ENCLOSURE

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM RELIEF REQUESTS

VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

1.0 INTRODUCTION

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

These regulations authorize the Commission to grant relief from ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested as part of the licensee's IST Program are contained in this Safety Evaluation (SE).

Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," was issued April 3, 1989, approving all inservice testing (IST) relief requests which were being reviewed by the staff if these were not in conflict with positions presented in Attachment 1 of GL 89-04. The approval of these relief requests was with the provision that licensees review their most recently submitted IST Programs and implementing procedures against the positions in Attachment 1 of GL 89-04. Vermont Yankee Nuclear Power Corporation performed this review and responded to GL 89-04 in a letter dated October 3, 1989. The letter identified program changes and additional relief requests for conformance with the generic letter.

2.0 EVALUATION

The staff, with support from our contractor, EG&G Idaho, Inc. (EG&G), has reviewed the relief requests in the October 3, 1989, submittal. Evaluations on the new or revised relief requests are provided in the attached Technical Evaluation Report (TER). The staff has reviewed the TER and concurs with the

evaluations and recommendations on the granting of relief. A summary of the status of the pump and valve relief request determinations is presented as Table 1 of this SE. Relief requests which were approved by GL 89-04 as discussed above, and relief requests which conform to a position in Attachment 1 of GL 89-04, have been reviewed but have not been further evaluated in the TER, but are listed in Table 1 of the SE, and may be discussed in Appendix A. Table 1 includes a description of each relief request and the NRC action on the granting of relief.

The licensee should refer to the TER, Appendix A, for a discussion of IST Program action items identified during the review. The licensee should resolve all the items in Appendix A in accordance with the guidance therein. As necessary, program or procedural changes covered in Appendix A should be completed within one year of the date of this SE, or by the end of the next refueling outage, whichever is later, unless a specific period (such as 6 months) is stipulated, or incorporated into the updated program for the third ten-year interval within this time period. No relief requests have been denied.

In evaluating Item 18 of Appendix A, the licensee should consider that a detailed review of the particular design of the systems has not been performed, and that the recommendations regarding IWV-3421 may not be applicable. The licensee should only follow the recommendations in Item 18 of Appendix A after a detailed review of the operation of the systems and of the interaction of all the valves in these systems. The relief requests should be revised, if necessary, for the updated IST program.

3.0 CONCLUSION

The staff concludes that the relief requests as reviewed, evaluated, and modified by this SE will provide reasonable assurance of the operational readiness of the pumps and valves to perform their safety-related functions. The staff has determined that granting relief, pursuant to 10 CFR 50.55a(a)(3)(i), (a)(3)(ii), or (g)(6)(i), or Generic Letter 89-04, is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest. In making this determination the staff has considered the alternative testing being implemented, compliance resulting in a hardship without a compensating increase in safety, and the impracticality of performing the required testing considering the burden if the requirements were imposed. The last column of Table 1 identifies the regulation or Generic Letter 89-04 guidance under which the requested relief is approved.

During the review of the licensee's inservice testing program, the staff has identified certain misinterpretations or omissions of 10 CFR 50.55a and Code requirements. The items are summarized in this SE and the TER, Appendix A. The IST program relief requests for Vermont Yankee provided by the October 3, 1989, submittal, are acceptable for implementation provided the changes and actions described in the SE and Appendix A of the TER are completed within one year of receipt of this SE, or by the end of the next refueling outage, whichever is later. As appropriate, the requirements or recommendations of this SE are to be incorporated into the licensee's updated IST program for the third ten-year interval.

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Date:

VERMONT YANKEE NUCLEAR POWER STATION
SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Pump GP-1	N/A	IWP-3210: Allowable ranges of differential pressure and flow	All pumps in the IST program	The licensee specified expanded Alert and Required Action Ranges.	Preapproved GL 89-04, See Anomaly Item 24.
Pump GP-2	N/A	IWP-3300 and -4300: Measure pump bearing temperature	All pumps in the IST program	Pump vibration will be measured per ANSI/ASME OM-6.	Preapproved GL 89-04, Relief not evaluated in TER.
Pump GP-3	2.1.1.1	IWP-4500: Pump vibration measurements	All pumps in the IST program	Pump vibration will be measured per ANSI/ASME OM-6.	Interim Relief Granted with provisions (a)(3)(i), for two years from SE's date
Pump P1	2.2.1.1	IWP-3100: Measure inlet pressure and flow rate	Service water pumps: P7-1A, -1B, -1C, and -1D	Perform as-found test quarterly and a full flow test at refueling outages.	Provisional Relief Granted (g)(6)(i)
Pump P2	N/A	IWP-3100: Measure differential pressure	Standby liquid control pumps: P45-1A and -1B	Measure and analyze flow and vibration per Iwp-3200.	Preapproved GL 89-04, See Anomaly Item 14.
Pump P3	N/A	IWP-3110: Observe lubricant level or pressure	Reactor building closed cooling water pumps: P59-1A and -1B	None.	Preapproved GL 89-04, See Anomaly Item 13.
Pump P4	2.3.1.1	IWP-3100: Test method and frequency	Reactor building closed cooling water pumps: P59-1A and -1B	As-found test quarterly and a full flow test once each year.	Interim Relief Granted (g)(6)(i) for one year or until next refueling outage.

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SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Pump P5	N/A	IWP-3100: Observe lubricant level or pressure	Fuel oil transfer pumps: P92-1A and -1B	None.	Preapproved GL 89-04, See Anomaly Item 13.
Pump P6	2.4.1.1	IWP-3100: Measurement of differential pressure and flow	Fuel oil transfer pumps: P92-1A and -1B	Observe pump operation during diesel test and measure flow once per operating cycle.	Interim Relief Granted (g)(6)(i) for one year or until next refueling outage.
Pump P7	N/A	IWP-3100 Measure flow rate	Chilled water pump: SP-1	Measure all parameters but flow until 1990 refueling outage. Measure all parameters thereafter.	Preapproved GL 89-04 Relief not evaluated in TER.
Valve GV-1	N/A	IWV-3417(b) and -3523: Corrective action prior to startup	All valves in the IST program	TS and administrative procedure to determine readiness for startup.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve GV-2	N/A	IWV-3417: Stroke time acceptance criteria and corrective action	All power operated valves in the IST program	Compare stroke times to reference values. Specified acceptance criteria and corrective action.	Preapproved GL 89-04 See Anomaly Item 26.
Valve GV-3	3.1.1.1	IWV-3420: Leak rate test Category A valves	Containment isolation valves	Test in accordance with 10 CFR 50, Appendix J, and Technical Specification.	Provisional Relief Granted (a)(3)(ii)
Valve V1	N/A	IWV-3520: Test frequency	Service water pump discharge check valves: V70-1A, -1B, -1C and -1D	Exercise valves twice a year when only three pumps are required.	Preapproved GL 89-04, See Anomaly Item 15.

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RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Valve V2	3.2.1.1	IWV-3520: Test frequency	Service water to diesels check valves: V70-43A and -43B	Exercise open quarterly. Verify closed by some positive means on sampling basis at refueling outages.	Interim Relief Granted (g)(6)(i) for one year or until next refueling outage.
Valve V3	N/A	IWV-3413: Measure stroke times	RHR service water pump cooling outlet valves: SE-70-4A, -4B, -4C and -4D	Exercise valves quarterly. Stroke times are not measured.	Preapproved GL 89-04, See Anomaly Item 16.
Valve V4	N/A	IWV-3520: Test frequency	Excess flow check valves: 2-2-7A, -7B, -8A and -8B	Verify valve closure during refueling outage hydrostatic test.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V5	N/A	IWV-3413: Measure stroke times	Diesel generator air start valves: AS1 and AS2	Verify proper valve operation by meeting the diesel start time requirement.	Preapproved GL 89-04, See Anomaly Item 23.
Valve V6	N/A	IWV-3520: Test frequency	Feedwater line check valves: V2-27A and -96A	Verify closure during refueling outage leak rate testing.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V7	3.10.1.1	IWV-3520: Test frequency	Inboard feedwater check valves: V2-28A and -28B	Verify closure by sample disassembly during refueling outages.	Relief Granted (g)(6)(i)
Valve V8	N/A	IWV-3420: Leak rate test Category A valves	Inboard feedwater check valves: V2-28A and -28B	These valves have been exempted as containment isolation valves and will not be leak tested.	Preapproved GL 89-04, See Anomaly Item 22.

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RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Valve V9 & V10	N/A	IWV-3520: Test method and frequency	MSRV air supply accumulator check valves: V2-37A, -37B, -37C and -37D	Verify closed by accumulator pressure drop test each refueling. Exercise open during MSRV testing every other refueling.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V11	N/A	IWV-3513: Additional tests	Main steam relief valves: RV2-71A, -71B, -71C & -71D and SV2-70A & -70B	Follow IWV-3513 if valve is tested during the outage. If valve is replaced and not tested, do not comply with IWV-3513.	Preapproved GL 89-04, See Anomaly Item 25.
Valve V12	N/A	IWV-3411: Test frequency	Automatic depressurization valves: RV2-71A, -71B, -71C and 71D	Exercise valves open during refueling outages.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V13	N/A	IWV-3520: Test frequency	Feedwater line check valves: V2-27B and -96B	Verify closure by leak testing during refueling outages.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V14	N/A	IWV-3520: Test frequency	Excess flow check valves: 2-62-A-D, 2-62-A-D, 2-73-A-H, and 2-305A/B	Verify closure by leak testing at each refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V15	N/A	IWV-3420: Leak rate test	Core Spray pressure boundary isolation valves: V14-12A, -12B, -13A and -13B	Verify leak tight integrity by continuous monitoring of downstream pressure.	Preapproved GL 89-04, See Anomaly Item 18.

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RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Valve V16	N/A	IWV-3520: Test frequency	Excess flow check valves: V14-31A and -31B	Functionally test each refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V17	N/A	IWV-3522: Test method	Core spray pressurizing line check valves: V14-33A and -33B	Verify proper closure during surveillance runs of the core spray pumps.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V18	N/A	IWV-3520: Test frequency	Excess flow check valves: SL23-37A through -37D	Functionally test each refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V19	3.3.1.1	IWV-3413: Stroke-timing	HPCI equipment cooling flow inlet valve: V23-50A	Exercise during pump surveillance tests plus observe via remote indication.	Interim Relief Granted (g)(6)(i) for one year or until next refueling outage.
Valve V20	N/A	IWV-3400: Test method and frequency	Control rod drive scram valves: V3-13-114, -115, -126 and -127	Verify valve operational readiness by scram testing per TS Sections 4.3.C.1 and 2.	Approved per GL 89-04, Position 7 Relief not evaluated in TER.
Valve V21	3.4.1.1	IWV-3521: Test frequency	CRD HCU charging water check valves: V3-13-115	Verify closure on an alternating refueling outage basis.	Provisional Relief Granted (a)(3)(i)
Valve V22	N/A	IWV-3520: Test frequency	Scram discharge volume vent check valves: V13-162A and -162B	Observe decrease in scram discharge volume water level upon reset from scram.	Preapproved GL 89-04, See Anomaly Item 19.

