VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

October 25, 2001

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 01-327A
NL&OS/ETS R0
Docket Nos. 50-338/-339
License Nos. NPF-4/-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
INSERVICE TESTING PROGRAM FOR PUMP AND VALVES
THIRD TEN YEAR INTERVAL UPDATE
REQUEST FOR ADDITIONAL INFORMATION

In a June 4, 2001 letter (Serial No. 01-327), Virginia Electric and Power Company (Dominion) submitted the North Anna Units 1 and 2 third interval Inservice Testing (IST) Programs for NRC review. In a September 20, 2001 telephone conference call, the NRC staff requested additional information to complete their review of the IST Programs. The requested information has been incorporated into revised relief requests. The revised relief requests and a summary of the changes are provided in Attachments 1 and 2 for North Anna Units 1 and 2.

If you have any further questions, please contact us.

Very truly yours,

L. N. Hartz
Vice President – Nuclear Engineering

Attachments

Units 1 and 2 Third IST Program revised relief requests, with summary of changes

Commitments made in this letter:

1. None

A047

Rec'd 12/19/01

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Attachment 1

North Anna Unit 1
Inservice Testing Program
Revised Relief Requests

Virginia Electric and Power Company
(Dominion)

The following is a summary of changes made to the North Anna Unit 1 Inservice Testing (IST) Program Plan, Interval 3, relief requests. The Interval 3 IST Program Plan was submitted to the NRC by letter dated June 4, 2001. These changes resulted from a conversation with the NRC and further review of the relief request bases.

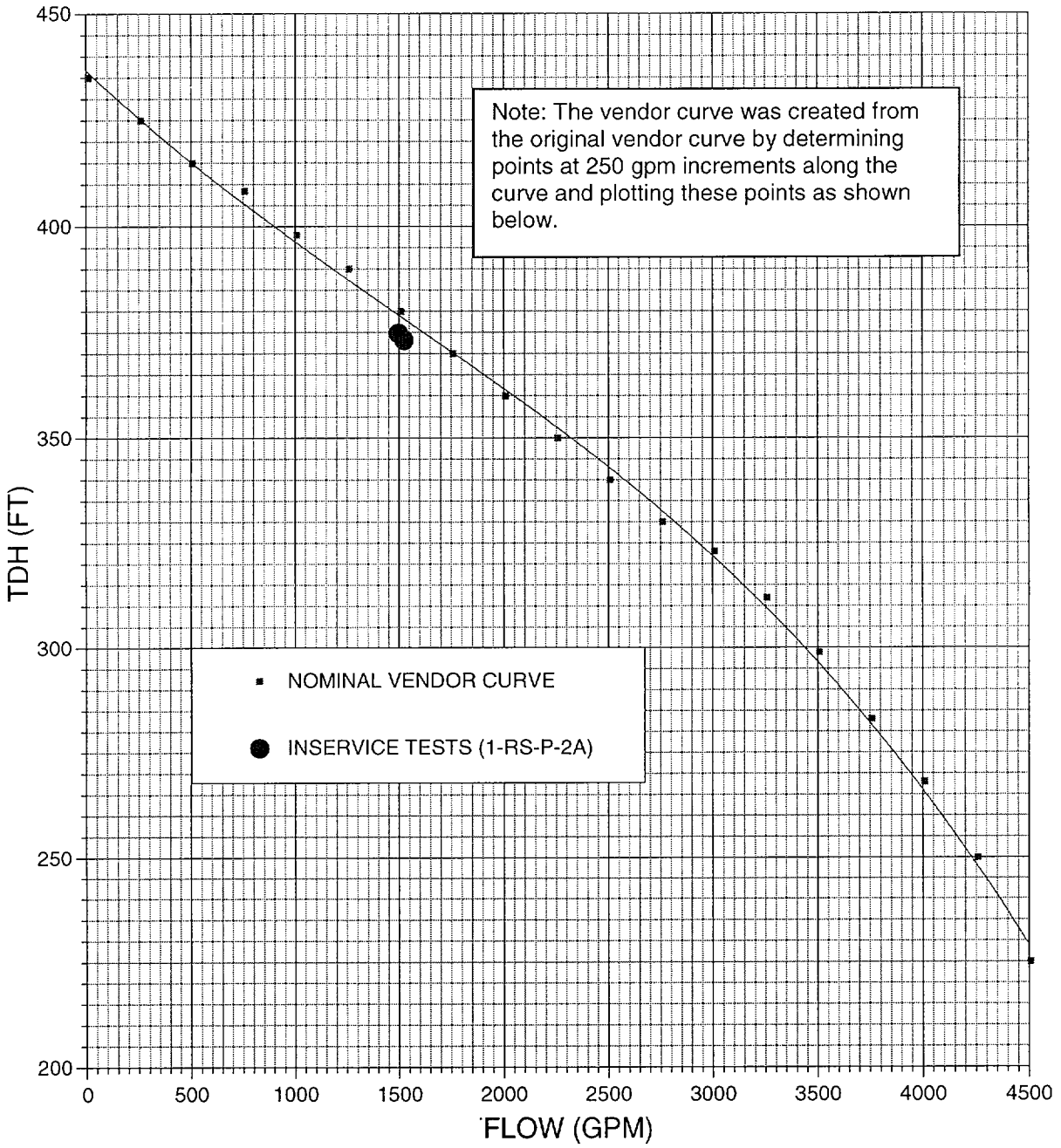
RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
G-1	In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.

RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
P-1	A table was added listing the pumps that currently have at least one vibration location with a measured reference value less then 0.05 inches per second. The basis for relief was expanded to include experience gained from the predictive maintenance program and a description of the predictive maintenance program. In the alternate testing section, references to the predictive maintenance program and 10 CFR 50.55a(a)(3)(i) were added.
P-2	For residual heat removal pumps 1-RH-P-1A and B, reference to the technical specifications was added to the basis for relief. In the alternate testing section, references to 10 CFR 50.55a(a)(3)(i) and 10CFR 50.55a(f)(6)(i) were added.
P-3	For service water pumps 1-SW-P-1A and B, the need for and consequently the request for relief from measuring differential pressure was eliminated. Existing reservoir level instrumentation will be used in calculating differential pressure. Also, reference to an assessment of combining relief requests for a given pump was removed. The relief request has been reduced to just one Code requirement. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
P-4	For component cooling water pumps 1-CC-P-1A and B, the need for and consequently the request for relief from the flow instrument accuracy requirement was eliminated. Based on guidance from ASME OM Interpretation 95-6, certain terms in the instrument loop accuracy calculation can be excluded, resulting in a calculated value for loop accuracy that is within $\pm$2%. Also, reference to an assessment of combining relief requests for a given pump was removed. The relief request has been reduced to

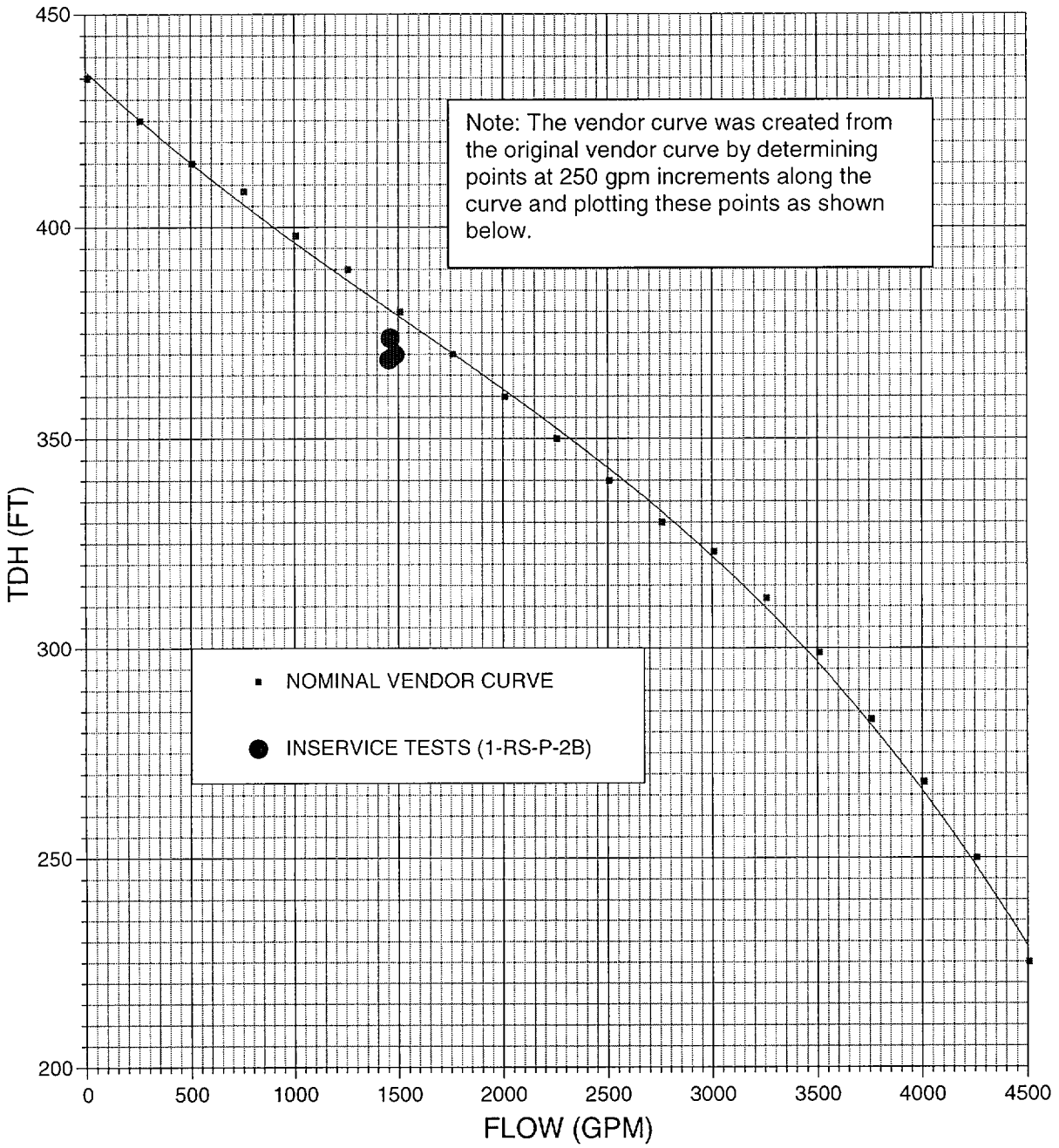
RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
	just one Code requirement. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
P-5	Relief Request P-5 originally referenced charging pumps 1-CH-P-1A, B and C and requested relief from the Code accuracy requirement for flow instruments. This entire request for relief is being withdrawn. Based on guidance from ASME OM Interpretation 95-6, certain terms in the instrument loop accuracy calculation can be excluded, resulting in a calculated value for loop accuracy that is within ±2%. Relief Request P-6 from the original IST Program Plan submittal has been renumbered from P-6 to P-5. Relief Request P-5 deals with boric acid transfer pumps 1-CH-P-2A and B. The basis in P-5 was revised to enhance clarity. Also, references to Generic Letter 89-04, Position 9, and 10CFR 50.55a(f)(6)(i) were added to the alternate testing section.
P-6	Relief Request P-7 from the original IST Program Plan submittal has been renumbered from P-7 to P-6. P-6 applies to outside recirculation spray pumps 1-RS-P-2A and B, and has been expanded to include: 1) a description of the preservice testing performed on the Unit 2 outside recirculation pumps, 2) the physical limitations of the system that prevents full flow testing, 3) the fact that the point on the pump curve where the test is conducted is well sloped which makes this a good point to detect hydraulic performance losses (a figure of the nominal vendor pump curve was added), 4) a description of the predictive maintenance program as it applies to the outside recirculation spray pumps, and 5) reference to restricting the acceptable range beyond the Code required range to ensure that the required accident flow can be delivered. Also, the range of reference flow rates was changed from 1350 to 1400 gpm, to 1450 to 1500 gpm (due to an instrument scaling error two flow rates are recorded in the test procedure and the higher flow rate represents the actual flow rate). References to 10 CFR 50.55a(a)(3)(i) and10CFR 50.55a(f)(6)(i) were added in the alternate testing section.

RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
	The four figures following the document are provided to aid the NRC in evaluating the bases in P-6. These figures show the nominal vendor pump curve and IST data points for pumps 1-RS-P-2A and B, and 2-RS-P-2A and B. In addition, preservice data points are given for the Unit 2 pumps. There were no preservice tests performed for the Unit 1 pumps.
P-7	For auxiliary service water pump 1-SW-P-4, the need for and consequently the request for relief from the discharge pressure instrument accuracy requirement was eliminated. Based on guidance from ASME OM Interpretation 95-6, certain terms in the instrument loop accuracy calculation can be excluded, resulting in a calculated value for loop accuracy that is within $\pm$2%. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.

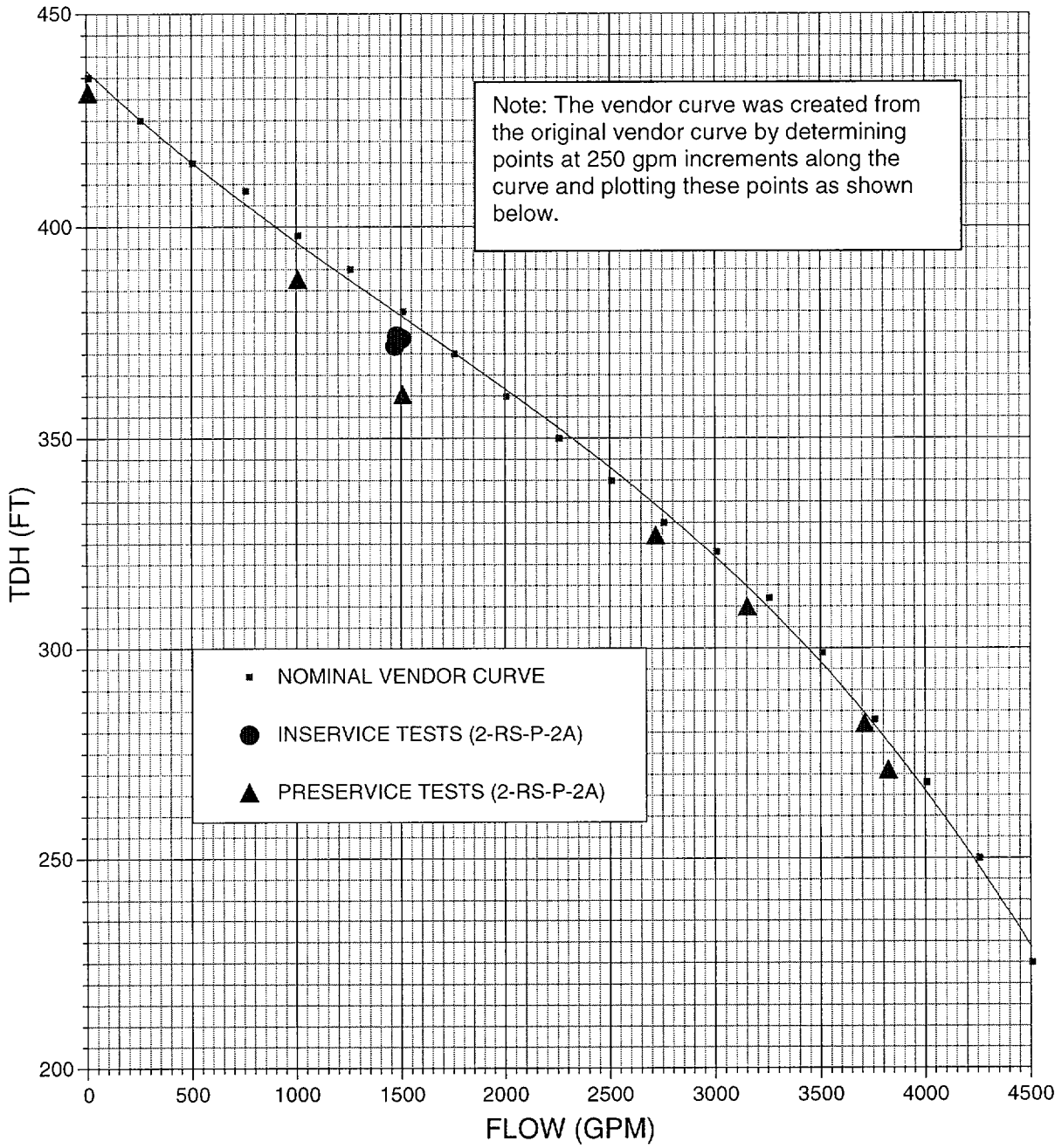
RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
V-1	A description of the evaluation to be used instead of repair or replacement, was added to Relief Request V-1 for the RWST isolation valves. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
V-2	The test interval for manual valves in Relief Request V-2 was changed from 5 years to 2 years per guidance from Proposed Rules issued for comment in the Federal Register, Vol. 66, No. 150, dated August 3, 2001. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
V-3	In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.



