UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 30, 2010

Mr. David A. Heacock
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: NORTH ANNA POWER STATION (NAPS), UNIT NOS. 1 AND 2, FOURTH 10-YEAR INSERVICE TESTING INTERVAL PROGRAM, PUMPS AND VALVES RELIEF REQUEST (RR) (TAC NOS. ME2748, ME2749, ME2753, ME2754, ME2755, ME2756, ME2757, ME2758, ME2759, ME2760, ME2763, ME2764, ME2765, ME2766, ME2767, ME2768, ME2769, ME2770, ME2771, ME2772, ME2778, ME2779, ME2780, ME2781, ME2782, ME2783, ME2784, ME2785, ME2786, ME2787, ME2788, AND ME2789)

Dear Mr. Heacock:

By letter dated November 24, 2009, as supplemented by letters dated April 27, 2010 and May 20, 2010, Virginia Electric and Power Company (the licensee) submitted request for relief P-1, P-2, P-3, P-4, P-5, P-6, P-7, P-8, V-1, V-2 and V-3 from certain requirements of the American Society of Mechanical Engineers *Operation and Maintenance of Nuclear Power Plants Code* (ASME Code) at NAPS, Unit Nos. 1 and 2. Specifically, in accordance with Title 10 of the *Code* of *Federal Regulations* (10 CFR) 50.55a(a)(3)(i), 50.55a(a)(3)(ii), 50.55a(f)(6)(i), the licensee proposed an alternative to requirements of ASME Code Class 1, 2, and 3 pumps and valves inservice testing (IST). The licensee requested implementation of this alternative during fourth 10-year IST program scheduled to start on December 15, 2010, and end on December 14, 2020.

Based on the review of the information the licensee provided, the NRC staff concludes pursuant to 10 CFR, Section 50.55a(a)(3)(i), RR Nos. P-1, P-2 (Part-B), P-3, P-4, P-7, P-8, V-2, and V-3 are authorized on the basis that the proposed alternatives would provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(ii), RR Nos. P-5 and V-1 are authorized on the basis that compliance with the specified requirements of the ASME Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Pursuant to 10 CFR 50.55a(f)(6)(i), RR No. P-2 (Part-A) is granted and alternative requirements are imposed on the basis that the ASME Code requirements are impractical for the facility. RR No. P-6 will be included in a separate safety evaluation. All other ASME Code requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions concerning this matter, please contact Dr. Sreenivas, at (301) 415-2597.

Sincerely,

Gloria Kulesa, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-338 and 50-339

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INTERVAL INSERVICE TESTING

RELIEF REQUEST NOS. P-1, P-2, P-3, P-4, P-5, P-7, P-8, V-1, V-2, V-3

NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2

VIRGINA ELECTRIC AND POWER COMPANY

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

By letter dated November 24, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML093350600), as supplemented by letters dated April 27, 2010 (ADAMS Accession No. ML101170589) and May 20, 2010 (ADAMS Accession No. ML101440128), Virginia Electric and Power Company (the licensee), requested relief from certain requirements of the American Society of Mechanical Engineers *Operation and Maintenance of Nuclear Power Plants* Code (ASME Code), 2004 Edition, under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(f)(4)(ii), for the fourth 10-year Interval Inservice Testing (IST) Program for North Anna Power Station (NAPS), Unit Nos. 1 and 2. The NAPS Unit Nos. 1 and 2 fourth 10-year IST interval is scheduled to start on December 15, 2010, and end on December 14, 2020.

The U.S. Nuclear Regulatory Commission (NRC) staff has evaluated the licensee's submittal. Pursuant to 10 CFR 50.55a(a)(3)(i), Relief Request (RR) Nos. P-1, P-2 (Part-B), P-3, P-4, P-7, P-8, V-2, and V-3 are authorized on the basis that the proposed alternatives would provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(ii), RR Nos. P-5 and V-1 are authorized on the basis that compliance with the specified requirements of ASME Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Pursuant to 10 CFR 50.55a(f)(6)(i), RR No. P-2 (Part-A) is granted and alternative requirements are imposed on the basis that the ASME Code requirements are impractical for the facility.

2.0 REGULATORY EVALUATION

Section 50.55a(f), "Inservice Testing Requirements," requires, in part, that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with the specified ASME Code and applicable addenda incorporated by reference in the regulations. Exceptions are allowed where alternatives have been authorized or relief has been requested by the licensee and granted by the NRC pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a.