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RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION BY USNRC
Valve V23	3.5.1.1	IWV-3521: Test frequency	SLC injection check valves: V11-16 and -17	Demonstrate opening each refueling and closure on alternating refueling outages.	Provisional Relief Granted (g)(6)(i)
Valve V24	N/A	IWV-3511: Test frequency	SLC relief valves: SR-39A and -39B	Test both valves each refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V25	N/A	IWV-3420: Test frequency	RHR pressure boundary isolation valves: V10-17, -27A, -27B, -46A and -46B	Verify leak tight integrity by continuous monitoring of downstream pressure.	Preapproved GL 89-04, See Anomaly Item 18.
Valve V26	N/A	IWV-3413: Measure stroke times	RHR flow control valves: V10-89A and -89B	Verify proper operation during the pump test.	Preapproved GL 89-04, See Anomaly Item 20.
Valve V27	3.6.1.1	IWV-3522: Test frequency	RHR pressurizing line check valves: V10-36A and -36B	Verify closure during surveillance runs of the RHR pumps.	Relief Granted (g)(6)(i)
Valve V28	N/A	IWV-3520: Test method and frequency	RCIC excess flow check valves: SL13-55A through -55D	Functionally test each refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V29	N/A	IWV-3413: Measure stroke times	RCIC turbine governor valve	Verify proper operation during pump tests.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V30	3.7.1.1	IWV-3520: Test method and frequency	Gland seal condensate pump discharge check valves: V13-70 and -133	Exercise open during RCIC surveillance test. Verify closure by disassembly or positive means each operating cycle.	Relief Granted (g)(6)(i)

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SAFETY EVALUATION TABLE 1
SUMMARY OF RELIEF REQUESTS

RELIEF REQUEST NUMBER	TER SECTION	SECTION XI REQUIREMENT & SUBJECT	EQUIPMENT IDENTIFICATION	ALTERNATE METHOD OF TESTING	ACTION B USNRC
Valve V31	N/A	IWV-3522(b): Test frequency	Torus-drywell vacuum breaker valves: V16-19-5A through -5J	Exercise manually quarterly. Measure opening force at refueling outages. Disassemble 2 of the 10 each refueling outage.	Preapproved GL 89-04, See Anomaly Item 21.
	N/A	IWV-3420: Leak rate test method	Torus-drywell vacuum breaker valves: V16-19-5A through -5J	Leak rate test all as a group by a differential pressure decay test.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V33	3.8.1.1	IWV-3520: Test method and frequency	Reactor water cleanup pump discharge check valves: V12-28A and -28B	Verify closure by observation of system indication or other positive means each refueling outage.	Interim Relief Granted (a)(3)(ii) for one year or until next refueling outage.
Valve V34	3.9.1.1	IWV-3520: Test method and frequency	Chilled water pump discharge check valve: SCW-8A	Verify closure annually, climatic condition permitting, via disassemby.	Interim Relief Granted (a)(3)(ii) for one year or next refueling outage.
Valve V35	N/A	IWV-3520: Test method and frequency	Nuclear boiler vessel instrumentation excess flow check valves	Functionally tested each refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.
Valve V36	N/A	IWV-3300: Test frequency	TIP ball valves A, B, and C	Verify full open each month and closure every refueling outage.	Preapproved GL 89-04, Relief not evaluated in TER.

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
VERMONT YANKEE NUCLEAR POWER STATION

Docket Number 50-271

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ABSTRACT

This report presents the results of the EG&G Idaho, Inc., evaluation of relief requests from the Vermont Yankee Nuclear Power Corporation for their inservice testing program for safety-related pumps and valves.

PREFACE

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

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TECHNICAL EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
VERMONT YANKEE NUCLEAR POWER STATION

1. INTRODUCTION

This report provides the results of the technical evaluation of certain relief requests from the pump and valve inservice testing (IST) program for Vermont Yankee Nuclear Power Station submitted by Vermont Yankee Nuclear Power Corporation.

Section 2 presents Vermont Yankee Nuclear Power Corporation's bases for requesting relief from the requirements for pumps followed by an evaluation and conclusion. Section 3 presents similar information for valves.

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

1.1 IST Program Description

Vermont Yankee Nuclear Power Corporation submitted Revision 10 to their IST program with a letter to NRC dated October 3, 1989. The IST program is dated September 2, 1989, and covers the second ten-year interval of November 30, 1982 to November 30, 1992. The licensee's program is based on the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI, 1980 Edition through Summer 1980 Addenda and the Code of Federal Regulations (CFR), 10 CFR 50.55a.

1.2 IST Requirements

10 CFR 50.55a(g) states that IST of certain ASME Code Class 1, 2, and 3 pumps and valves will be done according to the ASME Code, Section XI, Subsections IWP and IWV, except where relief is granted by NRC in accordance with 10 CFR 50.55a(a)(3)(i), (a)(3)(ii), or (g)(6)(i). Vermont Yankee Nuclear Power Corporation requests relief from the ASME Code testing requirements for specific pumps and valves. Certain of these requests are evaluated in this TER using the acceptance criteria of the Standard Review Plan, Section 3.9.6, NRC Generic Letter No. 89-04 (GL 89-04), "Guidance on Developing Acceptable Inservice Testing Programs," and 10 CFR 50.55a. Other requests in the licensee's IST program that are not evaluated in this TER, may be granted by provisions of GL 89-04 or addressed in previously issued NRC Safety Evaluations.

1.3 Scope and Limits of the Review

The scope of this review is limited to the relief requests addressed in this TER and the cold shutdown justifications submitted with the licensee's IST program. Other portions of the program, such as general discussions, pump and valve test tables, etc., are not necessarily reviewed. Endorsement of these aspects of the program by the reviewer or NRC is not stated or implied. Any deviation from the Code test method, frequency, or other requirement should be identified in the IST program and submitted according to 10 CFR 50.55a for review and approval by NRC prior to implementation.

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

Vermont Yankee Nuclear Power Corporation provided several cold shutdown justifications for exercising Category A, B, and C valves during cold shutdowns and refueling outages instead of quarterly. These justifications were reviewed and found to be acceptable except as noted in Appendix A.

2. PUMP TESTING PROGRAM

The following relief requests are evaluated. A summary and licensee's basis for each relief request is presented. The evaluation and recommendation follow. The requests are grouped according to topic or system.

2.1 General Relief Request

2.1.1 Vibration Measurements

2.1.1.1 Relief Request GP-3. GP-3 requests relief from measuring vibration in displacement units, as required by Section XI, Paragraph IWP-4500. The licensee proposes to measure vibration displacement or velocity, whichever is more relevant depending on the speed of the pump, in accordance with ANSI/ASME OM-6, Draft 11. Further, the licensee proposes alternate allowable ranges for HPCI pump vibration measurements.

2.1.1.1.1 Licensee's Basis for Requesting Relief--Recent analysis done by the ASME in developing ANSI/ASME Standard OM-6, "Inservice Testing of Pumps", Draft 11, has found that to more accurately monitor pump degradation, vibration measurement parameters should be determined by pump speed.

Currently IWP-4500 requires vibration amplitude measurements to be taken in displacement for all pumps, regardless of speed. However, it has been found that although displacement is a representative parameter for low speed pumps (<600 rpm), vibrational velocity is a more accurate and representative indicator of degradation of higher speed pumps ($\geq$ 600 rpm). Velocity measurements detect not only high amplitude vibrations that indicate a major mechanical problem, but also the equally harmful low amplitude, high frequency vibrations due to misalignment, unbalance, or bearing wear that may be undetected by displacement measurements.

In addition, due to the physical arrangement of the HPCI pump, supplemental limits of vibrational velocity have been developed. A summary of the development of these supplemental limits is provided below.

Alternate Testing: The requirements consistent with ANSI/ASME Standard OM-6, Draft 11 will be incorporated into the Vermont Yankee IST Program for pumps. These requirements, as well as the supplemental limits referred to above, are included in Table GP-3-1.

As a minimum, all measurements will be taken per the following guidelines:

a. On centrifugal pumps, measurements shall be taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions on each accessible pump bearing housing. Measurement also shall be taken in the axial direction on accessible pump thrust bearing housing.

b. On vertical line shaft pumps, measurements shall be taken on the upper motor bearing housing in three orthogonal directions, one of which is the axial direction.

c. On reciprocating pumps, the location shall be on the bearing housing of the crankshaft, approximately perpendicular to both the crankshaft and the line of plunger travel.

TABLE GP-3-1

RANGES OF TEST PARAMETERS

PUMP TYPE	PUMP SPEED	TEST PARAMETER	ACCEPTABLE RANGE	ALERT RANGE	REQUIRED ACTION RANGE
Centrifugal and Vertical Line Shaft	<600 rpm	V_d	≤2.5V, but not > 10.5 mils	>2.5V, to 6V, but not > 22 mils	>6V, or >22 mils
	≥600 rpm	V_v	≤2.5V, but not>.325 in/sec	>2.5V, to 6V, but not>0.70 in/sec	>6V, or >0.70 in/sec
Reciprocating		V_d or V_v	≤2.5V,	>2.5V, to 6V,	>6V,
HPCI(HP pump)*		V_v	≤2.5V, but not>.675 in/sec	>2.5V, to 6V, but not>0.70 in/sec	>6V, or >0.70 in/sec

Note: V_d = Vibrational displacement
V_v = Vibrational velocity
V_r = Reference vibration (spectrum overall value)

* Resonance peaks shall also be evaluated during each test and shall have an Acceptable Range upper limit of 1.05V_r and an Alert Range upper limit of 1.3V_r.

Past testing and analysis performed on the High Pressure Coolant Injection (HPCI) system by Vermont Yankee, the Pump manufacturer, and by independent vibration consultants has revealed characteristic pump vibration levels which exceed the acceptance criteria stated in ANSI/ASME OM-6, Draft 11. The root causes of the higher vibration levels have been determined to be:

1) An acoustical resonance in the piping connecting the low pressure and high pressure (HP) pumps, and
2) The presence of a structural resonance in the horizontal direction on the HP pump.

These resonance conditions are design related and have existed since initial pump installation. They have been documented over a number of years of operating experience.

Additional past contributor to the higher vibration levels was the excitation resulting from the blade pass frequency from the previously installed four vane impeller in the low pressure (LP) pump. In an effort to reduce/eliminate this effect, the four vane impeller was replaced with a five vane impeller during the 1989 refueling outage. This replacement significantly reduced vibration levels in both the LP and HP pumps. However, due to the resonance effects referenced above, Hp pump vibration levels remain higher than the acceptance criteria stated in ANSI/ASME OM-6, Draft 11.

Although existing vibration levels in the HP pump are higher than standard acceptance criteria, they are acceptable and reflect the unique

operating characteristics of the HPCI pump. It has been concluded that there are no major vibrational concerns that would prevent the HPCI pump from performing its intended function. Therefore, to allow for practical monitoring of the HPCI pump, alternate vibration acceptance criteria are required for the HP pump. Standard acceptance criteria per ANSI/ASME OM-6, Draft 11, are applied to the LP pump.

The following criteria will be used for the HP pump:

Test Parameter	Acceptable Range	Alert Range	Required Action Range
V_v	$\leq 2.5V_r$ but not $>.675$ in/sec	$>2.5V_r$ to $6V_r$ but not >0.70 in/sec	$>6V_r$ or >0.70 in/sec

In addition, the resonance peaks will be evaluated during each test and will have an Acceptable Range upper limit of 1.06 V_r and an Alert Range upper limit of 1.3 V_r.