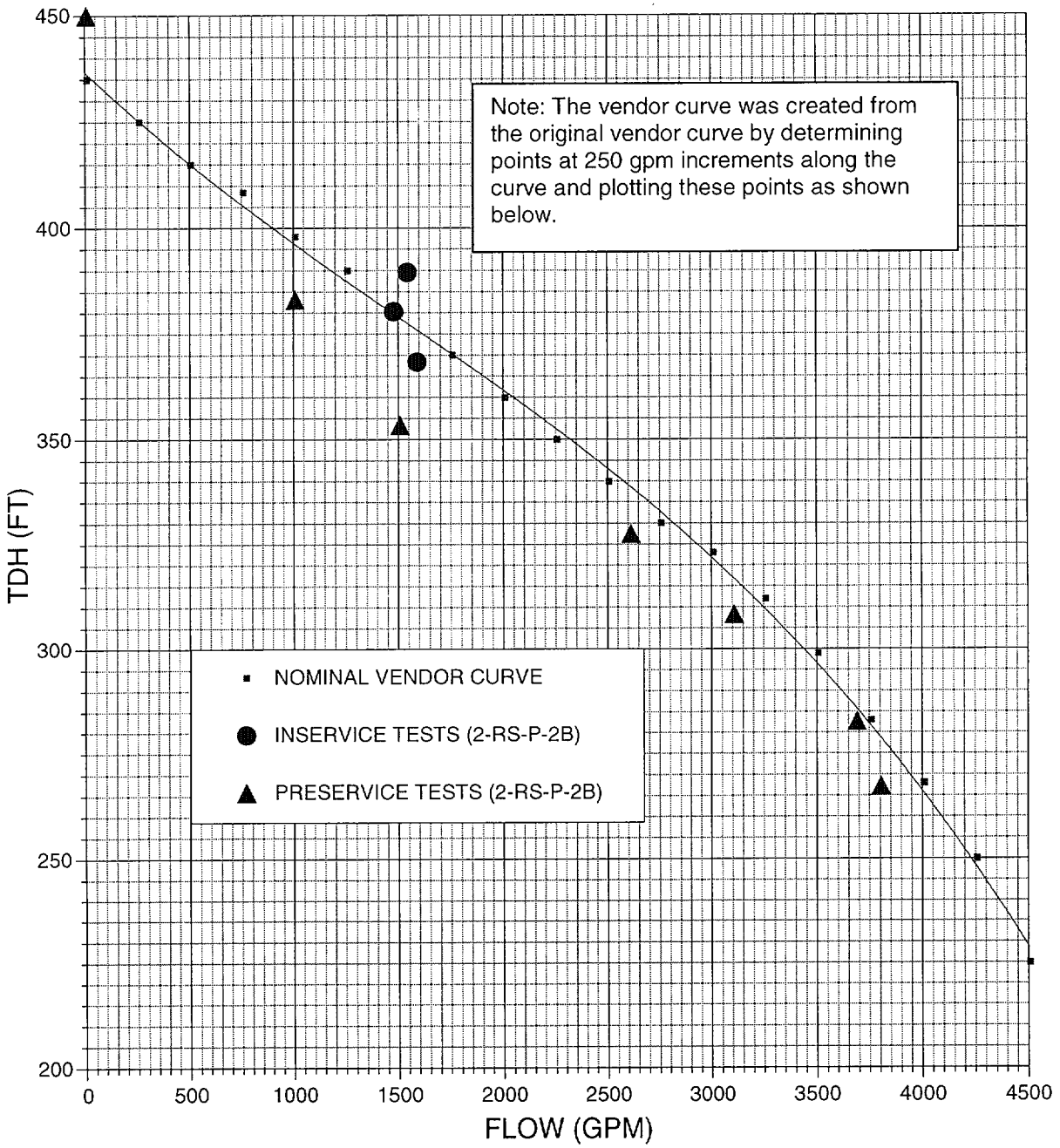
OUTSIDE RECIRCULATION SPRAY PUMP 1-RS-P-2A



OUTSIDE RECIRCULATION SPRAY PUMP 1-RS-P-2B



OUTSIDE RECIRCULATION SPRAY PUMP 2-RS-P-2A



OUTSIDE RECIRCULATION SPRAY PUMP 2-RS-P-2B

RELIEF REQUEST G-1

ISTA Code Requirements
For Which Relief Is Requested

ISTA 1.5 requires that provisions for examinations include access for the Inspector.

ISTA 2.1 details the specific requirements for access for the Inspector, qualification of the Authorized Inspection Agencies, Inspectors and Supervisors and the duties of the Inspector.

Section XI, IWA-2110, the 1996 Addenda to the 1995 Edition, details the duties of the inspector that pertain to inservice tests required on pumps and valves.

Basis for Request (ISTA 1.5 and ISTA 2.1, and Section XI, IWA-2110)

The ASME OMb Code-1997 Addenda to the 1995 ASME OM Code, ISTA 1.5 eliminates reference to access provisions for the Inspector. Requirements for access provisions for examination personnel and equipment remain. ISTA 2.1 from the 1995 ASME Code details the specific requirements for access for the Inspector, qualification of the Authorized Inspection Agencies, Inspectors and Supervisors and the duties of the Inspector. ISTA 2.1 has been deleted in its entirety from OMb Code-1997. Also, Section XI, IWA-2110, the 2000 Addenda to the 1998 Edition eliminates reference to inservice testing as a duty of the inspector.

The Authorized Nuclear Inservice Inspector (ANII) review of the IST Programs is usually far less comprehensive than the review performed for the ASME Section XI inservice inspection activities. Normally the ANII just reviews the IST Program Plan and the records of tests performed. In general, ANIIs do not have the training or background experience to make determinations about component safety functions in order to verify program scope, or to assess the operational readiness of components based on test results.

North Anna has a multi-layered review process that performs the same functions as the ANII. Also, the IST Program is subject to the North Anna Quality Assurance Program. The quality assurance process at North Anna provides an equivalent, or greater level of quality and safety as the Code requirements for ANII involvement. Therefore, there is no quality-related benefit in duplicating the review efforts.

RELIEF REQUEST G-1 (Cont.)

Alternate Proposed

Requirements for access for the Inspector described in ISTA 1.5, requirements for access, duties of the ANII and qualification of the Authorized Inspection Agencies and Inspectors described in ISTA 2.1, and requirements for duties of the ANII described in Section XI, IWA-2110 will be eliminated from the IST Program.

Using the provisions of this relief request as an alternative to the specific requirements of ISTA 1.5, ISTA 2.1 and Section XI, IWA-2110 identified above, will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-1

Systems: Refer to Table P-1

Pump(s): Refer to Table P-1

Group: Refer to Table P-1

Class: Refer to Table P-1

Function: Various

ISTB Code Requirements for Which Relief is Requested

ISTB 4.3, requires that reference values be determined from the results of preservice testing or from the results of the first inservice test. This request applies only to vibration testing.

Basis for Request

The pumps listed in Table P-1 have at least one vibration reference value (V_r) that is currently less than 0.05 inches per second (ips). Small values for V_r produce small acceptable ranges for pump operation. The acceptable range is defined in Table ISTB 5.2.1-1 as less than or equal to $2.5V_r$. Based on a small acceptable range, a smooth running pump could be subject to unnecessary corrective action.

For very small reference values, hydraulic noise and instrument error can be a significant portion of the reading and affect the repeatability of subsequent measurements. Also, experience gathered from the North Anna preventive maintenance program has shown that changes in vibration levels in the range of 0.05 ips do not normally indicate significant degradation in pump performance.

To avoid unnecessary corrective action, a minimum value for V_r of 0.05 ips has been established for velocity measurements. This minimum value will be applied to individual vibration locations for the pumps listed in Table P-1 where the measured reference value is less than 0.05 ips.

When new reference values are established per paragraphs ISTB 4.4, 4.5 or 4.6, the measured parameters will be evaluated for each location to determine if the provisions of this relief request still apply. If the measured V_r is greater than 0.05 ips, the requirements of ISTB 4.3 will be applied even if the pump is listed in Table P-1. Conversely, if the measured V_r is less than 0.05 ips, a minimum value of 0.05 ips will be used for V_r even if the pump is not currently listed in Table P-1.

RELIEF REQUEST P-1 (Cont.)

In addition to the requirements of ISTB, the pumps in the ASME Inservice Testing Program are included in the North Anna Predictive Maintenance Program. The North Anna Predictive Maintenance Program currently employs predictive monitoring techniques such as:

vibration monitoring and analysis beyond that required by ISTB,
bearing temperature trending,
oil sampling and analysis, and
thermography analysis.

If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, appropriate actions are taken that may include:

increased monitoring to establish rate of change,
review of component specific information to identify cause, and
removal of the pump from service to perform maintenance.

It should be noted that all of the pumps in the IST Program will remain in the Predictive Maintenance Program even if certain pumps have very low vibration readings and are considered to be smooth running pumps. This alternative to the requirements of ISTB 4.3 provides an acceptable level of quality and safety.

Alternate Testing Proposed

Pumps with a measured reference value below 0.05 ips for a particular vibration measurement location shall have subsequent test results for that location compared to an acceptable range based on 0.05 ips. In addition to the Code requirements, all pumps in the IST Program are included in and will remain in the North Anna Predictive Maintenance Program regardless of their smooth running status.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 4.3 identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-1 (Cont.)

Table P-1

Pump Number	System	Code Class	OM Group	Description
1-CC-P-1A 1-CC-P-1B	Component Cooling	3	A	Component Cooling Water Pumps
1-CH-P-2A 1-CH-P-2B	Chemical and Volume Control	2	A	Boric Acid Transfer Pumps
1-EG-P-1HA 1-EG-P-1HB 1-EG-P-1JA 1-EG-P-1JB	Emergency Diesel Generator	NC	B	Emergency Diesel Generator Fuel Oil Transfer Pumps
1-FW-P-3A 1-FW-P-3B	Feedwater	3	B	Motor Driven Auxiliary Feedwater Pumps
1-HV-P-20A 1-HV-P-20B 1-HV-P-20C	Heating and Ventilation	3	A	Control and Relay Room Chilled Water Pumps
1-HV-P-22A 1-HV-P-22B 1-HV-P-22C	Heating and Ventilation	3	A	Control and Relay Room Condenser Water Pumps
1-RH-P-1A 1-RH-P-1B	Residual Heat Removal	2	A	Residual Heat Removal Pumps
1-RS-P-3A 1-RS-P-3B	Recirculation Spray	3	B	Casing Cooling Pumps
1-SI-P-1A 1-SI-P-1B	Safety Injection	2	B	Low Head Safety Injection Pumps
1-SW-P-1B	Service Water	3	A	Main Service Water Pump

RELIEF REQUEST P-2

Systems: Residual Heat Removal

Pump(s): 1-RH-P-1A
1-RH-P-1B

Group: A

Class: 2

Function: The residual heat removal pumps remove decay heat from the reactor core and the reactor coolant system during plant cool down.

ISTB Code Requirements for Which Relief is Requested

Table ISTB 5.1-1, requires an inservice test be run on each Group A pump nominally every 3 months.

ISTB 5.2.1(b) states that, "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (Table ISTB 5.1-1)

The residual heat removal pumps are located inside containment and are inaccessible during normal operation. The pumps are low pressure (600 psig design pressure) pumps that take suction from and discharge to the reactor coolant system (RCS). Technical Specification paragraphs 4.7.9.1a and 4.7.9.2a require that the RHR subsystem be isolated from the RCS prior to the RCS exceeding 500 psig by closing and de-energizing both remote operated RHR suction isolation valves and locking the associated breakers. Therefore, testing the residual heat removal pumps during normal operation is not practical and would violate the Technical Specifications.

RELIEF REQUEST P-2 (Cont.)

Basis For Request (ISTB 5.2.1(b))

As a result of industry experience and NRC guidance (Generic Letter 88-17) concerning the loss of decay heat removal capability, North Anna Power Station practices a policy of minimizing perturbations to RHR pump flow and system configuration when decay heat must be removed during cold shutdowns and reactor refueling outages.

Therefore, to minimize system perturbations and to permit RHR pump testing during cold shutdown testing, the RHR pumps will be tested in a range of flows, and the results will be compared to acceptance criteria based on a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

Alternate Testing Proposed

These pumps will be tested every cold shutdown but not more frequently than once every three months. Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 5.1-1 and ISTB 5.2.1(b) identified above, which have been identified to be impractical, will provide adequate indication of pump performance. Therefore, pursuant to 10 CFR 50.55a(f)(6)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-3

Systems: Service Water

Pump(s): 1-SW-P-1A
1-SW-P-1B

Group: A

Class: 3

Function: The service water pumps supply cooling water to the component cooling and recirculation spray heat exchangers as well as other safety related components.

ISTB Code Requirements for Which Relief is Requested

ISTB 5.2.1(b) states that "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (ISTB 5.2.1(b))

Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate future plant conditions. In the service water system, reproducing one of these reference flow points is not practical with the large butterfly valves installed and it may not be desirable to alter cooling because of other plant operating parameters. Therefore, pumps will be tested in a range of flows and the results will be compared to acceptance criteria based a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed.