Enclosure

In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety (10 CFR 50.55a(a)(3)(i)); (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety (10 CFR 50.55a(a)(3)(ii)); or (3) conformance is impractical for the facility (10 CFR 50.55a(f)(6)(i)). Section 50.55a allows the NRC to authorize alternatives and to grant relief from ASME Code requirements upon making necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to ASME Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, Revision 1, "Guidelines for Inservice Testing at Nuclear Power Plants."

The NRC's findings with respect to authorizing the alternatives and granting the relief to the ASME Code are given below:

3.0 TECHNICAL EVALUATION

3.1 Relief Request P-1

(a) System/Component(s) for Which Relief is Requested

Pump groups listed in Table P-1.

(b) ASME Code Requirements

ISTB-3300, "Reference values" (Vr)

In accordance with the requirements of ISTB-3300(a), initial Vr shall be determined from the results of testing, meeting the requirements of ISTB-3100, Preservice Testing, or from the results of the first inservice test.

ISTB-3300(d) requires, "Vr shall be established at a point(s) of operation (reference point) readily duplicated during subsequent tests."

ISTB-3300(f) requires that all subsequent test results shall be compared to these initial Vr or to new Vr established in accordance with ISTB-3310, ISTB-3320, or ISTB-6200(c).

ISTB-5121(e) and ISTB-5123(e), "Group A Test Procedure and Comprehensive Test Procedure", requires, in part, that all deviations from the Vr shall be compared with the ranges of Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria," and corrective action taken as specified in ISTB-6200. Vibration measurements shall be compared to both the relative and absolute criteria shown in the alert range and required action ranges of Table ISTB-5121-1. For example, if vibration exceeds either 6Vr, or 0.7 inches per second (ips), the pump is in the required action range.

ISTB-5221 and ISTB-5223, "Group A Test Procedure and Comprehensive Test Procedure", requires, in part, that all deviations from the Vr shall be compared with the ranges of Table ISTB-5221-1 Vertical Line Shaft and Centrifugal Pumps Test Acceptance Criteria and corrective action taken as specified in ISTB-6200. Vibration measurements shall be compared to both the relative and absolute criteria shown in the alert and required action ranges of Table ISTB-5221-1.

ISTB-6200(a), "Alert Range," requires, in part, that if the measured test parameter values fall within the alert range of Table ISTB-5121-1 or ISTB-5221-1, as applicable, the frequency of testing specified in ISTB-3400 shall be doubled until the cause of the deviation is determined and condition is corrected.

(c) Licensee's Request for Relief

The licensee has requested an alternative to the vibration testing requirements included in Tables ISTB-5121-1 and ISTB-5221-1 for the pumps listed in Table P-1. Tables ISTB-5121-1 and ISTB-5221-1 establish ranges of acceptability of Vr. Specifically, the tables require the use of 2.5Vr and 6Vr in determining acceptable and alert ranges of vibration unless those calculated values exceed the absolute limits specified in the said tables.

(d) Licensee's Basis for Requesting Relief

The pumps listed in Table P-1 tend to be smooth running pumps. Each pump listed in Table P-1 has at least one vibration reference value (Vr) that is currently less than 0.05 inches per second (ips). Small values for Vr produce small acceptable ranges for pump operation. The acceptable ranges are defined in Tables ISTB-5121-1 and ISTB-5221-1 as less than or equal to 2.5Vr. Based on a small acceptable range, a smooth running pump could be subject to unnecessary corrective action if the measured vibration parameter exceeds this acceptable range.

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 Vr 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 ISTB-3310, ISTB-3320 or ISTB-6200(c), the measured parameters will be evaluated for each location to determine if the provisions of this relief request still apply.

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
- oil sampling and analysis where applicable (e.g., for pumps with sufficiently large oil reservoirs).

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-3300, ISTB-5120 and ISTB-5220, and Table ISTB-5121-1 and Table ISTB-5221-1 provides an acceptable level of quality and safety.

Table P-1

Pump Numbers		**OM Group**	**Description**
Unit-1	**Unit-2**		
1-CC-P-1A 1-CC-P-1B	2-CC-P-1A 2-CC-P-1B	A	Component Cooling Water Pumps
1-CH-P-1A 1-CH-P-1C	2-CH-P-1B	A	High Head Safety Injection/Charging Pumps
1-CH-P-2A 1-CH-P-2B	1-CH-P-2C 1-CH-P-2D	A	Boric Acid Transfer Pumps
1-FW-P-3A		B	Motor Driven Auxiliary Feedwater Pumps
1-HV-P-20A 1-HV-P-20B	2-HV-P-20A 2-HV-P-20B 2-HV-P-20C	A	Control and Relay Room Chilled Water Pumps
1-HV-P-22A 1-HV-P-22B 1-HV-P-22C	2-HV-P-22A 2-HV-P-22B 2-HV-P-22C	A	Control and Relay Room Condenser Water Pumps
	2QS-P-1A	B	Quench Spray Pump
1-RH-P-1B	2-RH-P-1A 2-RH-P-1B	A	Residual Heat Removal (RHR) Pumps
1-RS-P-3A	2-RS-P-3A 2-RS-P-3B	B	Casing Cooling Pumps
1-SW-P-1B	2-SW-P-1B	A	Main Service Water Pumps