NOTES

1. Non variable speed pump. Speed is not applicable per IWP-3110, Table IWP-3100-1.
2. Initial suction pressure can not be taken due to the fact that pumps are normally running.
3. Lubricant level or pressure observation is not necessary since pump bearings are lubricated by the fluid being pumped.

2.1.1.1.2 Evaluation--Section XI, Paragraph IWP-4500, requires measurement of pump vibration amplitude in displacement units irrespective of the speed of the pump. However, pump bearing degradation results in increased vibration at frequencies several times the rotational speed of the pump. These high frequency bearing noises would not produce a significant increase in pump vibration displacement measurements for pumps with rotational speeds of 600 rpm or greater and could go undetected. However, the high frequency noises would result in relatively large changes in pump vibration velocity measurements which could permit detection of bearing degradation and corrective action prior to catastrophic failure. Because of the high frequencies of the vibrations associated with the bearings of pumps with rotational speeds of 600 rpm or greater, vibration velocity measurements are generally much better than vibration displacement measurements in monitoring the mechanical condition of these pumps and detecting bearing degradation.

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

Section XI does not provide allowable ranges for vibration velocities and since the relationship between displacement and velocity is frequency dependent, a mathematical conversion of the Code displacement ranges is not appropriate. ANSI/ASME OM-6 provides a set of allowable ranges for pump

vibration velocity measurements that has been found to be acceptable by the NRC. The licensee indicated that they are using the ranges and limits specified in ANSI/ASME OM-6, Draft 11. The licensee further proposed to conduct all phases of the vibration measurement activity in accordance with the requirements of OM-6 for all pumps in their IST program. Measuring pump vibration in velocity units is at least equivalent to the Code requirements and is an acceptable alternative.

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

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

The licensee identified supplemental vibration velocity limits for the HPCI HP pump. These limits are based on past test measurements and discussions with the pump's manufacturer and independent vibration consultants. When Code limits cannot be met, IWP-3210 permits the licensee to specify less restrictive limits. These less restrictive limits should allow detection of pump degradation prior to catastrophic failure and, therefore, are acceptable.

2.2. Service Water System

2.2.1 Measurement of Inlet Pressure and Flow Rate

2.2.1.1 Relief Request P1. P1 requests relief from measuring the inlet pressure and flow rate, quarterly, as required by Section XI, Paragraph IWP-3100, for service water pumps P7-1A through -1D. The licensee proposes to perform a computerized curve fit test quarterly and a full flow test on these pumps each refueling outage.

2.2.1.1.1 Licensee's Basis For Requesting Relief--For these pumps, neither inlet pressure nor flow rate can be directly measured. Inlet pressure can not be directly measured as these pumps are of the deep well, centrifugal turbine type which rely on intake structure water level for suction head.

Flow rate can not be directly measured due to the absence of sufficient straight piping to allow for instrument installation. In lieu of direct measurement, flow rate, differential pressure and total discharge head are calculated using a computer program which fits in a head/capacity curve from the data inputs of intake structure water level and temperature and water discharge pressure. The results are evaluated against the quantitative values given in Table 1.

Since flow can not be throttled nor differential pressure fixed (dependent on river water levels and temperatures and system heat loads) the data received from the computer program may not be a true indication of the pump's performance. Vibration levels are also subject to change since the reference parameter of differential pressure can not always be achieved.

Alternate Testing: Portions of the service water system will be isolated during each refueling outage and all four service water pumps will be subjected to a full flow test using temporarily installed flow instrumentation. Data from this test will be evaluated against the values given in Table 1 and will be used to calculate a revised head/capacity curve. This revised curve will then be used in the performance evaluation discussed above using quarterly readings, and will be analyzed for trends to the degree possible. In addition, the current practice of taking one pump out of service during each operating cycle for preventive maintenance overhaul will be continued.

2.2.1.1.2 Evaluation--The service water pumps are submerged in and take suction from the Connecticut river. They supply a system consisting of multiple heat exchangers. Automatic temperature control valves independently modulate flow through each heat exchanger. Due to seasonal variations in temperature of the river water and constantly changing heat loads, the system flow rate and pumps' configuration vary. It is impractical to control this type of system to allow repeatability of reference values. There are no installed instruments to directly measure inlet or differential pressure. The flow-rate can not be measured because there are not sufficient straight sections of piping to install instrumentation. Significant redesign and modification of system would be needed to facilitate repeatability or direct measurement of flow rate and differential pressure. It would be costly and burdensome to the licensee.

Since these pumps are submerged and have no installed inlet pressure instruments, it is impractical to directly measure the inlet pressure. But inlet pressure can be calculated based on the height of water above the suction point. This calculation is neither impractical nor burdensome. The calculated inlet pressure can be used with discharge pressure to determine differential pressure. However, measuring the flow rate during the quarterly test may be difficult. There are not sufficient straight sections of piping to install instrumentation for that test.

During the quarterly test, the licensee proposes to calculate pump flow rate, differential pressure and discharge head by computer and to compare this

to a head/capacity curve developed the previous refueling outage. The results will, also, be evaluated against the acceptance criteria of Table 1. This test is very limited in its ability to asses the condition of these pumps. Therefore, the licensee should actively consider improvements to the proposed method and/or alternate methods for assessing the hydraulic condition of these pumps during quarterly testing.

During refueling outages, the licensee proposes to perform a full flow test while measuring flow with a temporarily installed instrument. The data from this test is evaluated against acceptance criteria of Table 1 and used to calculate a new head/capacity curve. This curve is used to evaluate pump performance during the quarterly test. Also, the data is analyzed for trends. Additionally, one pump will be overhauled each operating cycle. This proposal, in addition to the quarterly testing, allows an adequate assessment of operational readiness and provides a reasonable alternative if the full flow test at refueling outage meets the requirements of the Code.

Based on the conclusion that it is impractical to test these pumps per the Code quarterly, and a costly burden if the requirements are imposed, relief is granted, provided the full test performed at refueling outages meets the test method requirements of the Code. The licensee should also continue quarterly testing and strive to make it as meaningful a test as practicable.

TABLE 1

In addition to the reference values and allowable ranges established per IWP-3100 and IWP-3210, respectively, the below quantitative values are established based on the plant safety analysis. If these values can not be met, the pump shall be declared inoperative.

PUMP/SYSTEM	MINIMUM FLOW REQUIREMENTS	FLOW PATH	OPERABILITY FREQUENCY
P7-1A-D SW	2700 GPM AGAINST A TDH OF 250 FEET	NORMAL SYSTEM LINEUP	PER IWP-3400
P8-1A-D RHRSW	2700 GPM AT 70 PSIA *	NORMAL SYSTEM LINEUP	PER IWP-3400
P10-1A-D RHR	7450 ± 150 GPM	VESSEL TO VESSEL	EACH REFUELING OUTAGE
P44-1A HPCI	4250 GPM AT NORMAL REACTOR OPERATING PRESSURE	RECIRCULATE TO CONDENSATE STORAGE TANK	ONCE/OPERATING CYCLE
P45-1A/B SLC	35 GPM AT 1275 PSIG	RECIRCULATE TO TEST TANK USING DEMINERALIZE WATER	PER IWP-3400
P46-1A/B CS	3000 GPM AGAINST A SYSTEM HEAD OF 120 PSIG	TORUS TO TORUS	EACH REFUELING OUTAGE
P47-1A RCIC	400 GPM AT NORMAL REACTOR OPERATING PRESSURE	RECIRCULATE TO CONDENSATE STORAGE TANK	PER IWP-3400

* Pressure measured at the RHR heat exchanger service water outlet when the corresponding pairs of RHR service water pumps and station service water pumps are operating.

2.3 Reactor Building Closed Cooling Water System

2.3.1 Establish Reference Flow or Differential Pressure

2.3.1.1 Relief Request P4. P4 requests relief from the pump testing requirements of Section XI, Table IWP-3100-1, for the reactor building closed cooling water (RBCCW) pumps, P59-1A and -1B. Relief is requested from establishing reference test conditions for quarterly measurements of vibration, flow rate, and differential pressure. The licensee proposes to measure as-found pump vibration, inlet pressure, differential pressure, and flow rate (after flow rate instrumentation installation during the 1990 refueling outage) during quarterly testing and to measure all Code parameters at a full flow reference condition once a year as climatic conditions permit.

2.3.1.1.1 Licensee's Basis for Requesting Relief--Table IWP-3100-1 specifies the inservice test quantities to be measured or observed. Differential pressure varies due to the distribution of cooling water to the various loads as regulated by temperature and pressure control valves in the system. Inlet pressure also can not be measured before the pump test since the pumps are normally running. The vibration levels are also subject to change since the reference parameters can not always be achieved.

Alternate Testing: Quarterly readings will continue to be taken, recorded, and analyzed for trends to the degree possible. Due to the variation of cooling water distribution referenced above, flow testing must be performed at a climatic condition producing a reference pump discharge pressure. Therefore, full flow testing will be performed once per year as climatic conditions permit.

(Note: Pump flow indication will be incorporated no later than the end of the 1990 refueling outage.)

2.3.1.1.2 Evaluation--The system has automatic temperature control valves for individual cooling loads. These control valves modulate flow to control the temperature of the cooled components. It is impractical to control this type of a system to allow repeatability of reference values because doing so could result in overcooling or undercooling supplied components, depending on the heat load and ambient temperature. Significant redesign and modification of the system would be required to provide this capability. Performing the necessary modifications would be costly and burdensome to the licensee.

Pump testing at as-found conditions can be found to be acceptable if performed in a manner that allows adequate monitoring of pump hydraulic and mechanical condition and detection of degradation. The licensee's proposed quarterly testing does not appear to be capable of performing these functions. When reference conditions cannot be established during pump testing, measured test parameters can be compared to reference pump curves. However, this testing must be performed in a manner that permits adequate evaluation of pump operational readiness. Insufficient information is provided about the proposed yearly test to determine its acceptability. Further, the licensee has not provided an adequate justification for not performing a meaningful test at the Code required frequency.

Pump curves represent an infinite set of reference points of flow rates and differential pressures. Basing the acceptance criteria on these values can permit evaluation of pump condition and detection of degradation. However, for this technique to be effective, pump curves should be developed or manufacturers curves validated when the pump is known to be operating acceptably. To ensure the adequacy of the pump curve for IST, a sufficient number of data points must be taken to provide an accurate curve fit. To reduce the level of uncertainty associated with curve testing and improve the ability to detect degradation, the following guidelines should be considered:

a. Use only regions of the curve where pump operation is stable.
b. Do not use relatively flat regions of the pump curve.
c. Take at least 5 test points within the test region of the curve.
d. Use instrumentation as accurate as practicable for test points.
e. Use a curve fit method that minimizes uncertainty.
f. Do not extrapolate the curve more than 5% from any test point.

Taking pump test measurements at as-found conditions instead of returning to preestablished reference points can affect pump vibration measurements and the vibration acceptance criteria. Since the levels of vibration may vary significantly over the range of pump conditions encountered during testing, the licensee should develop a method for assigning vibration acceptance criteria that will give equivalent protection as provided by the Code. This may require taking vibration measurements at various points on the pump curve and assigning conservative vibration velocity reference values for regions of the pump curve. The pump curve may be divided into as many regions as necessary.