Past vibration data for the subject pumps has been reviewed and it has been determined that pump vibration does not vary significantly with flow rate over the range of the test flow rates. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

RELIEF REQUEST P-3 (Cont.)

Alternate Testing Proposed

Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of Table ISTB 4.1-1 and ISTB 5.2.1(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-4

Systems: Component Cooling

Pump(s): 1-CC-P-1A
1-CC-P-1B

Group: A

Class: 3

Function: The component cooling pumps supply cooling water to the component cooling heat exchangers, which remove heat from systems containing radioactive fluids.

ISTB Code Requirements for Which Relief is Requested

ISTB 5.2.1(b) states that "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (ISTB 5.2.1(b))

Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate future plant conditions. In the component cooling system, reproducing one of these reference flow points is difficult with the large butterfly valves installed and it may not be desirable to alter cooling because of other plant operating parameters. Therefore, pumps will be tested in a range of flows and the results will be compared to acceptance criteria based a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed.

Past vibration data for the subject pumps has been reviewed and it has been determined that pump vibration does not vary significantly with flow rate over the range of the test flow rates. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

RELIEF REQUEST P-4 (Cont.)

Alternate Testing Proposed

Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 5.2.1(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-5

Systems: Chemical and Volume Control

Pump(s): 1-CH-P-2A
1-CH-P-2B

Group: A

Class: 2

Function: The boric acid transfer pumps supply boric acid to the suction of the charging pumps for emergency boration. During normal operation they recirculate the contents of the boron injection tank

ISTB Code Requirements for Which Relief is Requested

Table ISTB 4.1-1 requires that flow rate be measured during a Group A test.

Table ISTB 5.1-1 requires that a Group A inservice test be run on each pump nominally every 3 months.

Basis for Request (Tables ISTB 4.1-1 and 5.1-1)

Permanent flow instrumentation is not installed on the recirculation piping, which is the only test loop available for quarterly testing. To measure flow, flow must be established to the charging pump suction lines. This flow would increase the reactor coolant system (RCS) boron inventory and cause a reactivity transient during normal operation.

The pump test requires an extended period of boric acid injection which should only be performed when borating the reactor to cold shutdown conditions in preparation for refueling. There could be much less need for the volume of boric acid required to perform this test, if the test were to be conducted during a mid-cycle cold shutdown evolution, where the initial boron concentration in the RCS could be significantly higher. The potential for over boration under those conditions could delay the ability of the plant to restart, due to the time required to dilute the excess boron in preparation for startup. Therefore, testing the boric acid transfer pumps to the requirements of Table ISTB 4.1-1 and Table 5.1-1 is not considered practical.

RELIEF REQUEST P-5 (Cont.)

Alternate Testing Proposed

These pumps will be tested every quarter on the recirculation loop, and differential pressure and vibration will be measured. Every reactor refueling, a comprehensive test measuring differential pressure, flow and vibration will be performed. This alternate testing of the boric acid transfer pumps complies with Generic Letter 89-04, Position 9.

Using the provisions of this relief request as an alternative to the specific requirements of Table ISTB 4.1-1 and Table 5.1-1 identified above, which have been identified to be impractical, will provide adequate indication of pump performance. Therefore, pursuant to 10 CFR 50.55a(f)(6)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-6

Systems: Recirculation Spray

Pump(s): 1-RS-P-2A
1-RS-P-2B

Group: B

Class: 2

Function: The outside recirculation spray pumps supply borated spray to cool and depressurize the containment atmosphere following a containment depressurization actuation signal and maintain containment subatmospheric following an accident.

ISTB Code Requirements for Which Relief is Requested

ISTB 4.1(a) (Preservice Testing) requires that, "For centrifugal and vertical line shaft pumps in systems where resistance can be varied, flow rate and differential pressure shall be measured at a minimum of five points. If practicable, these points shall be from pump minimum flow to at least pump design flow."

ISTB 4.3(e)(1) (Reference Values) requires that reference values shall be established within ±20% of pump design flow rate for comprehensive tests.

Basis for Request (ISTB 4.1(a))

The test loop for the outside recirculation pumps consists of a 10" pump discharge line feeding into a 4" recirculation line which feeds back to the pump sump. Refer to Figure P-6.1. With this test loop, pump design flow cannot be established. Also, the discharge piping was not designed to be temporarily reconfigured so that pump design flow could be achieved.

The outside recirculation spray pumps for Unit 2 were subject to long term full flow testing in 1979, during the construction phase. A test loop was established by replacing the spray nozzles from each of the two spray headers (150 nozzles for each header) with plugs, discharging pump flow to the spray headers and directing the flow back to the containment sump. A dike was constructed around the containment sump to simulate water levels in containment that are expected during an accident. The outside recirculation spray pumps took suction from the sump, thus, completing the loop. Re-establishing this full flow test loop for the purpose of periodic testing would require plant modifications and is not practicable.

RELIEF REQUEST P-6 (Cont.)

The spray headers are inaccessible without a significant amount of scaffolding. Even if the nozzles were accessible, the plugging of 300 spray nozzles, running the full flow test and returning the system to its operable configuration present substantial challenges in terms of complexity of the temporary modifications, labor intensive nature of the modifications, and controls and post modification testing needed to ensure that the system is returned to the original configuration.

As an alternative to flow testing at the design flow rate, the test loop shown in Figure P-6.1 will be used. Reference flows are typically established with this test loop in the range of 1450 to 1500 gpm, whereas the pump design flow is 3640 gpm. The low reference flows result from restrictions due to the small 4" recirculation line and the limited volume of water in the test loop. The limited water volume results in a rapid temperature rise in the test loop due to heat loads added by the running pump. This temperature rise affects repeatability of the measured hydraulic parameters. Therefore, care must be taken to ensure that the pump run time is limited and that the flow rate is maintained within an optimal range.

With the restrictions described above, the highest flow that can be measured while maintaining stable test conditions is approximately 40% of design flow. Measuring more than one point on the pump curve is limited to flow rates less than the 1450 to 1500 gpm range. Throttling the flow down to 20% of design flow to measure another point on the pump curve may cause flashing across the throttle valve which would cause hydraulic instabilities and questionable test results. Even if the measurements were valid, measuring one more point at 20% of design flow adds little to the determination of acceptable pump operation.

In the 1450 to 1500 gpm range of the head curve for these pumps, the head curve is not flat, but well sloped. Refer to Figure P-6.2. Therefore, as performance degrades due to internal recirculation caused by increasing internal pump clearances, the differential pressure will measurably decrease for a given reference flow rate. As discussed above, testing the outside recirculation spray pumps over the full range of the pump curve and measuring at least five points along the curve is impractical.

As an alternative to measuring at least five points for the preservice test, one point will be measured at approximately 40% of design flow. The proposed alternative to ISTB 4.1(a) provides an acceptable level of quality and safety.

RELIEF REQUEST P-6 (Cont.)

Basis For Request (ISTB 4.3(e)(1))

The pump design flow rate is 3640 gpm and the safety analysis flow is 3450 gpm. To be within 20% of the pump design flow requires a reference flow of 2912 gpm and to be within 20% of the safety analysis flow requires a reference flow of 2760 gpm. For the reasons stated above, reference flows are typically established in the range of 1450 to 1500 gpm, which is not within 20% of design flow.

As an alternative to testing within 20% of the design flow, the reference values will be established at approximately 40% of the design flow. It is our understanding that testing at design flow is important for pumps with characteristic head-flow curves that are flat or gently sloping in the low flow region (little change in developed head with increasing flow). In the low flow region, increasing internal flows, usually due to wear, are difficult if not impossible to detect. Pumps with the "flat" curves at low flows should be tested at near design conditions to determine if increasing internal recirculation flows have degraded pump performance to the point where design requirements cannot be met. This situation does not apply to the outside recirculation pumps if they are tested at 40% of design flow. Testing at the reference flows will detect pump degradation because the pump curve is well sloped at the point of testing. Refer to Figure P-6.2.

In addition to the testing described above, the outside recirculation pumps are included in the North Anna Predictive Maintenance Program. For the outside recirculation spray pumps, this program employs predictive monitoring techniques, such as vibration monitoring and analysis beyond that required by ISTB, and oil sampling and analysis.

If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, appropriate actions are taken that may include:

monitor additional parameters,
review of component specific information to identify cause, and
removal of the pump from service to perform maintenance.

To ensure that the outside recirculation spray pumps can deliver the required accident flow, the acceptable operating range for differential pressure will be more restrictive then the range found in Table ISTB 5.2.3-1. The more restrictive range is based on a minimum allowable pump curve. This minimum allowable pump curve was generated to provide the minimum pump performance parameters that would support the outside recirculation system flow values used in the containment analysis of record. As discussed above, testing the outside recirculation spray pumps to within 20% of the design point is impractical.

RELIEF REQUEST P-6 (Cont.)

The proposed alternative to ISTB 4.3(e)(1) provides an acceptable level of quality and safety.

Alternate Testing Proposed

Preservice tests will be conducted using one point on the pump curve at approximately 40% of pump design flow. Comprehensive test reference flows will be established at approximately 40% of pump design flow.

The outside recirculation spray pumps will be subject to additional testing, trending and diagnostic analysis of the North Anna Predictive Maintenance Program. Also, the acceptable operating range for differential pressure will be more restrictive than the range found in Table ISTB 5.2.3-1 to ensure that the outside recirculation spray pumps can deliver the required accident flow.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 4.1(a) and ISTB 4.3(e)(1) identified above, which have been identified to be impractical, will provide adequate indication of pump performance. Therefore, pursuant to 10 CFR 50.55a(f)(6)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-6 (Cont.)

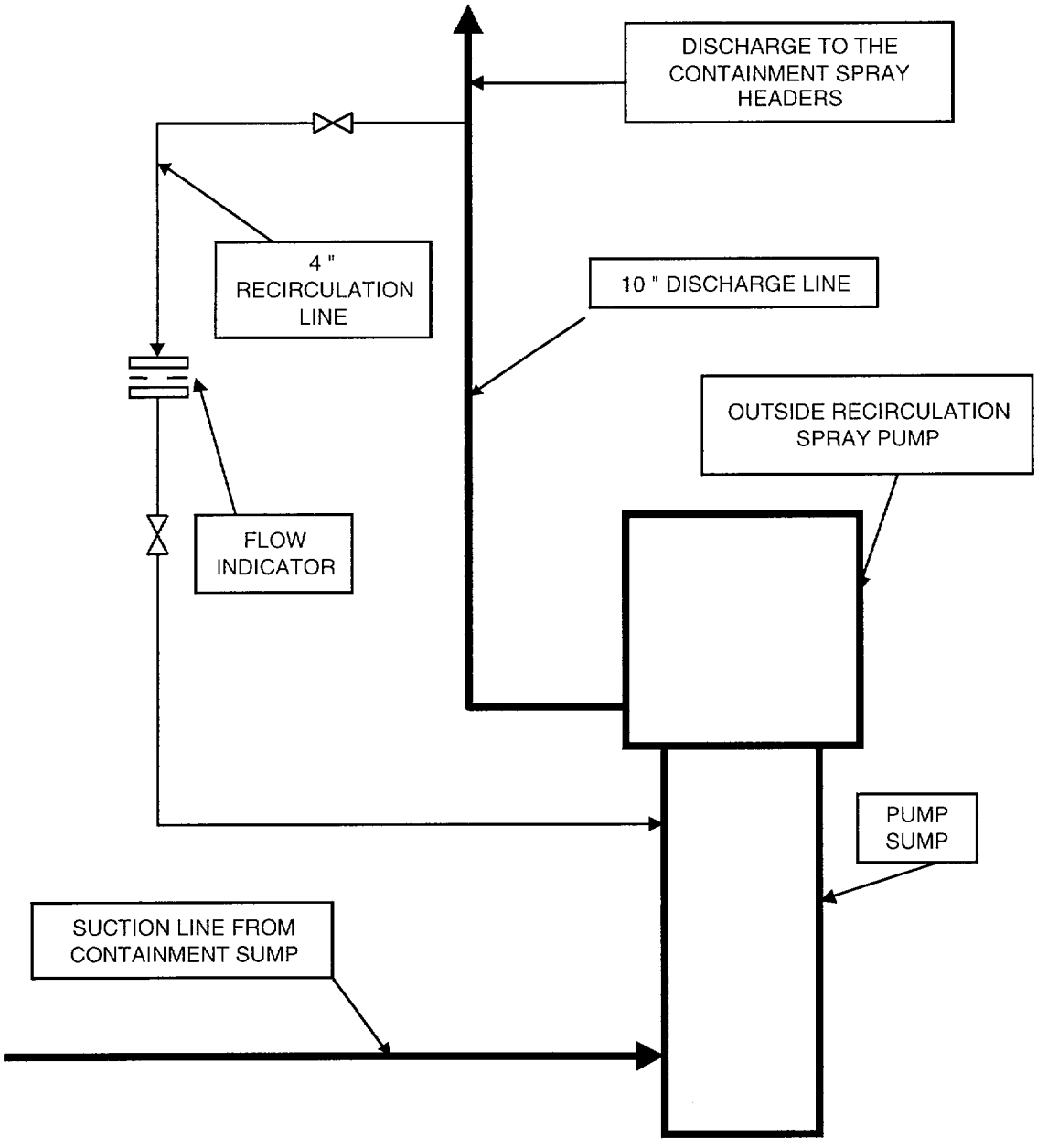


FIGURE P-6.1

RELIEF REQUEST P-6 (Cont.)

