcuded that routine exercising during power operation is "not practical" and, therefore, not required by IWV-3412(a).

At those facilities where the pressurizer PORVs are utilized during shutdown and reactor startup to protect the reactor vessel and coolant system from low termperature overpressurization conditions, the PORVs should be exercised prior to initiation of system conditions for which overpressure protection is needed.

The following test schedule should be implemented:

a. Full-stroke exercising and stroke timing should be performed at each cold shutdown or, as a minimum, once each refueling cycle. However, this is not required more often than once every three months.

b. Fail-safe actuation testing should be performed at each cold shutdown.

The pressurizer PORV block valves should be included in the IST program and tested to the Code requirements.

10. Starting point for time period in Technical Specification ACTION Statements

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 Technical Specifications 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 Technical Specification ACTION statement time period. Section XI, IWP-6000 requires the reference values, limits, and acceptance criteria to be included in the test procedure. 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 Technical Specification 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 interpreted by the staff as an alternative to replacement or repair, not an additional action that can be taken before declaring the pump inoperable.

In summary, it is the staff's position that as soon as the data is recognized as being within the Required Action Range the associated component must be declared inoperable and the Technical Specification ACTION time must be started.

The above position, which has been stated in terms of pump testing, is equally valid for valve testing.

11. <u>Pump Testing using Mini-flow Return Line With or Without Flow Measuring Devices</u>

An inservice pump test requires that the pump parameters shown in Table IWP-3100-1 be measured and evaulated 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 mini-flow return lines are the only flow paths that can be utilized for quarterly pump testing. Furthermore, some of these systems, such as containment spray, do not have any flow path that can be utilized for pump testing during any plant operating mode except the mini-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. Mini-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 mini-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 these testing frequencies should be trended as required by IWP-6000. Since the above position is an alternative to the Code required testing, a relief request must be included in the IST program.

In cases where only the mini-flow return line is available for pump testing, regardless of the test interval, the staff 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.

12. Containment isolation valve testing.

All containment isolation valves (CIVs) that are Appendix J, Type C, leak tested 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 requirements. Since this position represents a deviation from the Code requirements a request for relief under 10 CFR 50.55a(a)(3)(ii) must be included in the IST program.

13. Implementing Procedures

The IST programs contain basic information on the pumps and valves being tested, the type of tests being performed, and the frequency of testing. IST programs do not contain and are not intended to contain information on the procedures being followed. Review of actual test method being used are performed by the staff during IST inspections. The positions contained above primarily address generic shortcomings in IST programs. However, each of these positions, as well as other areas of the ASME Code, are dependent upon the adequacy of the implementing procedures. The generic letter to which these positions are attached require that certain actions be taken, as necessary, to correct deficiencies in the IST programs. The implementing procedures for these positions must likewise be amended to address any deficiencies related to implementation of these positions.