An interim period should be provided to allow the licensee time to develop and implement a test method that adequately monitors pump condition. While not acceptable for the long term, measuring and trending pump inlet pressure, differential pressure, flow rate, and vibration in the as-found condition quarterly and all Code required parameters during yearly testing at full flow, should allow an adequate assessment of pump operational readiness for one year or until the next refueling outage.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the adequacy of the licensee's proposed testing during the interim period, interim relief should be granted for one year or until the next refueling outage, whichever is longer. At the end of this interim period the licensee should implement quarterly testing that adequately monitors pump condition and allows detection of degradation.

Table IWP-3100-1 requires measurement of pump inlet pressure before pump startup and during testing. The licensee indicated that inlet pressure can not be measured before startup because the RBCCW pumps are normally running. IWP-3400 states that pumps that are operated more frequently than every three months need not be run or stopped for a special test. Therefore, relief is not necessary from this test requirement for these pumps. However, if one of these pumps is idle prior to testing, this parameter should be measured as required.

2.4 Fuel Oil Transfer System

2.4.1 Positive Displacement Pump Testing

2.4.1.1 Relief Request P6. P6 requests relief from the differential pressure and flow rate measurement requirements of Section XI, Table IWP-3100-1, for the diesel fuel oil transfer pumps P92-1A and -1B. The licensee proposes to verify that these pumps are capable of providing design flow rate once every operating cycle.

2.4.1.1.1 Licensee's Basis for Requesting Relief--Fuel oil pumps are positive displacement pumps which are in a fixed resistance system. Per Table IWP-3100-1, Note 1, it is required to measure differential pressure or flow rate. There is no method available for measuring flow. Differential pressure varies with the amount of fuel in the diesel fuel storage tank, TK-40-1A. The differential pressure is also subject to viscosity changes of the fuel oil due to seasonal temperature variations. These variations are not indicative of positive displacement pump performance.

Alternate Testing: Ensure that each pump is capable of supplying fuel oil to the day tank at a flow rate greater than that required by the associated diesel generator under full load operation. In addition, once per operating cycle, day tank level will be reduced to allow for a pump flow test. Day tank level increase will be measured versus pump operating time to calculate a flow rate. This rate will then be trended and analyzed.

2.4.1.1.2 Evaluation--IWP-3100 requires the quarterly measurement of pump test quantities to evaluate pump operational readiness. There are no installed instruments on the diesel fuel oil transfer system that allow direct measurement of pump flow rate, inlet pressure, or differential pressure. Pump flow rate can be calculated by measuring the change in day tank volume and the pump operating time required to make that change. This method yields a value for pump flow rate that can be used to evaluate pump hydraulic condition. However, the calculated pump flow rate may not be sufficiently accurate to meet the instrument accuracy requirements of IWP-4110 or to allow detection of pump degradation.

Pump differential pressure is normally evaluated with flow rate to determine pump hydraulic performance and to detect hydraulic degradation. The fuel oil transfer pumps are positive displacement pumps and their discharge pressure is dependant on the pressure of the system into which they are pumping and is not significantly affected by either inlet pressure (providing adequate NPSH exists) or flow rate. Since positive displacement pumps will match the pressure seen at the pump discharge up to the rated pressure of the pump, pump differential pressure and flow rate are not dependent variables and their relationship is not indicative of pump condition. Also, the inlet pressure measurement of a positive displacement pump does not provide information about pump condition or degradation other than that sufficient fluid is available to provide a suction source for the pump. Pump inlet and differential pressures are not meaningful parameters in determining if hydraulic degradation is occurring.

The discharge pressure for the fuel oil transfer pumps is relatively small since the pumps pump directly into the day tanks which are vented to the atmosphere. Discharge pressure depends on flow resistance offered by the

piping, valves, and other inline components, if any. Changes in flow resistance should not significantly affect the flow rate of these positive displacement pumps unless the rated discharge pressure is exceeded. Therefore, the hydraulic condition of these pumps can be evaluated by measuring the pump flow rate.

It would be burdensome to require the licensee to install inlet and differential pressure instruments to test these positive displacement pumps because these parameters do not provide useful information to evaluate pump operational readiness. If flow rate is calculated with sufficient accuracy to allow detection of pump degradation, installation of flow rate instrumentation would be burdensome because it would provide only a minimal improvement in the ability to monitor pump condition. The licensee has not provided nor justified less conservative flow rate acceptance criteria for these pumps, therefore, the allowable ranges specified in Table IWP-3100-2 should be used.

The proposed quarterly testing verifies pump operation but provides no information to permit detection of pump hydraulic degradation. The licensee did not provide a technical basis for not performing the flow measurement test at the Code required frequency. Therefore, long term relief should not be granted. An interim period should be provided to allow the licensee time to develop and implement a test method that adequately monitors pump condition. While not acceptable for the long term, the proposed testing should allow an adequate assessment of pump operational readiness for one year or until the next refueling outage.

Based on the determination that compliance with the Code requirements is impractical and burdensome, and considering the adequacy of the licensee's proposed testing during the interim period, interim relief should be granted for one year or until the next refueling outage, whichever is longer. At the end of this interim period the licensee should implement quarterly testing that adequately monitors pump condition and allows detection of degradation.

3. VALVE TESTING PROGRAM

The following valve relief requests are evaluated. A summary is presented for each relief request. This is followed by the licensee's basis for relief and the evaluation and the reviewer's recommendation. They are grouped according to system and Code Category.

3.1 General Valve Relief Request

3.1.1 Category A or A/C Valves

3.1.1.1 Relief Request GV-3. The licensee requests relief from the requirements of Section XI, Paragraphs IWV-3421 through IWV-3427, for valves listed in relief request basis GV-3. The licensee proposes to leak test them according to the requirements of 10 CFR 50, Appendix J, instead. Also, these valves will be leak rate tested, individually, per the plant's TS (as required by IWV-3426) and corrective action will be taken as required by 3427(a).

3.1.1.1.1 Licensee's Basis For Requesting Relief--

IWV-3421 through IWV-3425: The applicable leak test procedures and requirements for containment isolation valves are determined by 10 CFR 50, Appendix J. Relief from Paragraphs IWV-3421 through IWV-3425 is acceptable since the intent of these paragraphs is met by the Appendix J requirements. This testing will continue to give reasonable assurance that in the event of the postulated loss-of-coolant accident, the total release of fission products from the primary containment to the environs is limited such that off-site doses would be well below the values specified in 10 CFR 100.

IWV-3426: Paragraph IWV-3426 states that leakage rates may be specified by the owner. In this case, 10 CFR 50, Appendix J, Paragraph III.C.3 states that the combined leakage rate for all penetrations and valves subject to Type B and C tests shall be less than 0.60 La. Additionally, Vermont Yankee Technical Specifications, Section 3.7.A.4, states that the leakage from any one isolation valve shall not exceed 0.05 La and the leakage from any one main steam line isolation valve shall not exceed 15.50 scf/hr at 44 psig (Pa).

IWV-3427(a): Vermont Yankee Technical Specifications, Section 4.7.A.4 states that repair and retest shall be conducted to ensure compliance. Therefore, the intent of IWV-3427(a) is met.

IWV-3427(b): Paragraph IWV-3427(b) requires:

1) A doubling of the test frequency upon a reduction of the margin between the measured leakage rate and the maximum permissible rate by 50%, and
2) Repair or replacement should a projection based on three or more tests indicate that the leakage rate of the next scheduled test will exceed the maximum permissible leakage rate by greater than 10%.

The above limits have been compared to previous Appendix J leakage rate test data taken since 1976. This comparison suggests that the requirements of IWV-3427(b) do not provide accurate predictions of future valve leakage in all cases since increased valve leakage may not be a result of degradation. When performing periodic Appendix J leak testing, factors other than degradation contribute to the final results. These factors may cause either

an increase or decrease in the leakage rate, thereby making a determination of the valve condition based solely on tending difficult. These factors are summarized as follows:

1) Boundary valves which define the test envelop have individual leakage characteristics which can change from use, packing age, and closure force. Since these factors can affect each boundary valve and all resulting leakage is assigned to the tested valve, a repeatable periodic leakage characteristic for the tested valve is difficult to determine. Field test data supports this fact as summarized below.

2) Due to operational requirements, boundary configuration change may be necessary. This can affect leakage and indicate degradation of the tested valve that does not exist.

3) Due to operational requirements, testing may be performed by different methods. Test method and boundary changes make a repeatable periodic leakage characteristic for the tested valve difficult to determine.

The variance of the leakage rate test data and the difficulty in trending such data is shown by a study of the Appendix J leakage rate test data for valves 6" nominal pipe size and larger. Data from 1976 to the present was input in to computer program which performed least squares curve fits on the data. Curves for 25 equations were fitted to the data for each valve. Equation coefficients, correlation coefficients, and the best fit curve was computed in each case. In addition, projections were made at intermediate points using the best fit curves. The average deviation between the projected and actual test results was 145%. In addition, the projections provided early indication of an actual failure only 20% of the time.

In summary, Strict compliance with IWV-3427(b) may require an increase in valve testing, maintenance, and personnel radiation exposure without a compensating increase in the level of safety since predicting future valve leakage is statistically unreliable.

Relating to the requirement of IWV-3427(b) to conduct testing during cold shutdowns, relief request bases contained within the inservice testing program contain sufficient justification to test certain valves only on a refueling outage basis. The test frequency of these valves can not be increased without jeopardizing plant operations.

Alternate Testing: Perform leak testing, analysis and corrective actions in accordance with the Vermont Yankee Primary Containment Leak Rate Testing Program, 10 CFR 50, Appendix J. In addition, all exemptions from testing and testing methods contained within the Vermont Yankee primary containment leak rate testing program will be equally applied to this inservice testing program.

RELIEF REQUEST BASIS GV-3
Listing of Systems and Valves

SYSTEM	VALVES
Service and Instrument Air	V72-38A/B, V72-89B/C, V72-103
Reactor Building Closed Cooling Water	V70-103, V70-117
Nuclear Boiler	V2-27A/B, V2-28A/B, V2-39, V2-40, V2-74, V2-77, V2-80A-D, V2-86A-D, V2-96A/B
Core Spray	V14-5A/B, V14-11A/B, V14-12A/B, V14-13A/B, V14-26A/B
High Pressure Coolant Injection	V23-15, V23-16, V23-25, V23-56, V23-62, V23-65, V23-842, V23-843, SSC-23-12, SSC-23-13
Control Drive	V3-181, V3-162A/B, V3-412A/B, V3-413A/B
Residual Heat Removal	V10-16A/B, V10-17, V10-18, V10-19A-D, V10-25A/B, V10-26A/B, V10-31A/B, V10-32, V10-33, V10-34A/B, V10-38A/B, V10-39A/B, V10-46A/B
Reactor Core Isolation Cooling	V13-15, V13-16, V23-27, V23-29, V13-38, V13-41, V13-50, SSC-13-9, SSC-13-10
Primary Containment and Atmosphere Control	SB16-19-6, SB16-19-6A/B, SB16-19-7, SB16-19-7A/B, SB16-19-8, SB16-19-9, SB16-19-10, SB16-19-11A/B, V16-19-12A/B, V16-20-20, V16-20-22A/B, V16-19-23, V16-19-51, V16-19-52
Reactor Water Cleanup	V12-15, V12-18, V12-68
Radwaste	V20-82, V20-83, V20-94, V20-95
Containment Atmosphere Dilution	FSO-109-75A1,2, FSO-109-75B1,2, FSO-109-75C1,2, FSO-75D1,2, VG-75A3,4, FSO-109-76A/B, VG-23, VG-25, VG-26, VG-33, VG-34, VG-9A/B, VG-22A/B, NG-11A/B, NG-12A/B, NG-13A/B
TIP	Ball A-C

3.1.1.1.2 Evaluation--These Category A or A/C containment isolation valves are in various systems. As indicated in staff position 10, GL 89-04, the procedures and requirements specified in 10 CFR 50, Appendix J, for type C tests of containment isolation valves, are essentially equivalent to Code Paragraphs IWV-3421 through -3425 for assessing the containment isolation capability. Leak testing these valves to the requirements of both Appendix J, Type C, and Code Paragraphs IWV-3421 through -3425, would be a hardship. Efforts would be duplicated without a compensating increase in the level of quality and safety.