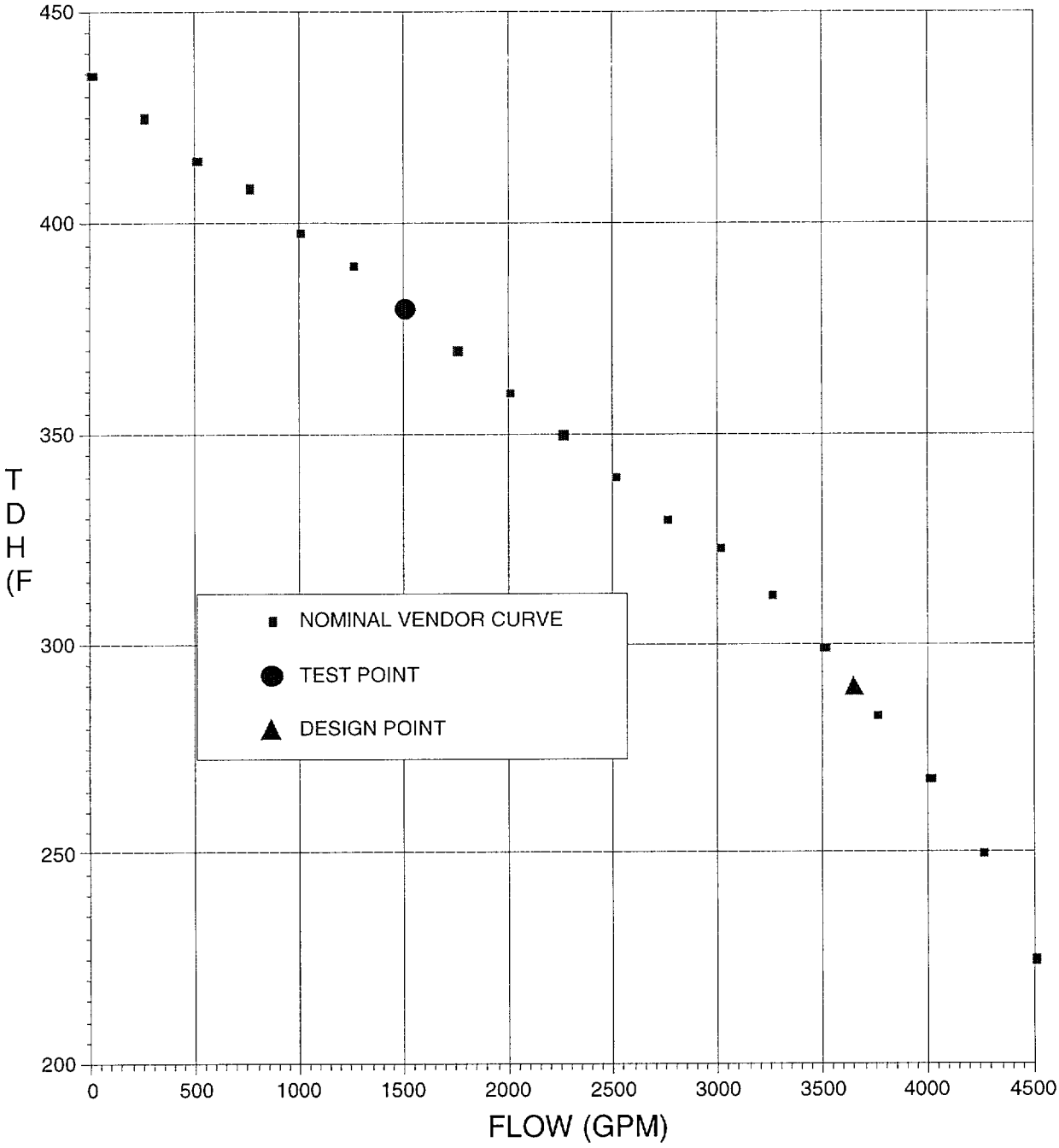


FIGURE P-6.2

RELIEF REQUEST P-7

Systems: Service Water

Pump(s): 1-SW-P-4

Group: B

Class: 3

ISTB Code Requirements for Which Relief is Requested

Table ISTB 4.1-1 (Inservice Test Parameters) requires the measurement of differential pressure.

ISTB 5.2.1(b) states that "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (Table ISTB 4.1-1)

This pump takes suction from Lake Anna. No inlet pressure instrumentation is installed. The North Anna lake level indicator is located near the North Anna dam, miles from the auxiliary service water pump intake. The indicator is outside and approximately 20 feet from the observation point. Therefore, measuring the lake level can be difficult during periods of inclement weather or low light conditions.

However, the lake level fluctuates very little from test to test and can be considered to be constant. The lake has a minimum level of 244 feet elevation as required by Technical Specifications, and maximum and minimum recorded levels during past testing of 250.24 feet and 248.16 feet, respectively. Therefore, the expected maximum variation in lake level is about 2 feet, which is less than 1 psi. The discharge pressure gauge has a full scale reading of 100 psig and the discharge pressures range from 50 to 65 psig. Even the maximum variation, which in all likelihood will not occur between successive tests, is a small percentage of the total head developed by the pump. Therefore, the repeatability of the tests and the ability to detect degradation will not be significantly affected if only discharge pressure is measured.

RELIEF REQUEST P-7 (Cont.)

Applying the Code acceptance criteria to discharge pressure instead of differential pressure is a conservative application of the acceptance criteria for the deep draft pump because the operability band is smaller. For this pump, the total developed head is calculated by adding the measured discharge pressure to the height from the discharge pressure gauge to the pump impeller, subtracting the height from the lake surface to the pump impeller. Therefore, the measured discharge pressure will always be a smaller number than the actual total head developed by the pump. This alternative to the requirements of Table ISTB 4.1-1 provides an acceptable level of quality and safety.

Basis For Request (ISTB 5.2.1(b))

Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate future plant conditions. In the service water system, reproducing one of these reference flow points is difficult with the large butterfly valves installed and it may not be desirable to alter cooling because of other plant operating parameters. Therefore, pumps will be tested in a range of flows and the results will be compared to acceptance criteria based a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

Assessment of Combining Requests for Relief

By letter dated October 18, 1994, the NRC requested that we assess the impact on operational readiness resulting from the combination of using discharge pressure and a pump curve. We responded to this request by letter dated October 18, 1995. As described in our letter, the assessment included a review of normalized test data for each pump. North Anna has the ability to normalize the test data and trend the data from test to test. By knowing the polynomial equation that describes the reference pump curve, a reference value was calculated for the dependent variable using the value of the independent variable. The actual test result was divided by the reference value to yield a normalized test result, which was then used to trend the performance of the pump. This review showed that the test results were trendable and provide the ability to assess the operational readiness of the pump.

RELIEF REQUEST P-7 (Cont.)

Alternate Testing Proposed

Discharge pressure will be measured in place of differential pressure. Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of Table ISTB 4.1-1 and ISTB 5.2.1(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-1

System: Chemical and Volume Control and Safety Injection

Valve(s): 1-CH-MOV-1115B
1-CH-MOV-1115D
1-SI-47
1-SI-MOV-1885A
1-SI-MOV-1885B
1-SI-MOV-1885C
1-SI-MOV-1885D

Category: A for 1-CH-MOV-1115B and D, and 1-SI-MOV-1885A-D
AC for 1-SI-47

Class: 2

Function: RWST Isolation Valves

ISTC Code Requirements for Which Relief is Requested

ISTC 4.3.3(f) - Valves or valve combinations with leakage rates exceeding the values specified by the Owner in ISTC 4.3.3(e) above shall be declared inoperable and be either repaired or replaced.

Basis for Request

Valves 1-CH-MOV-1115B and D, and 1-SI-47 are in the supply line to the charging pumps from the RWST. Valves 1-SI-MOV-1885A, B, C and D are on test lines that run from the discharge of the low head SI pumps to the RWST. During recirculation mode transfer, the RWST is isolated and the low head SI pumps recirculate highly contaminated water from the containment sump to the reactor vessel.

The RWST isolation valves work as a system of valves to protect the RWST from the contaminated sump water. Permissible valve leakage rates are based on each valve's possible contribution to the total allowable leakage rate to the RWST. When the leakage rate from each valve has been measured and summed with the leakage rates of the other RWST isolation valves, an individual valve's permissible leakage rate may have been exceeded but the overall allowable leakage to the RWST may not have been exceeded. In these cases, a repair or replacement may not be necessary because the system of isolation valves has been verified to be performing acceptably.

In addition to repair or replacement as corrective actions, an evaluation can be performed which demonstrates that even if a valve has exceeded its permissible

leakage rate, the overall leakage rate to the RWST will be maintained below the overall allowable RWST leakage rate and hence the system function is satisfied.

This evaluation should provide a high level of assurance that delaying the repair or replacement will not result in exceeding the overall limit before the next leak rate test. The evaluation should include a determination of the cause for the individual valve leakage. The evaluation should also address the effect of the degradation mechanism for the valve on the ability of the valve group to maintain overall leakage to the RWST below the overall allowable leakage rate during the subsequent 24 month interval. Evaluations will be documented and retained in plant records, and are available for subsequent review. This alternative to the requirements of ISTC 4.3.3(f) provides an acceptable level of quality and safety.

Alternate Testing Proposed

In addition to repair or replacement as corrective actions, an evaluation can be performed which demonstrates that even if a valve has exceeded its permissible leakage rate, the overall leakage rate to the RWST will be maintained below the overall allowable RWST leakage rate. No repair or replacement is necessary if the evaluation is performed and system leakage is projected to be maintained below the overall permissible leakage rate throughout the subsequent 24 month interval.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC 4.3.3(f) identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-2

System: Refer to Table V-2

Valve(s): Refer to Table V-2

Category: Refer to Table V-2

Class: Refer to Table V-2

Function: Refer to Table V-2

ISTC Code Requirements for Which Relief is Requested

ISTC 4.2.1 requires that valves be tested nominally every 3 months except as provided by paragraphs ISTC 4.2.2, ISTC 4.2.5, and ISTC 4.2.7.

ISTC 4.2.2 requires full-stroke exercising during plant operation, or if not practicable during plant operation then during cold shutdown, or if not practicable cold shutdown then during reactor refueling.

Basis for Request

The manual valves listed in Table V-2 remain in their aligned positions during normal operation and are not subject to significant process fluid wear. Also, the valves have a simple design with a limited number of failure causes. Therefore, an extended testing interval beyond the 3 month testing interval required by ASME OMa Code-1996 is acceptable for testing these manual valves.

Paragraph ISTC-3540 in the ASME Code, 1999 Addenda states,

> "Manual valves shall be full-stroke exercised at least once every 5 years, except where adverse conditions[1] may require the valve to be tested more frequently to ensure operational readiness. Any increase testing frequency shall be specified by the owner. The valve shall exhibit the required change of obturator position."

RELIEF REQUEST V-2 (Cont.)

Note 1 states

> "Harsh service environment, lubricant hardening, corrosive or sediment laden process fluid, or degraded valve components are some examples of adverse conditions."
>
> However, in Proposed Rules issued for comment in the Federal Register, Vol. 66, No. 150, dated August 3, 2001, the NRC proposed a modification in 10 CFR 50.55a(b)(3)(vi) that would require an exercise interval of 2 years for manual valves within the scope of the ASME OM Code in lieu of the exercise interval of 5 years specified in paragraph ISTC-3540 of the ASME Code, 1999 Addenda and the 2000 Addenda. Using the Proposed Rules as guidance, an exercise interval of 2 years for manual valves will be applied instead of the 5 year interval given in ISTC-3540. This alternative to the requirements of ISTC 4.2.1 and ISTC 4.2.2 provides an acceptable level of quality and safety.

Alternate Testing Proposed

The manual valves listed in Table V-2 will be exercised at least once every 2 years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness. The requirements of ISTC-3540 in ASME OMa Code-1999, with a 2 year test interval instead of a 5 year test interval, will be imposed.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC 4.2.1 and ISTC 4.2.2 identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-2 (Cont.)

Table V-2

Valve Number	System	OM Category	ASME Class	Function
1-CH-241	Chemical and Volume Control	B	3	Alternate Emergency Boration Line Manual Valve
1-FW-062 1-FW-064 1-FW-094 1-FW-096 1-FW-126 1-FW-128 1-FW-149 1-FW-155 1-FW-166 1-FW-172 1-FW-184 1-FW-190	Auxiliary Feedwater	B	3	Auxiliary Feedwater Header Alignment and Cross Connect Manual Isolation Valves
1-FW-145 1-FW-162 1-FW-180 1-FW-227	Auxiliary Feedwater	B	3	Auxiliary Feedwater Pump Alternate Supply Manual Isolation Valves
1-MS-018 1-MS-057 1-MS-095	Main Steam	B	2	Main Steam to Auxiliary Feedwater Turbine Line Manual Isolation Valves
1-SW-1067 1-SW-1070 1-SW-1139	Service Water	B	3	Service Water Chemical Addition System Manual Isolation Valves

RELIEF REQUEST V-3

System: Refer to Table V-3

Valve(s): Refer to Table V-3

Category: Refer to Table V-3

Class: Refer to Table V-3

Function: Refer to Table V-3

ISTC Code Requirements for Which Relief is Requested

ISTC 4.2.4(b) requires that the stroke time of all power-operated valves shall be measured to at least the nearest second.

ISTC 4.2.8 requires that measured stroke times be compared to the acceptance criteria in this section.

ISTC 4.2.9(b) requires that corrective action be taken if the measured stroke times do not meet the acceptance criteria in ISTC 4.2.8.

Basis for Request

ISTC 1.2(b) excludes "valves used only for system control, such as pressure regulating valves" from the testing requirements of the Code. It is not the intent of the Code to test the regulating function of control valves.

However, if these valves have a safety function to fail to an open of closed position, then the testing requirements for power-operated valves are imposed. Code Case OMN-8 provides alternative rules for inservice testing of power-operated valves that are used for system control and have a fail safe safety function. Code Case OMN-8 is given below.

> *Inquiry:* What alternative requirements to those of ASME/ANSI OMa-1988, Part 10, para. 4.2 through OM Code-1995, ISTC 4.2 may be used for power-operated control valves that have only a fail safe safety function?

RELIEF REQUEST V-3 (Cont.)

Reply: It is the opinion of the Committee that the requirements of ASME/ANSI OMa-1988, Part 10, para.4.2.1.4, Power-Operated Valve Stroke Testing; para. 4.2.1.8, Stroke Time Acceptance Criteria; and para. 4.2.1.9(b) need not be met. All other applicable requirements of para. 4.2 shall be met for ASME/ANSI OMa-1988, Part 10.

Further, the requirements of OM Code-1995, ISTC 4.2.4, Power-Operated Valve Stroke Testing; ISTC 4.2.8, Stroke Time Acceptance Criteria; and ISTC 4.2.9(b) need not be met. All other applicable requirements of paragraph shall be met.

Any abnormality or erratic action experienced during valve exercising shall be recorded in the record of tests, and an evaluation shall be made regarding need for corrective action.

The power-operated control valves listed in Table V-3 have only a fail safe function. We propose applying the alternative rules described in Code Case OMN-8 to the control valves listed in Table V-3. This alternative to the requirements of ISTC 4.2.4(b), ISTC 4.2.8 and ISTC 4.2.9(b) provides an acceptable level of quality and safety.

Alternate Testing Proposed

The control valves listed in Table V-3 will be tested to the requirements of Code Case OMN-8.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC 4.2.4(b), ISTC 4.2.8 and ISTC 4.2.9(b) identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-3 (Cont.)

Table V-3

Valve Number	System	OM Category	ASME Class	Function
1-CH-FCV-1113A	Chemical and Volume Control	B	3	Alternate Emergency Boration Line Flow Control Valve
1-CH-FCV-1114A	Chemical and Volume Control	B	3	Primary Grade Water Flow Control Valve
1-FW-HCV-100A 1-FW-HCV-100B 1-FW-HCV-100C	Auxiliary Feedwater	B	3	Standby Auxiliary Feedwater Supply Hand Control Valves
1-FW-PCV-159A 1-FW-PCV-159B	Auxiliary Feedwater	B	2	Auxiliary Feedwater Pressure Control Valves
1-HV-PCV-1235A1 1-HV-PCV-1235B1 1-HV-PCV-1235C1	Control Room Air Conditioning	B	3	Control Room Condenser Water Bypass Line Pressure Control Valves
1-HV-PCV-1235A2 1-HV-PCV-1235B2 1-HV-PCV-1235C2	Control Room Air Conditioning	B	3	Control Room Condenser Water Line Pressure Control Valves
1-MS-PCV-101A 1-MS-PCV-101B 1-MS-PCV-101C	Main Steam	B	2	Main Steam Header Discharge to Atmosphere Pressure Control Valves
1-SI-HCV-1936	Safety Injection	B	2	Waste Gas from Accumulators to Charcoal Filter Line Hand Control Valve
1-SW-TCV-102A 1-SW-TCV-102B 1-SW-TCV-102C	Service Water	B	3	Service Water from Charging Pump Lube Oil Cooler Temperature Control Valves

Attachment 2

North Anna Unit 2
Inservice Testing Program
Revised Relief Requests

Virginia Electric and Power Company
(Dominion)

The following is a summary of changes made to the North Anna Unit 2 Inservice Testing (IST) Program Plan, Interval 3, relief requests. The Interval 3 IST Program Plan was submitted to the NRC by letter dated June 4, 2001. These changes resulted from a conversation with the NRC and further review of the relief request bases.

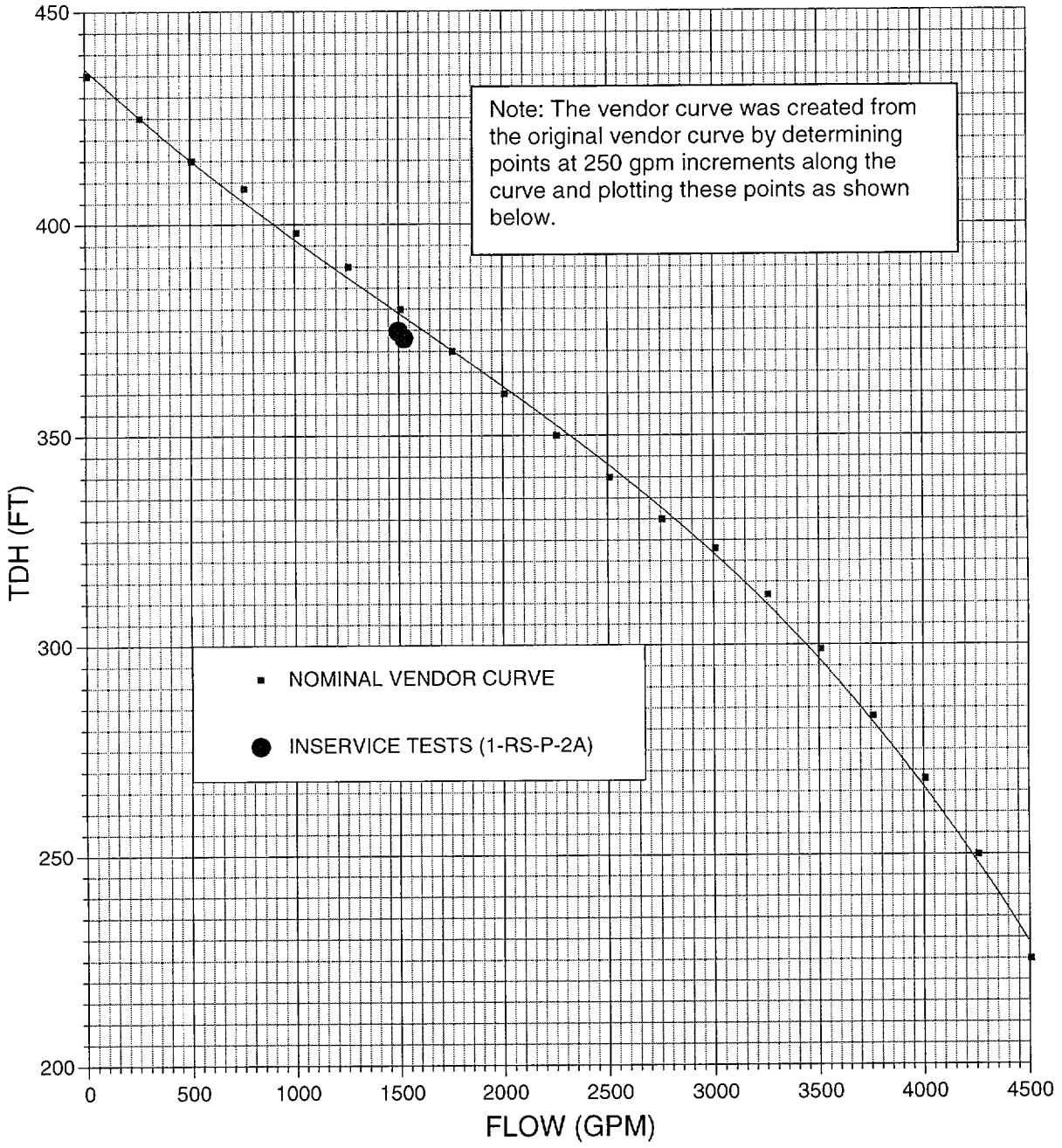
RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
G-1	In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.

RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
P-1	A table was added listing the pumps that currently have at least one vibration location with a measured reference value less then 0.05 inches per second. The basis for relief was expanded to include experience gained from the predictive maintenance program and a description of the predictive maintenance program. In the alternate testing section, references to the predictive maintenance program and 10 CFR 50.55a(a)(3)(i) were added.
P-2	For residual heat removal pumps 2-RH-P-1A and B, reference to the technical specifications was added to the basis for relief. In the alternate testing section, references to 10 CFR 50.55a(a)(3)(i) and 10CFR 50.55a(f)(6)(i) were added.
P-3	For service water pumps 2-SW-P-1A and B, the need for and consequently the request for relief from measuring differential pressure was eliminated. Existing reservoir level instrumentation will be used in calculating differential pressure. Also, reference to an assessment of combining relief requests for a given pump was removed. The relief request has been reduced to just one Code requirement. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
P-4	For component cooling water pumps 2-CC-P-1A and B, the need for and consequently the request for relief from the flow instrument accuracy requirement was eliminated. Based on guidance from ASME OM Interpretation 95-6, certain terms in the instrument loop accuracy calculation can be excluded, resulting in a calculated value for loop accuracy that is within $\pm$2%. Also, reference to an assessment of combining relief requests for a

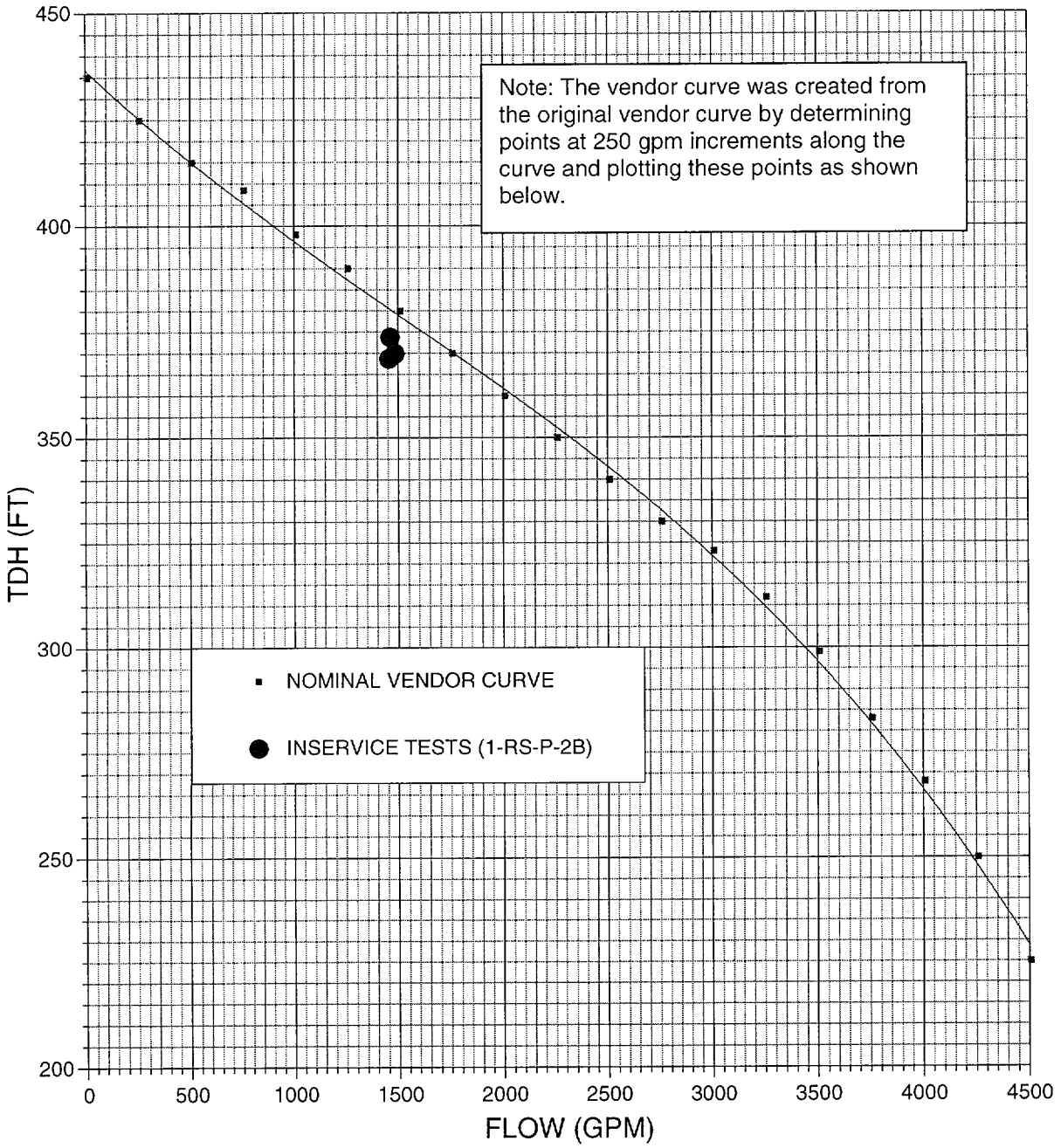
RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
	given pump was removed. The relief request has been reduced to just one Code requirement. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
P-5	Relief Request P-5 originally referenced charging pumps 2-CH-P-1A, B and C and requested relief from the Code accuracy requirement for flow instruments. This entire request for relief is being withdrawn. Based on guidance from ASME OM Interpretation 95-6, certain terms in the instrument loop accuracy calculation can be excluded, resulting in a calculated value for loop accuracy that is within ±2%. Relief Request P-6 from the original IST Program Plan submittal has been renumbered from P-6 to P-5. Relief Request P-5 deals with boric acid transfer pumps 1-CH-P-2C and D. The basis in P-5 was revised to enhance clarity. Also, references to Generic Letter 89-04, Position 9, and 10CFR 50.55a(f)(6)(i) were added to the alternate testing section.
P-6	Relief Request P-7 from the original IST Program Plan submittal has been renumbered from P-7 to P-6. P-6 applies to outside recirculation spray pumps 1-RS-P-2A and B, and has been expanded to include: 1) a description of the preservice testing performed on the Unit 2 outside recirculation pumps, 2) the physical limitations of the system that prevents full flow testing, 3) the fact that the point on the pump curve where the test is conducted is well sloped which makes this a good point to detect hydraulic performance losses (a figure of the nominal vendor pump curve was added), 4) a description of the predictive maintenance program as it applies to the outside recirculation spray pumps, and 5) reference to restricting the acceptable range beyond the Code required range to ensure that the required accident flow can be delivered. Also, the range of reference flow rates was changed from 1350 to 1400 gpm, to 1450 to 1500 gpm (due to an instrument scaling error two flow rates are recorded in the test procedure and the higher flow rate represents the actual flow rate). References to 10 CFR 50.55a(a)(3)(i) and10CFR 50.55a(f)(6)(i) were added in the alternate testing section. The four figures following the document are provided to aid the NRC in evaluating the bases in P-6. These figures show the nominal vendor pump curve and IST data points for pumps 1-RS-P-2A and B, and 2-RS-P-2A and B. In addition, preservice data points are given for the

RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
	Unit 2 pumps. There were no preservice tests performed for the Unit 1 pumps.
P-7	For auxiliary service water pump 2-SW-P-4, the need for and consequently the request for relief from the discharge pressure instrument accuracy requirement was eliminated. Based on guidance from ASME OM Interpretation 95-6, certain terms in the instrument loop accuracy calculation can be excluded, resulting in a calculated value for loop accuracy that is within $\pm$2%. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.

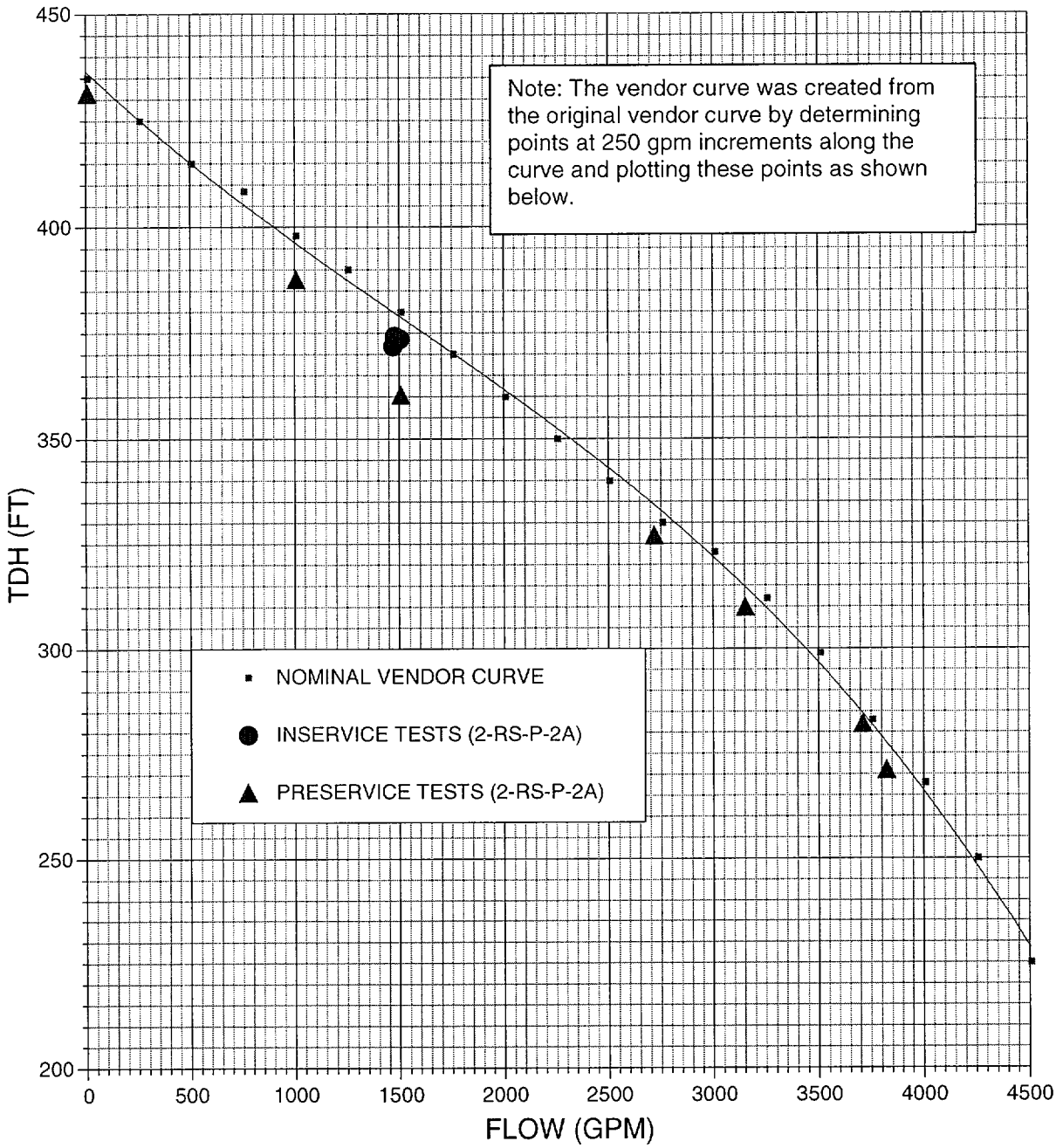
RELIEF REQUEST NO.	DESCRIPTION OF CHANGE
V-1	A description of the evaluation to be used instead of repair or replacement, was added to Relief Request V-1 for the RWST isolation valves. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
V-2	The test interval for manual valves in Relief Request V-2 was changed from 5 years to 2 years per guidance from Proposed Rules issued for comment in the Federal Register, Vol. 66, No. 150, dated August 3, 2001. In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.
V-3	In the alternate testing section, 10 CFR 50.55a(a)(3)(i) was added as a reference.