The requirements of IWV-3427(b) are applicable to every Category A valve that performs a leakage restriction function, other than or in addition to, containment isolation. Valves in this group include pressure isolation valves, even if they also perform a containment isolation function. The proposal to not endorse IWV-3427(b) does not provide a reasonable alternative to the Code for these valves.

Based upon the conclusion that testing to both requirements would be a hardship and that Appendix J, Type C, testing essentially meets the requirements Paragraphs IWV-3421 through -3425, relief should be granted with the following provision. The licensee should test these valves to the requirements of Appendix J, Type C, and Paragraphs IWV-3426 and -3427(a) per GL 89-04, Position 10.

This relief is limited to assessing the containment isolation capability of these valves. Relief from IWV-3427(b) applies only to the testing of the containment isolation function. For Category A valves that perform any other leakage restriction function, in addition to or other than containment isolation, the requirements of IWV-3427(b) should be met.

3.2 Service Water System

3.2.1 Category C Valves

3.2.1.1 Relief Request V2. The licensee requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3520, for closure testing of the service water system supply to diesel generator cooling jackets check valves, V70-43A and -43B. The licensee proposes to full-stroke exercise these valves open quarterly and to verify their closure capability by disassembly and inspection during the 1990 refueling outage. Subsequently, their closure would be verified by a positive means, on an alternating basis, at refueling outages.

3.2.1.1.1 Licensee's Basis For Requesting Relief--Valves can not be exercised during power operation since this would require isolating all cooling water to the diesel generators. Valve opening is demonstrated by adequate cooling to the diesel generators during system surveillance.

Alternate Testing: Per LER 89-017 commitments, both check valves will be verified to close via disassembly and inspection during the 1990 refueling outage. Valve closure will then be verified by positive means on an alternating basis during subsequent refueling outages.

Inspection on a staggered sampling basis provides reasonable assurance of the ability of these valves to perform their safety-related function. Each

valve is of the same design (manufacturer, size, model number and materials of construction) and has the same service conditions. Therefore, the condition and performance of both valves should be similar. If it is found that the inspected valve's operability is in question, both valves will be disassembled and inspected during the same refueling outage.

3.2.1.1.2 Evaluation--These valves are located in the service water supply lines to the diesel generator cooling jackets. These are simple check valves, not equipped with position indicating devices or external operators. It is impractical to exercise these valves closed during power operation. That test would require isolating cooling water to the diesel generators and several other vital loads. System redesign and modifications would be required to test these valves closed according to the Code test method requirements quarterly or during cold shutdowns. These modifications would be costly and burdensome to the licensee.

The licensee proposes to test the opening of these valves quarterly during surveillance tests of the diesel generators. It is assumed, for this evaluation, that this test constitutes a full-stroke exercise of these valves in accordance with GL 89-04, Position 1. The licensee also proposed to disassemble and inspect them during the 1990 refueling outage, which has already occurred. The licensee further proposes to disassemble and inspect these valves alternately during refueling outages to assess their closure capability. That disassembly is done as part of the commitments made for LER 89-017.

Disassembly, inspection, and manual full-stroke of the disk can adequately ascertain a check valve's condition. However, this technique should be used as an alternate to the Code closure testing requirements only when testing with flow or by pressure measurements is impracticable. From the review of the licensee's service water system prints, it appears that testing the reverse flow closure of these valves, according to the Code test method requirements, may be feasible. If it is not feasible to test these check valves closed according to the Code methods, it might be practicable to verify their closure using non-intrusive diagnostic testing techniques, such as acoustics, radiography, or magnetics. The licensee should consider these and other methods of testing these valves closed. Given the difficulties discussed above with testing these valves closed quarterly or during cold shutdowns, the appropriate frequency for the test is each refueling outage.

The NRC considers check valve disassembly and inspection to be a maintenance procedure and not a test equivalent to reverse flow closure testing per Section XI. This procedure has some risks, which might make its routine use as a substitute for testing undesirable when other methods are possible. The procedure is particularly undesirable for closure verification. The procedure is a valuable maintenance tool that can provide much information about valve internal condition and, as such, it should be performed under the maintenance program at a frequency commensurate with the valve type and service. The licensee's proposal to disassemble and inspect these valves alternately during refueling outages to assess their closure capability allows an adequate assessment of operational readiness and provides a reasonable alternative to the Code for an interim period of one year or until the next refueling outage. However, as discussed in LER 89-017, these valves are susceptible to, and have experienced significant degradation. Also, since a

method of testing each of these valves closed might be feasible during refueling outages, long term relief should not be granted.

During the interim period, the licensee should evaluate methods of testing these valves closed according to the Code. By the end of that period, the licensee should test these valves per the Code or propose an alternate method that provides a reasonable alternative to the Code. If the licensee determines that the only feasible method of assessing the closure capability of these valves is by disassembly and inspection, the licensee should either follow the guidelines of GL 89-04, Position 2, or propose and justify deviations from that position. Given the history of these valves, it may be appropriate to consider disassembly and inspection of each valve each refueling outage.

Based on the determination that compliance with the Code required test method and frequency for closure is impracticable and burdensome, and considering the licensee's proposal, interim relief should be granted for the period described above. In the interim, the licensee should evaluate the suggestions and consider program modifications, as needed.

3.3 High Pressure Coolant Injection System

3.3.1 Category B Valve

3.3.1.1 Relief Request V19. The licensee requests relief from the stroke-timing requirements of Section XI, Paragraph IWV-3413, for the high pressure injection system (HPCI) equipment cooling line valve V23-50A. The licensee proposes to verify its operation via remote indication and by adequate cooling flow to system loads during pump surveillance tests.

3.3.1.1.1 Licensee's Basis For Requesting Relief--Valve cannot be independently stroke timed as no manual switch exists for such operation.

Alternate Testing: V23-50A will be exercised during pump surveillance tests and will be considered to be operating satisfactorily upon demonstration of proper HPCI pump operation and adequate flow to the lube oil and gland seal condenser. In addition, valve exercising will be observed via remote indication.

3.3.1.1.2 Evaluation--This is the inlet valve for cooling flow in the equipment cooling line of the HPCI system. It is actuated with a control signal from HPCI initiation, with no handswitch for individual control. Therefore, exercising and stroke timing requirements of the Code, are impractical for it. System modifications might be necessary to directly exercise and stroke time this valve. That would be expensive and burdensome to the licensee.

The proposal to exercise this valve, during pump surveillance testing, allows a limited assessment of the valve's condition. It provides a reasonable alternative to the Code for an interim period of one year or until the next refueling outage, whichever is longer. However, some method of stroke timing or otherwise evaluating the condition of this valve is necessary to assess its operational readiness. The proposed alternative shows that the valve operates, but provides little indication of its condition with respect to degradation. Therefore, the licensee should actively pursue an alternate

method of stroke timing or otherwise assessing its condition. Methods employing magnetics, acoustics, ultrasonics, or other technologies should be investigated for their suitability. If an adequate alternate method is found to be practical, it should be implemented during the interim. The proposed alternative is not shown to be adequate for the long term.

Based on the conclusion that exercising and stroke-timing is impractical and a burden if the requirements of the Code are imposed, interim relief may be granted for one year or until the next refueling outage whichever is longer. In the interim, the licensee should investigate the suggested alternatives.

3.4 Control Rod Drive Hydraulic System

3.4.1 Category C Valves

3.4.1.1 Relief Request V21. The licensee requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, for control rod drive scram valves V3-13-115. The licensee proposes to test these valves on an alternate refueling outage basis.

3.4.1.1.1 Licensee's Basis For Requesting Relief--Closure verification of these valves requires that the control rod drive pumps be stopped to depressurize the charging water header. This test can not be performed during power operation because stopping the pumps results in a loss of cooling water to all control rod drive mechanisms and seal damage could result. Additionally, this test can not be performed during each cold shutdown because the control drive pumps supply seal water to the reactor recirculation pumps.

Alternate Testing: Vermont Yankee performed the above described pressure decay leak test during the 1989 refueling outage. This was the first test of this kind performed since original plant start-up in 1972. Results of the 1989 test were very similar to the 1972 test. (Note: Valve leakage is determined by depressurizing the charging water header and observing accumulator pressure decay corresponding to each 115 valve. During the 1972 startup test, accumulators maintained pressure for at least 16 minutes. 1989 test results showed the worst case accumulator pressure decay to be a decrease to 920 psig after 18 minutes, which is still well above the acceptance criteria pressure of 800 psig. Therefore, the exceptional leak tight integrity of these valves was reconfirmed after 17 years of operation.)

Based on the above, valve closure will be verified on an alternating refueling outage basis by stopping the control rod drive pumps and observing control rod drive accumulator pressures. Proper valve closure will be demonstrated by accumulators maintaining adequate charging pressure for 5 minutes after the pumps are stopped.

3.4.1.1.2 Evaluation--This check valve is located in the charging water header of the control rod drive (CRD) hydraulic control unit (HCU). There is one for each control rod. This valve closes to maintain pressure in the accumulator on loss of pressure in the supply header.

According to Position 7, GL-89-04, the HCU accumulator pressure decay test frequency specified in the facility's technical specification (TS) is an

acceptable alternative for verifying closure of the charging water header check valves. Position 7 further states that if this test is not addressed in the TS, closure verification should be performed at least once each refueling outage. The licensee indicated that the leak tightness of these valves did not degrade during 17 years of plant operation. However, failure history is not the only consideration for establishing test frequency. Other criteria should be examined to verify that testing at the extended interval would provide reasonable assurance of valve operational readiness. The criteria for extending the sample disassembly and inspection interval in Position 2 of GL 89-04 should be considered. Since the licensee has not adequately justified extending the GL 89-04 test interval for the CRD charging water check valves, the proposed frequency is not acceptable.

Based on the GL 89-04 position and the above conclusion, relief should be granted from the Section XI test frequency provided the licensee either follows the TS or exercises these valves at each refueling outage per GL 89-04, Position 7.

3.5 Standby Liquid Control System

3.5.1 Category C Valves

3.5.1.1 Relief Request V23. The licensee requests relief from the test frequency requirements of Section XI, Paragraph IWV-3521, Section XI of the Code for exercising standby liquid control (SLC) injection check valves V11-16 and -17. The licensee proposes to verify their opening each refueling outage. Their closing would be demonstrated on an alternating refueling cycle basis.