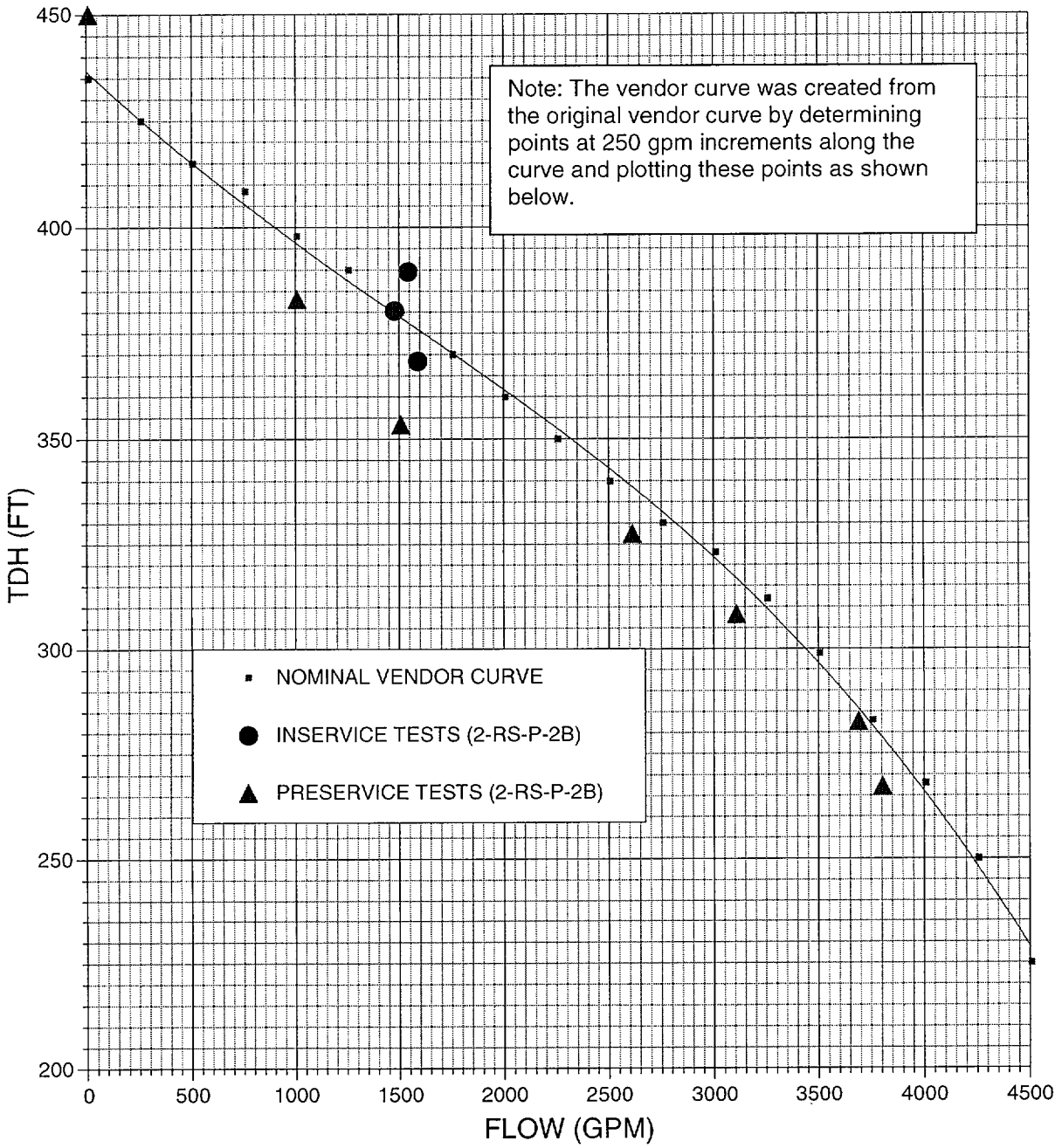
OUTSIDE RECIRCULATION SPRAY PUMP 1-RS-P-2A



OUTSIDE RECIRCULATION SPRAY PUMP 1-RS-P-2B



OUTSIDE RECIRCULATION SPRAY PUMP 2-RS-P-2A



OUTSIDE RECIRCULATION SPRAY PUMP 2-RS-P-2B

RELIEF REQUEST G-1

ISTA Code Requirements for Which Relief is Requested

ISTA 1.5 requires that provisions for examinations include access for the Inspector.

ISTA 2.1 details the specific requirements for access for the Inspector, qualification of the Authorized Inspection Agencies, Inspectors and Supervisors and the duties of the Inspector.

Section XI, IWA-2110, the 1996 Addenda to the 1995 Edition, details the duties of the inspector that pertain to inservice tests required on pumps and valves.

Basis for Request (ISTA 1.5 and ISTA 2.1, and Section XI, IWA-2110)

The ASME OMb Code-1997 Addenda to the 1995 ASME OM Code, ISTA 1.5 eliminates reference to access provisions for the Inspector. Requirements for access provisions for examination personnel and equipment remain. ISTA 2.1 from the 1995 ASME Code details the specific requirements for access for the Inspector, qualification of the Authorized Inspection Agencies, Inspectors and Supervisors and the duties of the Inspector. ISTA 2.1 has been deleted in its entirety from OMb Code-1997. Also, Section XI, IWA-2110, the 2000 Addenda to the 1998 Edition eliminates reference to inservice testing as a duty of the inspector.

The Authorized Nuclear Inservice Inspector (ANII) review of the IST Programs is usually far less comprehensive than the review performed for the ASME Section XI inservice inspection activities. Normally the ANII just reviews the IST Program Plan and the records of tests performed. In general, ANIIs do not have the training or background experience to make determinations about component safety functions in order to verify program scope, or to assess the operational readiness of components based on test results.

North Anna has a multi-layered review process that performs the same functions as the ANII. Also, the IST Program is subject to the North Anna Quality Assurance Program. The quality assurance process at North Anna provides an equivalent or greater level of quality and safety as the Code requirements for ANII involvement. Therefore, there is no quality-related benefit in duplicating the review efforts.

RELIEF REQUEST G-1 (Cont.)

Alternate Proposed

Requirements for access for the Inspector described in ISTA 1.5, requirements for access, duties of the ANII and qualification of the Authorized Inspection Agencies and Inspectors described in ISTA 2.1, and requirements for duties of the ANII described in Section XI, IWA-2110 will be eliminated from the IST Program.

Using the provisions of this relief request as an alternative to the specific requirements of ISTA 1.5, ISTA 2.1 and Section XI, IWA-2110 identified above will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-1

Systems: Refer to Table P-1

Pump(s): Refer to Table P-1

Group: Refer to Table P-1

Class: Refer to Table P-1

Function: Various

ISTB Code Requirements for Which Relief is Requested

ISTB 4.3 requires that reference values be determined from the results of preservice testing or from the results of the first inservice test. This request applies only to vibration testing.

Basis for Request

The pumps listed in Table P-1 have at least one vibration reference value (V_r) that is currently less than 0.05 inches per second (ips). Small values for V_r produce small acceptable ranges for pump operation. The acceptable range is defined in Table ISTB 5.2.1-1 as less than or equal to $2.5V_r$. Based on a small acceptable range, a smooth running pump could be subject to unnecessary corrective action.

For very small reference values, hydraulic noise and instrument error can be a significant portion of the reading and affect the repeatability of subsequent measurements. Also, experience gathered from the North Anna preventive maintenance program has shown that changes in vibration levels in the range of 0.05 ips do not normally indicate significant degradation in pump performance.

To avoid unnecessary corrective action, a minimum value for V_r of 0.05 ips has been established for velocity measurements. This minimum value will be applied to individual vibration locations for the pumps listed in Table P-1 where the measured reference value is less than 0.05 ips.

When new reference values are established per paragraphs ISTB 4.4, 4.5 or 4.6, the measured parameters will be evaluated for each location to determine if the provisions of this relief request still apply. If the measured V_r is greater than 0.05 ips, the requirements of ISTB 4.3 will be applied even if the pump is listed in Table P-1. Conversely, if the measured V_r is less than 0.05 ips, a minimum value of 0.05 ips will be used for V_r even if the pump is not currently listed in Table P-1.

RELIEF REQUEST P-1 (Cont.)

In addition to the requirements of ISTB, the pumps in the ASME Inservice Testing Program are included in the North Anna Predictive Maintenance Program. The North Anna Predictive Maintenance Program currently employs predictive monitoring techniques such as:

vibration monitoring and analysis beyond that required by ISTB,
bearing temperature trending,
oil sampling and analysis, and
thermography analysis.

If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, appropriate actions are taken that may include:

increased monitoring to establish rate of change,
review of component specific information to identify cause, and
removal of the pump from service to perform maintenance.

It should be noted that all of the pumps in the IST Program will remain in the Predictive Maintenance Program even if certain pumps have very low vibration readings and are considered to be smooth running pumps. This alternative to the requirements of ISTB 4.3 provides an acceptable level of quality and safety.

Alternate Testing Proposed

Pumps with a measured reference value below 0.05 ips for a particular vibration measurement location shall have subsequent test results for that location compared to an acceptable range based on 0.05 ips. In addition to the Code requirements, all pumps in the IST Program are included in and will remain in the North Anna Predictive Maintenance Program regardless of their smooth running status.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 4.3 identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-1 (Cont.)

Table P-1

Pump Number	System	Code Class	OM Group	Description
1-CH-P-2C 1-CH-P-2D	Chemical and Volume Control	2	A	Boric Acid Transfer Pumps
2-CC-P-1A 2-CC-P-1B	Component Cooling	3	A	Component Cooling Water Pumps
2-EG-P-2HA 2-EG-P-2HB 2-EG-P-2JA 2-EG-P-2JB	Emergency Diesel Generator	NC	B	Emergency Diesel Generator Fuel Oil Transfer Pumps
2-HV-P-20B 2-HV-P-20C	Heating and Ventilation	3	A	Control and Relay Room Chilled Water Pumps
2-HV-P-22A 2-HV-P-22B 2-HV-P-22C	Heating and Ventilation	3	A	Control and Relay Room Condenser Water Pumps
2-QS-P-1A 2-QS-P-1B	Quench Spray	2	B	Quench Spray Pumps
2-RH-P-1A 2-RH-P-1B	Residual Heat Removal	2	A	Residual Heat Removal Pumps
2-RS-P-3A 2-RS-P-3B	Recirculation Spray	3	B	Casing Cooling Pumps
2-SI-P-1B	Safety Injection	2	B	Low Head Safety Injection Pumps
2-SW-P-1A	Service Water	3	A	Main Service Water Pump
2-SW-P-4	Service Water	3	B	Auxiliary Service Water Pump

RELIEF REQUEST P-2

Systems: Residual Heat Removal

Pump(s): 2-RH-P-1A
2-RH-P-1B

Group: A

Class: 2

Function: The residual heat removal pumps remove decay heat from the reactor core and the reactor coolant system during plant cool down.

ISTB Code Requirements for Which Relief is Requested

Table ISTB 5.1-1, requires an inservice test be run on each Group A pump nominally every 3 months.

ISTB 5.2.1(b) states that, "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (Table ISTB 5.1-1)

The residual heat removal pumps are located inside containment and are inaccessible during normal operation. The pumps are low pressure (600 psig design pressure) pumps that take suction from and discharge to the reactor coolant system (RCS). Technical Specification paragraphs 4.7.9.1a and 4.7.9.2a require that the RHR subsystem be isolated from the RCS prior to the RCS exceeding 500 psig by closing and de-energizing both remote operated RHR suction isolation valves and locking the associated breakers. Therefore, testing the residual heat removal pumps during normal operation is not practical and would violate the Technical Specifications.

RELIEF REQUEST P-2 (Cont.)

Basis For Request (ISTB 5.2.1(b))

As a result of industry experience and NRC guidance (Generic Letter 88-17) concerning the loss of decay heat removal capability, North Anna Power Station practices a policy of minimizing perturbations to RHR pump flow and system configuration when decay heat must be removed during cold shutdowns and reactor refueling outages.

Therefore, to minimize system perturbations and to permit RHR pump testing during cold shutdown testing, the RHR pumps will be tested in a range of flows, and the results will be compared to acceptance criteria based on a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

Alternate Testing Proposed

These pumps will be tested every cold shutdown but not more frequently than once every three months. Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 5.1-1 and ISTB 5.2.1(b) identified above, which have been identified to be impractical, will provide adequate indication of pump performance. Therefore, pursuant to 10 CFR 50.55a(f)(6)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-3

Systems: Service Water

Pump(s): 2-SW-P-1A
2-SW-P-1B

Group: A

Class: 3

Function: The service water pumps supply cooling water to the component cooling and recirculation spray heat exchangers as well as other safety related components.

ISTB Code Requirements for Which Relief Is Requested

ISTB 5.2.1(b) states that "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (ISTB 5.2.1(b))

Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate future plant conditions. In the service water system, reproducing one of these reference flow points is not practical with the large butterfly valves installed and it may not be desirable to alter cooling because of other plant operating parameters. Therefore, pumps will be tested in a range of flows and the results will be compared to acceptance criteria based a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed.

Past vibration data for the subject pumps has been reviewed and it has been determined that pump vibration does not vary significantly with flow rate over the range of the test flow rates. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

RELIEF REQUEST P-3 (Cont.)

Alternate Testing Proposed

Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of Table ISTB 4.1-1 and ISTB 5.2.1(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-4

Systems: Component Cooling

Pump(s): 2-CC-P-1A
2-CC-P-1B

Group: A

Class: 3

Function: The component cooling pumps supply cooling water to the component cooling heat exchangers, which remove heat from systems containing radioactive fluids.