3.5.1.1.1 Licensee's Basis For Requesting Relief--Exercising these valves during power operation would require injecting borated water into the reactor coolant system. This would create a reactivity excursion and potential for reactor trip. Injection of demineralized water would require removing the system from service to clean the borated solution from the piping and replacing the explosive actuated valves. This system is required for power operation.

Alternate Testing: Valve opening will be demonstrated each refueling outage by the system flow test directly into the reactor vessel.

Valve closure was verified during the 1989 refueling outage via leak testing in accordance with IWV-3420. This was the first of record ever performed on these valves and occurred after 17 years of service. Valve V11-16 exhibited no leakage and valve V11-17 exhibited very limited leakage that was well below IWV-3420 limits. (Note: Observed leakage of V11-17 was 0.428 ml/min versus an acceptance criteria of 550 ml/min.). Based on the above test results, the fact that these valves are rarely cycled, and that the internals are in a clean demineralized water environment, valve closure will be demonstrated on an alternating refueling cycle basis. This demonstration will continue to consist of leak testing in accordance with IWV-3420 limits.

3.5.1.1.2 Evaluation--These are the check valves located in the SLC injection line to the reactor vessel. The SLC system is required to be in service during power operation. Exercising these valves with flow to the open position would require firing an explosive valve and injecting borated water into the reactor vessel. Injection of borated water into the reactor vessel

dc ng power operation would result in a power fluctuation which could cause a reactor trip. It would also cause water chemistry problems that could damage reactor components and require extensive flushing to correct. Further, the explosive charge would have to be replaced in the explosive actuated valve. Therefore, it is impractical to exercise these valves open with flow during power operations. The closure capability of these valves can be verified only by leak rate testing. It is impractical to leak test these valves during power operations because it requires isolating the system.

Significant system modifications would be necessary to enable exercising these valves during power operation. It would be burdensome to require the licensee to make these modifications due to the costs involved. This is a difficult and time consuming test to perform. To do the test during cold shutdown could result in a delay in return to power. Requiring these tests to be performed during cold shutdowns would be burdensome to the licensee because delaying startup from cold shutdown could be very costly.

The licensee performed a leak rate test on these valves during the 1989 refueling outage. Based on the results of that test, the licensee proposes to verify their closure capability every other refueling outage. The data is insufficient to support the significant extension of the test interval from quarterly to every other refueling outage. Also, the licensee has not shown that testing the valves closed every refueling outage is a hardship or burden. However, exercising these valves to the open and closed positions every refueling outage should allow an adequate assessment of operational readiness and provide a reasonable alternative to the Code test frequency requirements.

Based on the conclusion that compliance with the test frequency requirements of the Code is impractical and burdensome, and considering the proposed alternate testing, relief should be granted provided the licensee exercises the valves to the open and closed positions every refueling outage.

3.6 Residual Heat Removal System

3.6.1 Category C Valves

3.6.1.1 Relief Reques 27. The licensee requests relief from the test method requirements of Sec XI, Paragraph IWV-3522, for the pressurizing line (keep fill) check val V10-36A and -36B. The licensee proposes to verify their closure durir testing of the residual heat removal (RHR) pumps.

3.6.1.1.1 Licensee's Basis For Requesting Relief--There is no test loop available to regularly exercise these valves. Their proper operation is assured through continuous Residual Heat Removal discharge header pressure monitoring and by verification of acceptable residual heat removal parameters during system surveillance.

Alternate Testing: Proper closure of V10-36A/B is verified during surveillance runs of the residual heat removal pumps. This meets the intent of IWV-3522.

3.6.1.1.2 Evaluation--These check valves are located in the RHR pressurizing line. They function to prevent gross diversion of flow from the RHR pump discharge headers into the system pressurizing line. There are no installed test connections or instruments in the line for verifying their

closure capability. System modifications would be necessary to enable compliance with the test method requirements of the Code. Performing these modifications would be burdensome to the licensee due to the cost involved.

The proposal is to verify valve closure capability during quarterly RHR pump testing. The flow instruments used during pump testing are downstream of the pressurizing line connection to the discharge header. Failure of the valves to close would be indicated by a significant decrease in the RHR flow rate. Therefore, the proposed alternative is adequate to demonstrate valve closure capability. It provides adequate assurance of operational readiness and a reasonable alternative to the Code test method.

Based on the conclusion that compliance with the requirements of the Code is impractical and burdensome, and that the proposed alternative provides a reasonable assurance of operational readiness, relief should be granted as requested.

3.7 Reactor Core Isolation Cooling System

3.7.1 Category C Valves

3.7.1.1 Relief Request V30. The licensee requests relief from the test method and frequency requirements of Section XI, Paragraph IWV-3520, for the RCIC condensate pump discharge line check valves, V13-70 and -133. The licensee proposes to exercise these valves open during normal RCIC surveillance testing and to verify their closure capability once each operating cycle.

3.7.1.1.1 Licensee's Basis For Requesting Relief--Proper operation of this pair of valves, which are installed in series, cannot be individually verified in the closed direction due to the piping arrangement.

Alternate Testing: Valves will be verified to open during normal reactor core isolation cooling surveillance testing. Closure of at least one valve in the pair is confirmed via continuous monitoring of gland seal condenser level. Since these valves can not be isolated without affecting system operability and based on the above monitoring, verification that each valve functions in the closed direction will be performed once each operating cycle via disassembly or other positive means.

3.7.1.1.2 Evaluation--These check valves are located in series in the discharge line of the RCIC condensate pump. There is no instruments or test connections installed in this line that permit verifying a full-stroke exercise to the open or closed position. Significant system modifications would be necessary for compliance with the test method requirements of the Code. These modifications would be burdensome due to the costs involved.

The licensee proposes to verify the full stroke open capability of these valves during normal surveillance testing of the RCIC system. Significant degradation of these valves would be manifested in failure of the condensate pump to maintain level in the barometric condenser vacuum tank. The proposed alternate method for testing to the open position would, therefore, provide a reasonable alternative to the requirements of the Code.

The licensee also proposes to confirm the closure capability of at least one valve of the pair by continuous monitoring of the condenser level with the condensate pump not running. Additionally, functionality of each valve, in the closed direction, is to be verified by disassembly or other positive means each refueling outage. This combination of methods would provide a reasonable assurance of operational readiness. However, the NRC staff considers valve disassembly and inspection to be a maintenance procedure and not a test equivalent to reverse flow closure testing according to Section XI. It has inherent risks which make its routine use as a substitute for testing undesirable, especially when another method of testing is feasible. The licensee should, therefore, actively pursue the use of non-intrusive diagnostic techniques, such as acoustics or radiography.

If significant back-leakage is detected during continuous monitoring, it is an indication of degradation in both valves. In this case both valves should be repaired or replaced.

Based on the conclusion that compliance with the requirements of the Code is impractical and burdensome, and that the proposed alternatives are adequate, relief may be granted. However, the licensee should actively pursue the use of positive means, other than disassembly, to individually verify the closure capability of these valves during refueling outages. The licensee should also repair or replace both valves on evidence of significant back-leakage during continuous monitoring.

3.8 Reactor Water Cleanup System

3.8.1 Category C Valves

3.8.1.1 Relief Request. The licensee requests relief from the test method requirements of Section XI, Paragraph IWV-3520, for the reactor water cleanup pump discharge check valves, V12-28A and -28B. The licensee proposes to verify valve closure via observation of appropriate system indicators or by other unspecified positive means.

3.8.1.1.1 Licensee's Basis For Requesting Relief--Due to the operating characteristics of the Reactor Water Cleanup system, the two subject valves cannot each be verified to close on a quarterly basis.

Alternate Testing: Both valves were disassembled and refurbished during the 1989 refueling outage. During each subsequent refueling outage, both valves will be verified to close via observation of appropriate system indication or by other positive means.

3.8.1.1.2 Evaluation -These check valves are in the pump discharge of the reactor water cleanup system. Except for the isolation valves, components in this system are not normally included in the IST program. The safety function of these valves is not apparent. The licensee may want to reexamine their safety function.

In accordance with 10 CFR 50.55a, the staff may grant relief in cases where a licensee demonstrates that compliance with the requirements of the Code is impractical and burdensome or would result in hardship without a compensating increase in the level of quality and safety. Further, the proposed alternative, if any, should provide a reasonable assurance of

operational readiness. Relief may also be granted if it is demonstrated that the proposed alternative is, at least, equivalent to the requirements of the Code or would otherwise provide an acceptable level of quality and safety. After review of the system's piping and instrumentation drawing (P&ID) and the basis for relief, it is not clear why these valves cannot be exercised to the closed position as required quarterly or during cold shutdowns. The request does not provide adequate explanation.

Immediate compliance with the Code requirements would be a hardship without a compensating increase in the level of quality and safety. An interim period should be provided to allow the licensee time to develop and implement test procedures to verify valve closure at the Code required frequency. While not acceptable for the long term, the proposed testing should allow an adequate assessment of operational readiness for one year or until the next refueling outage.

If further investigation shows that these valves have a safety function in the closed position and that quarterly or cold shutdown testing is impractical or presents an unusual hardship, the licensee should revise and resubmit the request. It must, however, contain a detailed explanation of the impracticality and burden or unusual hardship of complying with the Code.

Based on the determination that immediate compliance with the Code requirements would be a hardship without a compensating increase in the level of quality and safety, and considering the adequacy of the licensee's proposed testing during the interim period, interim relief should be granted for one year or until the next refueling outage, whichever is longer. At the end of this interim period the licensee should implement testing at the Code frequency or resubmit the relief request with an adequate technical justification.

3.9 Control Room Ventilation Cooling System

3.9.1 Category C Valve

3.9.1.1 Relief Request V34. V34 requests relief from the exercising method and frequency requirements of the Code, Paragraph IWV-3520, for the chilled water pump discharge check valve, SCW-8A. The licensee submits that the valve is exercised open during normal system operation and pump surveillance testing. The licensee proposes to verify its closure annually by disassembly or by placing the system in alternate configuration and observing the pressure indication.

3.9.1.1.1 Licensee's Basis For Requesting Relief--This valve cannot be exercised closed during system operation since this would require isolation of the control room chilled water system and related ventilation equipment.

Alternate Testing: Valve opening is demonstrated by normal system operation and pump surveillance testing. Closure will be verified annually as climatic conditions permit via valve disassembly or by placing the system in an alternate configuration and observing appropriate system pressure indication.

3.9.1.1.2 Evaluation--This check valve is located in the discharge of the chilled water pump. The pump is in the control room ventilation cooling system. This valve is exercised open quarterly during normal system

operation or during pump testing. Verifying its closure capability would require taking the system out of service. Control room habitability requirements do not allow this during power operations. The closed safety function of this valve is not apparent. The licensee may want to reexamine its safety function.

The licensee proposed to verify valve closure yearly by disassembly or back pressure test. In accordance with 10 CFR 50.55a, the staff may grant relief in cases where a licensee demonstrates that compliance with the requirements of the Code is impractical and burdensome or would result in hardship without a compensating increase in the level of quality and safety. Further, the proposed alternative, if any, should provide a reasonable assurance of operational readiness. Relief may also be granted if it is demonstrated that the proposed alternative is, at least, equivalent to the requirements of the Code or would otherwise provide an acceptable level of quality and safety. After review of the system's piping and instrumentation drawing (P&ID) and the basis for relief, it is not clear why these valves cannot be exercised to the closed position during cold shutdowns. The request does not provide adequate explanation.