ISTB Code Requirements for Which Relief is Requested

ISTB 5.2.1(b) states that "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (ISTB 5.2.1(b))

Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate future plant conditions. In the component cooling system, reproducing one of these reference flow points is difficult with the large butterfly valves installed and it may not be desirable to alter cooling because of other plant operating parameters. Therefore, pumps will be tested in a range of flows and the results will be compared to acceptance criteria based a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed.

Past vibration data for the subject pumps has been reviewed and it has been determined that pump vibration does not vary significantly with flow rate over the range of the test flow rates. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

RELIEF REQUEST P-4 (Cont.)

Alternate Testing Proposed

Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 5.2.1(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-5

Systems: Chemical and Volume Control

Pump(s): 1-CH-P-2C
1-CH-P-2D

Group: A

Class: 2

Function: The boric acid transfer pumps supply boric acid to the suction of the charging pumps for emergency boration. During normal operation they recirculate the contents of the boron injection tank

ISTB Code Requirements for Which Relief is Requested

Table ISTB 4.1-1 requires that flow rate be measured during a Group A test.

Table ISTB 5.1-1 requires that a Group A inservice test be run on each pump nominally every 3 months.

Basis for Request (Tables ISTB 4.1-1 and 5.1-1)

Permanent flow instrumentation is not installed on the recirculation piping, which is the only test loop available for quarterly testing. To measure flow, flow must be established to the charging pump suction lines. This flow would increase the reactor coolant system (RCS) boron inventory and cause a reactivity transient during normal operation.

The pump test requires an extended period of boric acid injection which should only be performed when borating the reactor to cold shutdown conditions in preparation for refueling. There could be much less need for the volume of boric acid required to perform this test, if the test were to be conducted during a mid-cycle cold shutdown evolution, where the initial boron concentration in the RCS could be significantly higher. The potential for over boration under those conditions could delay the ability of the plant to restart, due to the time required to dilute the excess boron in preparation for startup. Therefore, testing the boric acid transfer pumps to the requirements of Table ISTB 4.1-1 and Table 5.1-1 is not considered practical.

RELIEF REQUEST P-5 (Cont.)

Alternate Testing Proposed

These pumps will be tested every quarter on the recirculation loop, and differential pressure and vibration will be measured. Every reactor refueling, a comprehensive test measuring differential pressure, flow and vibration will be performed. This alternate testing of the boric acid transfer pumps complies with Generic Letter 89-04, Position 9.

Using the provisions of this relief request as an alternative to the specific requirements of Table ISTB 4.1-1 and Table 5.1-1 identified above, which have been identified to be impractical, will provide adequate indication of pump performance. Therefore, pursuant to 10 CFR 50.55a(f)(6)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-6

Systems: Recirculation Spray

Pump(s): 2-RS-P-2A
2-RS-P-2B

Group: B

Class: 2

Function: The outside recirculation spray pumps supply borated spray to cool and depressurize the containment atmosphere following a containment depressurization actuation signal and maintain containment subatmospheric following an accident.

ISTB Code Requirements for Which Relief is Requested

ISTB 4.1(a) (Preservice Testing) requires that, "For centrifugal and vertical line shaft pumps in systems where resistance can be varied, flow rate and differential pressure shall be measured at a minimum of five points. If practicable, these points shall be from pump minimum flow to at least pump design flow."

ISTB 4.3(e)(1) (Reference Values) requires that reference values shall be established within ±20% of pump design flow rate for comprehensive tests.

Basis for Request (ISTB 4.1(a))

The test loop for the outside recirculation pumps consists of a 10" pump discharge line feeding into a 4" recirculation line which feeds back to the pump sump. Refer to Figure P-6.1. With this test loop, pump design flow cannot be established. Also, the discharge piping was not designed to be temporarily reconfigured so that pump design flow could be achieved.

The outside recirculation spray pumps for Unit 2 were subject to long term full flow testing in 1979, during the construction phase. A test loop was established by replacing the spray nozzles from each of the two spray headers (150 nozzles for each header) with plugs, discharging pump flow to the spray headers and directing the flow back to the containment sump. A dike was constructed around the containment sump to simulate water levels in containment that are expected during an accident. The outside recirculation spray pumps took suction from the sump, thus, completing the loop. Re-establishing this full flow test loop for the purpose of periodic testing would require plant modifications and is not practicable.

RELIEF REQUEST P-6 (Cont.)

The spray headers are inaccessible without a significant amount of scaffolding. Even if the nozzles were accessible, the plugging of 300 spray nozzles, running the full flow test and returning the system to its operable configuration present substantial challenges in terms of complexity of the temporary modifications, labor intensive nature of the modifications, and controls and post modification testing needed to ensure that the system is returned to the original configuration.

As an alternative to flow testing at the design flow rate, the test loop shown in Figure P-6.1 will be used. Reference flows are typically established with this test loop in the range of 1450 to 1500 gpm, whereas the pump design flow is 3640 gpm. The low reference flows result from restrictions due to the small 4" recirculation line and the limited volume of water in the test loop. The limited water volume results in a rapid temperature rise in the test loop due to heat loads added by the running pump. This temperature rise affects repeatability of the measured hydraulic parameters. Therefore, care must be taken to ensure that the pump run time is limited and that the flow rate is maintained within an optimal range.

With the restrictions described above, the highest flow that can be measured while maintaining stable test conditions is approximately 40% of design flow. Measuring more than one point on the pump curve is limited to flow rates less than the 1450 to 1500 gpm range. Throttling the flow down to 20% of design flow to measure another point on the pump curve may cause flashing across the throttle valve, which would cause hydraulic instabilities and questionable test results. Even if the measurements were valid, measuring one more point at 20% of design flow adds little to the determination of acceptable pump operation.

In the 1450 to 1500 gpm range of the head curve for these pumps, the head curve is not flat, but well sloped. Refer to Figure P-6.2. Therefore, as performance degrades due to internal recirculation caused by increasing internal pump clearances, the differential pressure will measurably decrease for a given reference flow rate. As discussed above, testing the outside recirculation spray pumps over the full range of the pump curve and measuring at least five points along the curve is impractical.

As an alternative to measuring at least five points for the preservice test, one point will be measured at approximately 40% of design flow. The proposed alternative to ISTB 4.1(a) provides an acceptable level of quality and safety.

RELIEF REQUEST P-6 (Cont.)

Basis For Request (ISTB 4.3(e)(1))

The pump design flow rate is 3640 gpm and the safety analysis flow is 3450 gpm. To be within 20% of the pump design flow requires a reference flow of 2912 gpm and to be within 20% of the safety analysis flow requires a reference flow of 2760 gpm. For the reasons stated above, reference flows are typically established in the range of 1450 to 1500 gpm, which is below 20% of design flow.

As an alternative to testing within 20% of the design flow, the reference values will be established at approximately 40% of the design flow. It is our understanding that testing at design flow is important for pumps with characteristic head-flow curves that are flat or gently sloping in the low flow region (little change in developed head with increasing flow). In the low flow region, increasing internal flows, usually due to wear, are difficult if not impossible to detect. Pumps with the "flat" curves at low flows should be tested at near design conditions to determine if increasing internal recirculation flows have degraded pump performance to the point where design requirements cannot be met. This situation does not apply to the outside recirculation pumps if they are tested at 40% of design flow. Testing at the reference flows will detect pump degradation because the pump curve is well sloped at the point of testing. Refer to Figure P-6.2.

In addition to the testing described above, the outside recirculation pumps are included in the North Anna Predictive Maintenance Program. For the outside recirculation spray pumps, this program employs predictive monitoring techniques, such as vibration monitoring and analysis beyond that required by ISTB, and oil sampling and analysis.

If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, appropriate actions are taken that may include:

monitor additional parameters,
review of component specific information to identify cause, and
removal of the pump from service to perform maintenance.

To ensure that the outside recirculation spray pumps can deliver the required accident flow, the acceptable operating range for differential pressure will be more restrictive then the range found in Table ISTB 5.2.3-1. The more restrictive range is based on a minimum allowable pump curve. This minimum allowable pump curve was generated to provide the minimum pump performance parameters that would support the outside recirculation system flow values used in the containment analysis of record. As discussed above, testing the outside recirculation spray pumps to within 20% of the design point is impractical.

RELIEF REQUEST P-6 (Cont.)

The proposed alternative to ISTB 4.3(e)(1) provides an acceptable level of quality and safety.

Alternate Testing Proposed

Preservice tests will be conducted using one point on the pump curve at approximately 40% of pump design flow. Comprehensive test reference flows will be established at approximately 40% of pump design flow.

The outside recirculation spray pumps will be subject to additional testing, trending and diagnostic analysis of the North Anna Predictive Maintenance Program. Also, the acceptable operating range for differential pressure will be more restrictive then the range found in Table ISTB 5.2.3-1 to ensure that the outside recirculation spray pumps can deliver the required accident flow.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 4.1(a) and ISTB 4.3(e)(1) identified above, which have been identified to be impractical, will provide adequate indication of pump performance. Therefore, pursuant to 10 CFR 50.55a(f)(6)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST P-6 (Cont.)

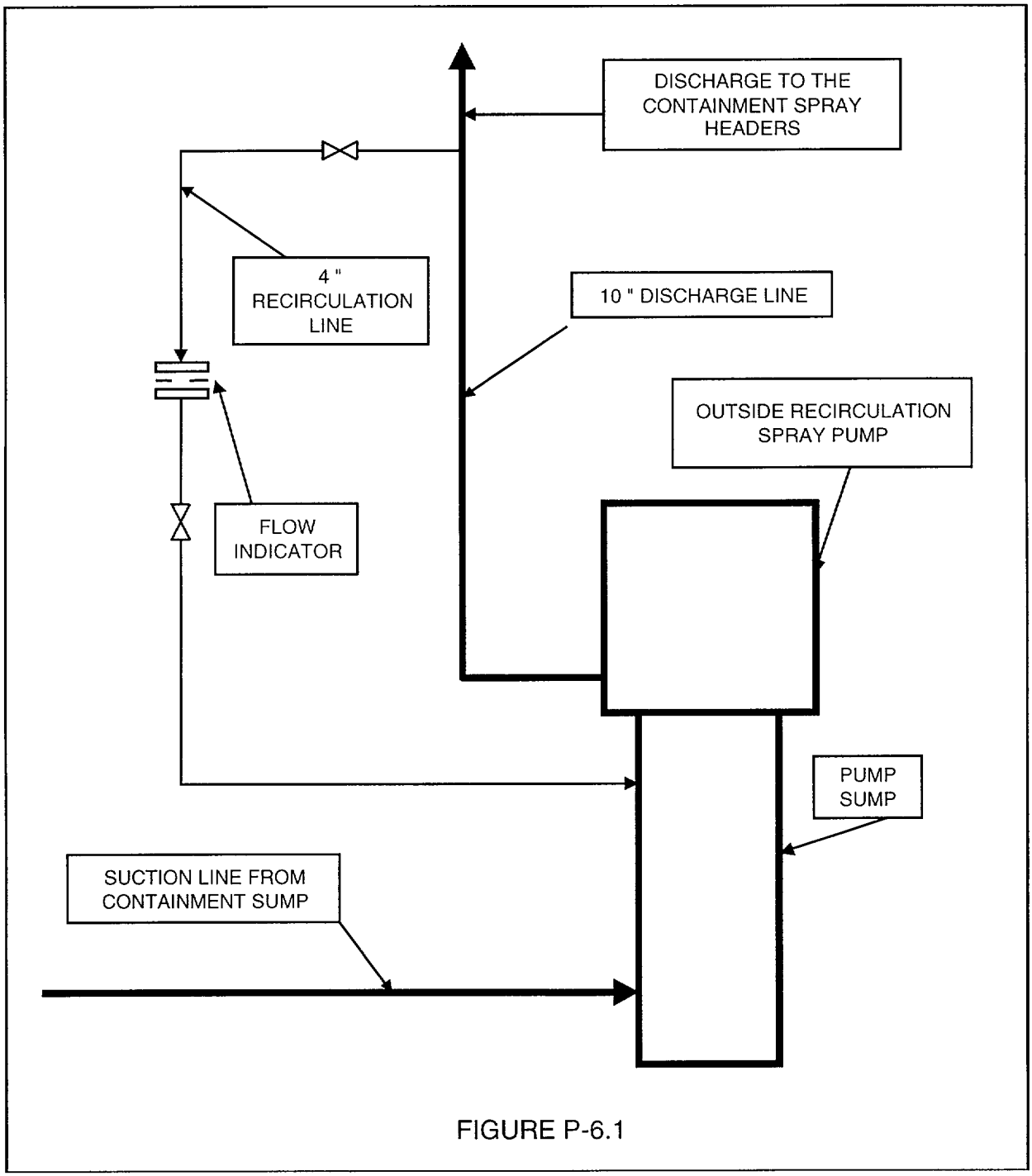


FIGURE P-6.1

RELIEF REQUEST P-6 (Cont.)

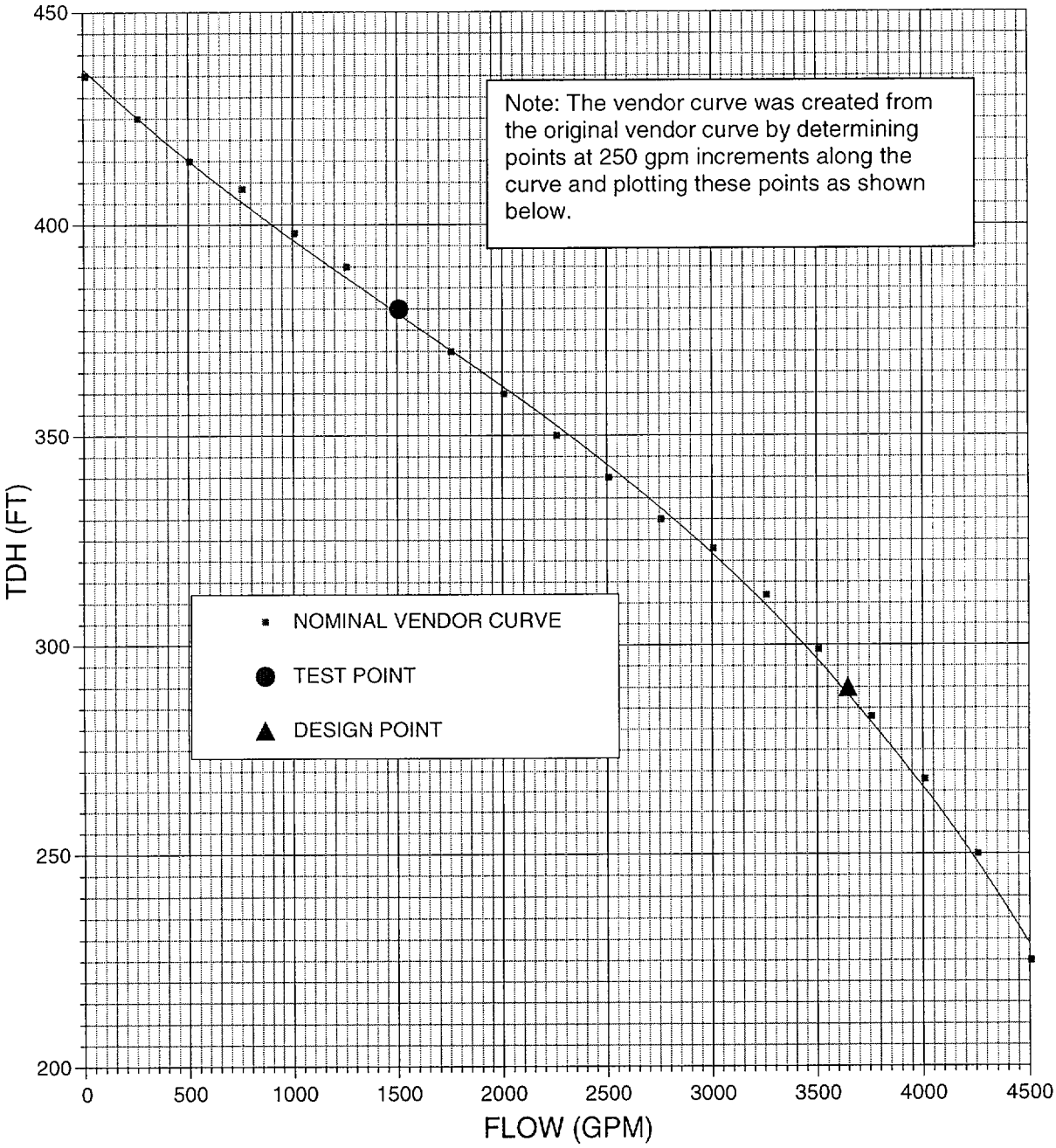


FIGURE P-6.2

RELIEF REQUEST P-7

Systems: Service Water

Pump(s): 2-SW-P-4

Group: B

Class: 3

ISTB Code Requirements for Which Relief is Requested

Table ISTB 4.1-1 (Inservice Test Parameters) requires the measurement of differential pressure.