Immediate compliance with the Code requirements would be a hardship without a compensating increase in the level of quality and safety. An interim period should be provided to allow the licensee time to develop and implement test procedures to verify valve closure at the Code required frequency. While not acceptable for the long term, the proposed testing should allow an adequate assessment of operational readiness for one year or until the next refueling outage.

If further investigation shows that this valve has a safety function in the closed position and that quarterly or cold shutdown testing is impractical or presents an unusual hardship, the licensee should revise and resubmit the request. It must, however, contain a detailed explanation of the impracticality and burden or unusual hardship of complying with the Code.

Based on the determination that immediate compliance with the Code requirements would be a hardship without a compensating increase in the level of quality and safety, and considering the adequacy of the licensee's proposed testing during the interim period, interim relief should be granted for one year or until the next refueling outage, whichever is longer. At the end of this interim period the licensee should implement testing at the Code frequency or resubmit the relief request with an adequate technical justification.

3.10 Nuclear Boiler System

3.10.1 Category C Valves

3.10.1.1 Relief Request V7. Relief Request V7 requests relief from the closed exercising requirements of Section XI, Paragraph IWV-3520, for the inboard feedwater check valves, V2-28A and -28B. The licensee proposes to disassemble and inspect these valves on a sampling basis during refueling outages to verify valve closure.

NOTE: Relief Request V7 is affected by GL 89-04 Position 2. However, since disassembly is to verify valve closure, this relief request is not approved by the Generic Letter and is evaluated below.

3.10.1.1.1 Licensee's Basis for Requesting Relief--Valves are required to be open during both power operation and HPCI/RCIC operation. The valves are not required to close for primary containment isolation as they have been exempted from leak testing as described in the Vermont Yankee Primary Containment Leak Rate Testing Program. However, verification of closure on cessation of flow will be performed as described below.

Closure of the valves during power operation will result in loss of feedwater to the vessel. Closure of the valves during cold shutdown would require removing the only mechanism of vessel level control (via reactor water cleanup system).

Alternate Testing: Valves will be exercised to the fully open position by the proper operation of the feedwater system at startup.

To verify proper closure on cessation of flow, the valves will be partially disassembled and inspected to verify closure and that valve internals are structurally sound. The disassembly of each valve will be performed on a staggered sampling basis, one valve during each refueling outage. Inspection on a staggered sampling basis provides reasonable assurance of the ability of these valves to perform their safety related function. Each valve is of the same design (manufacturer, size, model number and materials of construction) and have the same service conditions. Therefore, the condition and performance of both valves should be similar. If it is found the disassembled valve's operability is in question, the alternate valve will also be disassembled and inspected during the same refueling outage.

3.10.1.1.2 Evaluation--It is impractical to exercise these valves to the closed position during power operations because it would stop feedwater flow to the reactor vessel. Loss of feedwater flow would cause a decrease in vessel level which could result in a plant trip. It is impractical to exercise these valves closed during cold shutdowns because it would result in isolation of the flow path from the reactor water cleanup system that is used to maintain vessel level during shutdowns. These valves cannot be verified closed quarterly or during cold shutdowns unless extensive system modifications are made which permit this testing. It would be burdensome for the licensee to make such modifications because of the cost involved.

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

The Minutes of the Public Meeting on Generic Letter 89-04 state that the use of disassembly to verify closure capability may be found to be acceptable depending on whether verification by flow or pressure measurements is practical. The NRC considers valve disassembly and inspection to be a

maintenance procedure and not a test equivalent to the exercising produced by fluid flow. This procedure has some risk, which make its routine use as a substitute for testing undesirable when some method of testing is possible. Check valve disassembly is a valuable maintenance tool that can provide much information about a valve's internal condition and as such should be performed under the maintenance program at a frequency commensurate with the valve type and service.

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

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

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

APPENDIX A

ANOMALIES

APPENDIX A
ANOMALIES

Anomalies or inconsistencies found during the evaluation are given below. The licensee should resolve these items as indicated.

1. GP-3 requests relief from the Code requirement to measure vibration in displacement units. The licensee proposes to measure vibration in accordance with ANSI/ASME OM-6, Draft 11. The licensee also proposes alternate allowable ranges for HPCI pump vibration measurements. Relief should be granted provided the licensee verifies that the proposed testing would detect any significant mechanical degradation of vertical line shaft pumps. If that degradation cannot be detected, the licensee should investigate alternate testing methods for those pumps. If an acceptable alternate method is found, it should be incorporated into the IST program within two years. If the investigation shows that no acceptable alternatives exist, this should be documented in the program and the proposed testing continued until an alternate method is found and implemented.

2. P1 requests relief from the Code requirement to measure inlet pressure and flow rate, quarterly, for the service water pumps. The licensee proposes to perform a computerized curve fit test quarterly and a full flow test while measuring flow with a temporarily installed instrument during refueling outages. The data from this test will be evaluated against the Code acceptance criteria and that of Table 1. The data will also be used to calculate a new head/capacity curve for the quarterly test. Relief is granted, provided the full flow test performed at refueling outages meets the Code test method requirements. The licensee should also continue quarterly testing and strive to make it as meaningful a test as practicable.

3. P4 requests relief from the Code requirement to establish reference test conditions for measuring vibration, flow rate, and differential pressure quarterly, for the RBCCW pumps. The licensee proposes to measure as-found pump vibration, inlet pressure, differential pressure, and flow rate quarterly and to measure all Code parameters at a full flow reference condition once a year.

   Pump curves represent an infinite set of reference points of flow rates and differential pressures. Basing the acceptance criteria on these values can permit evaluation of pump condition and detection of degradation. However, pump curves should be developed or manufacturer's curves validated when the pump is known to be operating acceptably. Also, a sufficient number of data points must be taken to provide an accurate curve fit. To reduce the uncertainty associated with curve testing and improve the ability to detect degradation, the following guidelines should be considered:

   a. Use only regions of the curve where pump operation is stable.
   b. Do not use relatively flat regions of the pump curve.
   c. Take at least 5 test points within the test region of the curve.

d. Use instrumentation as accurate as practicable for test points.
e. Use a curve fit method that minimizes uncertainty.
f. Do not extrapolate the curve more than 5% from any test point.

Since pump vibration levels may vary significantly over the range of the curve, a method should be developed for assigning vibration acceptance criteria that will give equivalent protection as provided by the Code. This may require taking vibration measurements at various points on the pump curve and assigning conservative vibration velocity reference values for regions of the pump curve. The pump curve may be divided into as many regions as necessary.

An interim period should be provided to allow the licensee time to develop and implement a test method that adequately monitors pump condition. While the proposal is not shown to be acceptable for the long term, it should allow an adequate assessment of pump operational readiness for an interim period of one year or until the next refueling outage, whichever is longer.

Interim relief should be granted for that period. At the end of that period the licensee should implement quarterly testing that adequately monitors pump condition and allows detection of degradation.

The licensee indicated that RBCCW pumps' inlet pressure cannot be measured before startup because they are normally running. IWP-3400 gives an allowance for that situation. Therefore, relief is not necessary from that requirement for these pumps. However, if one of these pumps is idle prior to testing, inlet pressure should be measured as required.

4. P6 requests relief from the Code requirement to measure differential pressure and flow rate for the diesel fuel oil transfer pumps. The licensee proposes to verify these pumps are capable of providing design flow rate once every operating cycle. The licensee has not proposed nor justified less conservative flow rate acceptance criteria for these pumps. Therefore, the allowable ranges specified in Table IWP-3100-2 should be used as required. Long term relief should not be granted. An interim period should be provided to allow the licensee time to develop and implement a test method that adequately monitors pump condition. While not acceptable for the long term, the proposed testing should allow an adequate assessment of pump operational readiness for one year or until the next refueling outage, whichever is longer.

   Interim relief should be granted for that period. At the end of that period the licensee should implement quarterly testing that adequately monitors pump condition and allows detection of degradation.

5. GV-3 requests relief from the leak testing requirements of Code Paragraphs IWV-3421 through IWV-3427 for the CIVs listed in the relief request basis. The licensee proposes to leak test them according to the requirements of 10 CFR 50, Appendix J. Also, these valves will be leak rate tested, individually, per the plant's TS (as required by IWV-3426) and corrective action will be taken as required by 3427(a). Relief should be granted provided the licensee tests these valves to the requirements of Appendix J, Type C, and Paragraphs IWV-3426 and -3427(a)

per GL 89-04, Position 10. This relief is limited to assessing the containment isolation capability of these valves. Relief from IWV-3427(b) applies only to the testing of the containment isolation function. For Category A valves that perform any other leakage restriction function, in addition to or other than containment isolation, the requirements of IWV-3427(b) should be met.

6. V2 requests relief from the Code test method and frequency requirements for closure testing the service water system supply to diesel generator cooling jackets check valves. The licensee proposes to full-stroke exercise them open quarterly and verify their closure capability by disassembly and inspection during the 1990 refueling outage. Subsequently, their closure would be verified by a positive means, on an alternating basis, at refueling outages. The proposed disassembly and inspection of these valves is required as part of the commitments made for LER 89-017.

   Disassembly, inspection, and manual full-stroke of the disk can adequately ascertain a check valve's condition. However, this technique should be used as an alternate to the Code closure testing requirements, only when testing with flow or by pressure measurements is impracticable. From the review of the licensee's service water system P&IDs, it appears that it may be feasible to test the reverse flow closure of these valves, according to the Code test method. If it is not feasible to test these check valves closed according to the Code methods, it might be practicable to verify their closure using non-intrusive diagnostic testing techniques, such as acoustics, radiography, or magnetics. The licensee should, therefore, consider these and other methods of testing these valves closed. Given the difficulties associated with testing these valves closed quarterly or during cold shutdowns, the appropriate frequency for the test is each refueling outage.

   The NRC considers check valve disassembly and inspection to be a maintenance procedure and not a test equivalent to reverse flow closure testing per Section XI. This procedure has some risks, which might make its routine use as a substitute for testing undesirable when other methods are possible. The procedure is particularly undesirable for closure verification. The procedure is a valuable maintenance tool that can provide much information about valve internal condition and, as such, it should be performed under the maintenance program at a frequency commensurate with the valve type and service.

   As discussed in LER 89-017, these valves are susceptible to, and have experienced significant degradation. Also, since a method of testing each of these valves closed might be feasible during refueling outages, long term relief should not be granted.

   Interim relief should be granted for one year or until the next refueling outage, whichever is longer. During that period, the licensee should evaluate methods of testing these valves closed according to the Code. By the end of that period, the licensee should test these valves per the Code or propose an alternate method that provides a reasonable alternative to it. If the licensee determines that the only feasible method of assessing the closure capability of these valves is by

disassembly and inspection, the licensee should either follow the guidelines of GL 89-04, Position 2, or propose and justify deviations from that position. Given the history of these valves, it may be appropriate to consider disassembly and inspection of each valve each refueling outage.