ISTB 5.2.1(b) states that "For centrifugal and vertical line shaft pumps, the resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value."

Basis for Request (Table ISTB 4.1-1)

This pump takes suction from Lake Anna. No inlet pressure instrumentation is installed. The North Anna lake level indicator is located near the North Anna dam, miles from the auxiliary service water pump intake. The indicator is outside and approximately 20 feet from the observation point. Therefore, measuring the lake level can be difficult during periods of inclement weather or low light conditions.

However, the lake level fluctuates very little from test to test and can be considered to be constant. The lake has a minimum level of 244 feet elevation as required by Technical Specifications, and maximum and minimum recorded levels during past testing of 250.24 feet and 248.16 feet, respectively. Therefore, the expected maximum variation in lake level is about 2 feet, which is less than 1 psi. The discharge pressure gauge has a full scale reading of 100 psig and the discharge pressures range from 50 to 65 psig. Even the maximum variation, which in all likelihood will not occur between successive tests, is a small percentage of the total head developed by the pump. Therefore, the repeatability of the tests and the ability to detect degradation will not be significantly affected if only discharge pressure is measured.

RELIEF REQUEST P-7 (Cont.)

Applying the Code acceptance criteria to discharge pressure instead of differential pressure is a conservative application of the acceptance criteria for the deep draft pump because the operability band is smaller. For this pump, the total developed head is calculated by adding the measured discharge pressure to the height from the discharge pressure gauge to the pump impeller, subtracting the height from the lake surface to the pump impeller. Therefore, the measured discharge pressure will always be a smaller number than the actual total head developed by the pump. This alternative to the requirements of Table ISTB 4.1-1 provides an acceptable level of quality and safety.

Basis For Request (ISTB 5.2.1(b))

Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate future plant conditions. In the service water system, reproducing one of these reference flow points is difficult with the large butterfly valves installed and it may not be desirable to alter cooling because of other plant operating parameters. Therefore, pumps will be tested in a range of flows and the results will be compared to acceptance criteria based a portion of the pump curve and the hydraulic acceptance criteria given in ISTB. The guidelines set forth in Code Case OMN-9, "Use of a Pump Curve for Testing" will be followed. This alternative to the requirements of ISTB 5.2.1(b) provides an acceptable level of quality and safety.

Assessment of Combining Requests for Relief

By letter dated October 18, 1994, the NRC requested that we assess the impact on operational readiness resulting from the combination of using discharge pressure and a pump curve. We responded to this request by letter dated October 18, 1995. As described in our letter, the assessment included a review of normalized test data for each pump. North Anna has the ability to normalize the test data and trend the data from test to test. By knowing the polynomial equation that describes the reference pump curve, a reference value was calculated for the dependent variable using the value of the independent variable. The actual test result was divided by the reference value to yield a normalized test result, which was then used to trend the performance of the pump. This review showed that the test results were trendable and provide the ability to assess the operational readiness of the pump.

RELIEF REQUEST P-7 (Cont.)

Alternate Testing Proposed

Discharge pressure will be measured in place of differential pressure. Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values.

Using the provisions of this relief request as an alternative to the specific requirements of Table ISTB 4.1-1 and ISTB 5.2.1(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-1

System: Chemical and Volume Control and Safety Injection

Valve(s): 2-CH-MOV-2115B
2-CH-MOV-2115D
2-SI-18
2-SI-MOV-2885A
2-SI-MOV-2885B
2-SI-MOV-2885C
2-SI-MOV-2885D

Category: A for 2-CH-MOV-2115B and D, and 2-SI-MOV-2885A-D
AC for 2-SI-18

Class: 2

Function: RWST Isolation Valves

ISTC Code Requirements for Which Relief is Requested

ISTC 4.3.3(f) - Valves or valve combinations with leakage rates exceeding the values specified by the Owner in ISTC 4.3.3(e) above shall be declared inoperable and be either repaired or replaced.

Basis for Request

Valves 1-CH-MOV-1115B and D, and 1-SI-47 are in the supply line to the charging pumps from the RWST. Valves 1-SI-MOV-1885A, B, C and D are on test lines that run from the discharge of the low head SI pumps to the RWST. During recirculation mode transfer, the RWST is isolated and the low head SI pumps recirculate highly contaminated water from the containment sump to the reactor vessel.

The RWST isolation valves work as a system of valves to protect the RWST from the contaminated sump water. Permissible valve leakage rates are based on each valve's possible contribution to the total allowable leakage rate to the RWST. When the leakage rate from each valve has been measured and summed with the leakage rates of the other RWST isolation valves, an individual valve's permissible leakage rate may have been exceeded but the overall allowable leakage to the RWST may not have been exceeded. In these cases, a repair or replacement may not be necessary because the system of isolation valves has been verified to be performing acceptably.

In addition to repair or replacement as corrective actions, an evaluation can be performed which demonstrates that even if a valve has exceeded its permissible

RELIEF REQUEST V-1 (Cont.)

leakage rate, the overall leakage rate to the RWST will be maintained below the overall allowable RWST leakage rate and hence the system function is satisfied.

This evaluation should provide a high level of assurance that delaying the repair or replacement will not result in exceeding the overall limit before the next leak rate test. The evaluation should include a determination of the cause for the individual valve leakage. The evaluation should also address the effect of the degradation mechanism for the valve on the ability of the valve group to maintain overall leakage to the RWST below the overall allowable leakage rate during the subsequent 24 month interval. Evaluations will be documented and retained in plant records, and are available for subsequent review. This alternative to the requirements of ISTC 4.3.3(f) provides an acceptable level of quality and safety.

Alternate Testing Proposed

In addition to repair or replacement as corrective actions, an evaluation can be performed which demonstrates that even if a valve has exceeded its permissible leakage rate, the overall leakage rate to the RWST will be maintained below the overall allowable RWST leakage rate. No repair or replacement is necessary if the evaluation is performed and system leakage is projected to be maintained below the overall permissible leakage rate throughout the subsequent 24 month interval.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC 4.3.3(f) identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-2

System: Refer to Table V-2

Valve(s): Refer to Table V-2

Category: Refer to Table V-2

Class: Refer to Table V-2

Function: Refer to Table V-2

ISTC Code Requirements for Which Relief is Requested

ISTC 4.2.1 requires that valves be tested nominally every 3 months except as provided by paragraphs ISTC 4.2.2, ISTC 4.2.5, and ISTC 4.2.7.

ISTC 4.2.2 requires full-stroke exercising during plant operation, or if not practicable during plant operation then during cold shutdown, or if not practicable cold shutdown then during reactor refueling.

Basis for Request

The manual valves listed in Table V-2 remain in their aligned positions during normal operation and are not subject to significant process fluid wear. Also, the valves have a simple design with a limited number of failure causes. Therefore, an extended testing interval beyond the 3 month testing interval required by ASME OMa Code-1996 is acceptable for testing these manual valves.

Paragraph ISTC-3540 in the ASME Code, 1999 Addenda states,

> "Manual valves shall be full-stroke exercised at least once every 5 years, except where adverse conditions[1] may require the valve to be tested more frequently to ensure operational readiness. Any increase testing frequency shall be specified by the owner. The valve shall exhibit the required change of obturator position."

RELIEF REQUEST V-2 (Cont.)

Note 1 states

> "Harsh service environment, lubricant hardening, corrosive or sediment laden process fluid, or degraded valve components are some examples of adverse conditions."
>
> However, in Proposed Rules issued for comment in the Federal Register, Vol. 66, No. 150, dated August 3, 2001, the NRC proposed a modification in 10 CFR 50.55a(b)(3)(vi) that would require an exercise interval of 2 years for manual valves within the scope of the ASME OM Code in lieu of the exercise interval of 5 years specified in paragraph ISTC-3540 of the ASME Code, 1999 Addenda and the 2000 Addenda. Using the Proposed Rules as guidance, an exercise interval of 2 years for manual valves will be applied instead of the 5 year interval given in ISTC-3540. This alternative to the requirements of ISTC 4.2.1 and ISTC 4.2.2 provides an acceptable level of quality and safety.

Alternate Testing Proposed

The manual valves listed in Table V-2 will be exercised at least once every 2 years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness. The requirements of ISTC-3540 in ASME OMa Code-1999, with a 2 year test interval instead of a 5 year test interval, will be imposed.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC 4.2.1 and ISTC 4.2.2 identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-2 (Cont.)

Table V-2

Valve Number	System	OM Category	ASME Class	Function
2-CH-156	Chemical and Volume Control	B	3	Alternate Emergency Boration Line Manual Valve
2-FW-064 2-FW-066 2-FW-096 2-FW-098 2-FW-128 2-FW-130 2-FW-157 2-FW-173 2-FW-174 2-FW-193 2-FW-194 2-FW-317	Auxiliary Feedwater	B	3	Auxiliary Feedwater Header Alignment and Cross Connect Manual Isolation Valves
2-FW-147 2-FW-164 2-FW-182 2-FW-202	Auxiliary Feedwater	B	3	Auxiliary Feedwater Pump Alternate Supply Manual Isolation Valves
2-MS-018 2-MS-057 2-MS-095	Main Steam	B	2	Main Steam to Auxiliary Feedwater Turbine Line Manual Isolation Valves

RELIEF REQUEST V-3

System: Refer to Table V-3

Valve(s): Refer to Table V-3

Category: Refer to Table V-3

Class: Refer to Table V-3

Function: Refer to Table V-3

ISTC Code Requirements for Which Relief is Requested

ISTC 4.2.4(b) requires that the stroke time of all power-operated valves shall be measured to at least the nearest second.

ISTC 4.2.8 requires that measured stroke times be compared to the acceptance criteria in this section.

ISTC 4.2.9(b) requires that corrective action be taken if the measured stroke times do not meet the acceptance criteria in ISTC 4.2.8.

Basis for Request

ISTC 1.2(b) excludes "valves used only for system control, such as pressure regulating valves" from the testing requirements of the Code. It is not the intent of the Code to test the regulating function of control valves.

However, if these valves have a safety function to fail to an open of closed position, then the testing requirements for power-operated valves are imposed. Code Case OMN-8 provides alternative rules for inservice testing of power-operated valves that are used for system control and have a fail safe safety function. Code Case OMN-8 is given below.

> *Inquiry:* What alternative requirements to those of ASME/ANSI OMa-1988, Part 10, para. 4.2 through OM Code-1995, ISTC 4.2 may be used for power-operated control valves that have only a fail safe safety function?

RELIEF REQUEST V-3 (Cont.)

Reply: It is the opinion of the Committee that the requirements of ASME/ANSI OMa-1988, Part 10, para.4.2.1.4, Power-Operated Valve Stroke Testing; para. 4.2.1.8, Stroke Time Acceptance Criteria; and para. 4.2.1.9(b) need not be met. All other applicable requirements of para. 4.2 shall be met for ASME/ANSI OMa-1988, Part 10.

Further, the requirements of OM Code-1995, ISTC 4.2.4, Power-Operated Valve Stroke Testing; ISTC 4.2.8, Stroke Time Acceptance Criteria; and ISTC 4.2.9(b) need not be met. All other applicable requirements of paragraph shall be met.

Any abnormality or erratic action experienced during valve exercising shall be recorded in the record of tests, and an evaluation shall be made regarding need for corrective action.

The power-operated control valves listed in Table V-3 have only a fail safe function. We propose applying the alternative rules described in Code Case OMN-8 to the control valves listed in Table V-3. This alternative to the requirements of ISTC 4.2.4(b), ISTC 4.2.8 and ISTC 4.2.9(b) provides an acceptable level of quality and safety.

Alternate Testing Proposed

The control valves listed in Table V-3 will be tested to the requirements of Code Case OMN-8.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC 4.2.4(b), ISTC 4.2.8 and ISTC 4.2.9(b) identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) we request relief from the specific ISTB Code requirements identified in this relief request.

RELIEF REQUEST V-3 (Cont.)

Table V-3

Valve Number	System	OM Category	ASME Class	Function
2-CH-FCV-2113A	Chemical and Volume Control	B	3	Alternate Emergency Boration Line Flow Control Valve
2-CH-FCV-2114A	Chemical and Volume Control	B	3	Primary Grade Water Flow Control Valve
2-FW-HCV-200A 2-FW-HCV-200B 2-FW-HCV-200C	Auxiliary Feedwater	B	3	Standby Auxiliary Feedwater Supply Hand Control Valves
2-FW-PCV-259A 2-FW-PCV-259B	Auxiliary Feedwater	B	2	Auxiliary Feedwater Pressure Control Valves
2-HV-PCV-2235A1 2-HV-PCV-2235B1 2-HV-PCV-2235C1	Control Room Air Conditioning	B	3	Control Room Condenser Water Bypass Line Pressure Control Valves
2-HV-PCV-2235A2 2-HV-PCV-2235B2 2-HV-PCV-2235C2	Control Room Air Conditioning	B	3	Control Room Condenser Water Line Pressure Control Valves
2-MS-PCV-201A 2-MS-PCV-201B 2-MS-PCV-201C	Main Steam	B	2	Main Steam Header Discharge to Atmosphere Pressure Control Valves
2-SI-HCV-2936	Safety Injection	B	2	Waste Gas from Accumulators to Charcoal Filter Line Hand Control Valve
2-SW-TCV-202A 2-SW-TCV-202B 2-SW-TCV-202C	Service Water	B	3	Service Water from Charging Pump Lube Oil Cooler Temperature Control Valves