7. V19 requests relief from the Code stroke-timing requirements for the RCIC equipment cooling line check valve. The licensee proposes to verify its operation via remote indication and by adequate cooling flow to system loads during pump surveillance testing. That proposal allows only a limited assessment of the valve's condition and is not adequate for the long term. Some method of stroke timing or otherwise evaluating the condition of this valve is necessary to assess its operational readiness. The licensee should actively pursue alternate methods of assessing this valve's condition. Methods employing magnetics, acoustics, ultrasonics, or other technologies should be investigated for their suitability. If an adequate alternate method is found to be practical, it should be implemented. Interim relief should be granted for one year or until the next refueling outage, whichever is longer.

8. V21 requests relief from the test frequency requirements of IWV-3521 for control rod drive scram valves. The licensee proposes to test these valves on an alternate refueling outage basis. Relief should be granted from the Code test frequency provided the licensee either follows the TS or exercises these valves at each refueling outage per GL 89-04, Position 7.

9. V23 requests relief from the test frequency requirements for exercising SLC injection check valves. The licensee proposes to verify their opening each refueling outage. Their closing would be demonstrated every other refueling outage. Relief should be granted provided the licensee exercises the valves to the open and closed positions each refueling outage.

10. V33 requests relief from the Code test method requirements for the reactor water cleanup pump discharge check valves. The licensee proposes to verify their closure via observation of appropriate system indicators or by other positive means. After review of the system [illegible]s and the basis for relief, it is not clear why these valves cann[illegible] exercised to the closed position, as required, quarterly or during c[illegible] hutdowns. The request does not provide adequate explanation.

    If further investigation shows that these valves have a safety function in the closed position and that quarterly or cold shutdown testing is impractical or presents an unusual hardship, the licensee should revise and resubmit the request. It must, however, contain a detailed explanation of the impracticality and burden or unusual hardship of complying with the Code. Interim relief shou[illegible] be granted for one year or until the next refueling outage, whichever is longer. At the end of that period, the licensee should implement testing at the Code frequency or resubmit the relief request with an adequate technical justification.

12. V34 requests relief from the Code exercising method and frequency requirements for the chilled water pump discharge check valve. The

licensee submits that the valve is exercised open during normal system operation and pump surveillance testing. The licensee proposes to verify its closure annually by disassembly or by placing the system in alternate configuration and observing the pressure indication. After review of the system P&IDs and the basis for relief, it is not clear why these valves cannot be exercised to the closed position during cold shutdowns. The request does not provide adequate explanation.

If further investigation shows that this valve has a safety function in the closed position and that quarterly or cold shutdown testing is impractical or presents an unusual hardship, the licensee should revise and resubmit the request. It must, however, contain a detailed explanation of the impracticality and burden or unusual hardship of complying with the Code. Interim relief should be granted for one year or until the next refueling outage, whichever is longer. At the end of that period, the licensee should implement testing at the Code frequency or resubmit the relief request with an adequate technical justification.

13. Relief requests P3 and P5 regard pumps with grease-packed bearings that cannot be checked for proper lubricant level or pressure. Relief is not needed from the Code requirement. These requests may be deleted from the program and this issue addressed in a note.

14. The basis provided for relief request P2 is not clear. It states that SLC pump differential pressure will not be measured as suction is from a vented tank and may vary. The proposed alternate test appears not to establish reference conditions. Simply measuring flow and vibration without establishing reference values might not give adequate information to properly assess the operational readiness of these pumps. Generally, discharge pressure is set and pump flow rate is assessed to determine operational readiness of positive displacement pumps. This request should be revised to more clearly describe the proposed testing and show that it is a reasonable alternative to the Code. This information should be provided as part of any future IST program submittals.

15. Relief request V1 is for pump discharge check valves in the service water system. The request addresses frequencies for testing the valves, however, does not address cold shutdown. Since service water system loads are much lower in that plant mode, the licensee should either test the valves during that condition, if practicable, or provide a justification for deferring the tests. This is considered to be particularly important in the light of the degradation found to affect other check valves in this system.

16. Relief request V3 proposes to verify proper operation of several Category B valves in the service water supply to the RHR service water pump motor coolers by system operational parameters. The proposed test appears to be very limited in its ability to detect any degradation of these valves short of complete failure. The test may not allow a proper determination of operational readiness. Some method should be developed to adequately assess operational readiness of these valves. The licensee should respond to this concern within six months.

17. Relief Request V7 requests relief from the closed exercising requirements of Section XI for the inboard feedwater check valves. The licensee proposes to disassemble and inspect these valves on a sampling basis during refueling outages to verify valve closure. Relief Request V7 is affected by GL 89-04 Position 2. However, since disassembly is to verify valve closure, this relief request is not approved by the Generic Letter and is evaluated in Section 3.10.1.1 of the TER. Due to the impracticality and burden of complying with the Code method and frequency requirements, relief should be granted with the following provisions. The licensee should investigate methods of verifying the reverse flow closure capability of these valves other than disassembly and inspection. It may be practical, at least each refueling outage, to verify by non-intrusive diagnostic technique that the valve disks travel to their closed seats when the upstream isolation valves are closed. Valves that are disassembled in lieu of testing should have a post maintenance part-stroke exercise performed prior to their return to service.

18. Relief requests V15 and V25 request relief from the leak rate testing requirements of the Code for the listed pressure boundary isolation valves. In these requests, the licensee states that adequate leak tightness of these valves is verified by continuous monitoring of downstream pressure. IWV-3421 states that valves which function in the course of plant operation in a manner that demonstrates functionally adequate seat tightness need not be leak tested. In such cases, the valve record shall provide the basis for the conclusion that operational observations constitute satisfactory demonstration. It appears that these valves meet the conditions specified in IWV-3421. If this is the case, these relief requests would not be needed and could be deleted.

19. Relief request V22 requests relief from the Code test frequency requirements for the scram discharge volume vent check valves. This relief request states that operability of these valves is demonstrated by decreasing scram discharge volume water level upon reset from scram. However, the request does not specify if this condition will be observed following every scram or less frequently. Section XI testing should be performed as close to the Code specified frequency as practicable. If less frequent testing is intended by this relief request, it should be revised and resubmitted.

20. Relief request V26 requests relief from the stroke time measurement requirements of the Code for the RHR flow control valves, V10-89A and -89B. The licensee states that proper valve operation is verified through normal system operation during pump tests. The licensee's proposed testing does not provide a means to detect valve degradation. A significantly degraded valve may be capable of performing a function during a pump test, but not be capable of performing its safety function under accident conditions (such as stroking to its fail-safe position) when called upon to do so. The licensee should investigate the practicality of implementing a test that monitors the condition of these valves and allows detection of degradation. The licensee should respond to this concern within six months.

21. IWV-3411 and -3521 establish the valve exercising frequency as once every three months, except as provided by IWV-3412 and 3522. These paragraphs

permit use of the cold shutdown frequency for testing when full-stroke exercising is not practical during plant operation. Several relief requests in the Vermont Yankee IST program request to use a refueling outage exercise frequency. These requests provide bases for not exercising the valves during power operations, but fail to provide technical justification for not testing the valves during cold shutdowns. When valve testing is impractical or an unusual hardship quarterly during power operation, it must be performed at cold shutdowns if practical. It can only be deferred to refueling outages if it is demonstrated to be impractical or an unusual hardship during both power operation and cold shutdowns. This information should be documented, for both frequencies, in each specific relief request. The licensee should review all relief requests for test frequency to ensure that they provide an adequate justification as discussed above.

22. Relief request V8 requests relief from the leakage rate measurement requirements of the Code for the feedwater check valves, V2-28A and -28B. The licensee states that these valves need not close to provide primary containment isolation and that an exemption was approved by the NRC from testing them to verify a containment isolation function. However, if these valves perform another function where their seat leakage is limited to a specific maximum amount, they must be tested in accordance with IWV-3420 to verify their ability to perform that function. If it is determined that these valves do not perform a function where their leakage rate is limited to a specific maximum, they should not be categorized A or A/C in the IST program and this relief request should be deleted (it should be noted in the IST program that these valves are exempted from containment isolation leak rate testing).

23. V5 requests relief from the Code requirements to measure the stroke times of the emergency diesel generator (EDG) air start valves, AS1 and AS2 (on each EDG). The licensee proposes to indirectly ascertain valve operational readiness by verifying the starting times of the EDGs are 13 seconds or less. Many EDG air start systems are composed of two totally redundant air start trains, either of which can start the diesel within the required time. If the Vermont Yankee installation is totally redundant, the proposed testing may not detect a seriously degraded or failed valve. In this case, an alternate method of testing that detects individual valve degradation should be developed and implemented. The licensee should respond to this concern within six months.

24. GP-1 requests relief from the Code allowable range requirements for flow rate and differential pressure for all pumps in the IST program. The licensee proposed new allowable ranges with greatly relaxed high end Alert and Required Action ranges. The Alert range is from 1.08 reference to 1.12 reference and the Required Action is greater than 1.12 reference. Pump flow rate and differential pressure should not increase at the reference point over time unless the pump has undergone maintenance, because that would be indicative of pump improvement. As a pump is operated and subjected to erosion and corrosion, its performance should not improve. Therefore, any significant increase in flow rate or differential pressure at the reference point may indicate a problem with the test method or instrumentation. Since a high reading is indicative of a bad test, actual pump condition isn't known and may, in fact, be

degraded. While it may not be desirable to declare a pump inoperable in this situation, taking no action is unacceptable. When the flow rate or differential pressure increases by an amount greater than normal data scatter, the licensee should investigate the situation and make any necessary changes or repairs and then retest the affected pump in a timely manner. The licensee should respond to this concern within six months.

25. V11 requests relief from the safety relief valve (SRV) test method requirements of the Code for the main steam safety relief valves and proposed to remove 3 of the 6 valves each refueling outage and either replace them with refurbished valves or test them and return them to service. Relief is also requested from the corrective action requirements of IWV-3513 for the SRVs. The licensee does not test additional valves based on the failure rate of the tested valves. Not performing additional testing based on failure rates is not conservative and does not appear to be warranted considering the high failure rate of SRVs in the nuclear industry. The licensee should respond to this concern within six months.

26. GV-2 requests relief from the Code corrective action requirements for stroke time measurements on power operated valves. The licensee compares stroke time measurements to reference stroke times instead of the previous test measurements. This prevents gradual stair stepping and is, therefore, better than the Code requirement. The licensee also differentiates between motor operated valves and other power operated valves and has assigned more restrictive criteria to these valves. This is also an improvement to the Section XI requirements.

When power operated valve stroke times deviate significantly from the previous stroke times but remain below the limiting values of full-stroke times, IWV-3417(a) requires the test frequency be increased to once each month until corrective action is taken. This allows closer monitoring of the degraded valve to ensure that it is still capable of performing its function. If stroke times increase significantly from reference values, 2.b.3 of this request indicates that for valves normally tested during refueling outages only, the test frequency would remain at each refueling outage. This could permit a significantly degraded valve to remain in service for an entire reactor cycle. Likewise, 2.b.2 of this request could permit a significantly degraded valve tested at cold shutdowns to remain in service for the remainder of a reactor cycle (if there are no other cold shutdowns during that cycle). These paragraphs of this relief request are not conservative and may not provide an adequate level of quality and safety. The licensee should respond to this concern within six months.