Note: There are no ASME Code classified positive displacement pumps in the NAPS IST program. The pumps listed in Table P-1 are centrifugal pumps.

(e) Licensee's Proposed Alternative

For the pumps listed in Table P-1, if a measured reference value is below 0.05 ips for a particular vibration measurement location, then subsequent test results for that location may be 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-3300, ISTB-5120 and ISTB-5220, and Table ISTB-5121-1and Table ISTB-5221-1 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), Relief Request P-1 requests relief from the specific ISTB requirements identified in this request.

(f) NRC Staff's Evaluation

The ASME Code requires that the vibration of all safety-related pumps be measured. ISTB-3540(a) requires that for centrifugal pumps, the vibration measurements for each pump be taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions on each accessible pump bearing housing. The measurement is also required to be taken in the axial direction on each accessible pump thrust bearing housing. These measurements are to be compared with the ASME Code vibration criteria specified in Table ISTB-5121-1 or Table ISTB-5221-1 to determine if the measured values are acceptable.

Table ISTB-5121-1 and Table ISTB-5221-1 require that, if during an inservice test, a vibration measurement exceeds 2.5 times the Vr, previously established as required by ISTB-3300, the pump is considered to be in the alert range. The frequency of testing is then doubled in accordance with ISTB-6200 until the cause of the deviation is determined, the condition is corrected, and the vibration level returns below the alert range. Pumps, whose vibration is recorded to be greater than 6 times Vr, are considered in the required action range and must be declared inoperable until the cause of the deviation has been determined and the condition is corrected. ISTB-3300 requires that Vr to be established when the pump is known to be operating acceptably.

For pumps whose absolute magnitude of vibration is an order of magnitude below the absolute vibration limits in Table ISTB-5121-1 or Table ISTB-5221-1, a relatively small increase in vibration magnitude may cause the pump to enter the alert or required action range. These instances may be attributed to variation in flow, instrument accuracy, or other noise sources that would not be associated with degradation of the pump. Pumps that operate in this region are typically referred to as "smooth-running". Based on a small acceptable range, a smooth running pump could be subjected to unnecessary testing and corrective action.

The NRC staff has authorized a minimum vibration level of 0.05 ips for smooth running pumps, at several nuclear plants. There have been no reports to the NRC staff of any degradation issues that have gone undetected in pumps at these facilities. However, at one particular plant, the

minimum NRC-authorized Vr was 0.1 ips. A pump bearing at this plant experienced significant degradation even though the vibration was below the minimum Vr in the approved alternative. This degradation was discovered during Predictive Maintenance Program (PdM) activities. After this issue was discovered, the NRC staff noted that only monitoring pump vibration at the approved minimum Vr for smooth running pumps, would not be sufficient to determine pump degradation.

The licensee's proposal combines the minimum Vr method with a commitment to monitor all the IST pumps listed in Table P-1 with a Predictive Maintenance Program, even if certain pumps have very low vibration readings and are considered to be smooth-running pumps. The licensee will assign a vibration Vr of 0.05 ips to any pump bearing vibration direction that, in the course of determining its Vr, has a measured value below 0.05 ips. Therefore, the acceptable range as defined in Table ISTB-5121-1 or Table ISTB-5221-1 will be less than or equal to 0.125 ips, the alert range will be greater than 0.125 to 0.30 ips, and the required action range will be greater than 0.30 ips.

The licensee's proposed alternative describes the PdM for all IST program pumps (Table P-1) considered important to safe and reliable plant operation. The licensee states that the Predictive Maintenance Program goes beyond the IST requirements for pumps. The program includes bearing temperature trending, oil sampling and analysis, thermographic analysis, and vibration monitoring. However, bearing temperature trending and thermographic analysis are not routinely performed, but are only used on a limited basis for diagnostic evaluation.

For the vibration monitoring, the PdM analyzes and trends, displacement, velocity, and acceleration vibration patterns, to predict the need to correct problems in rotating equipment, prior to equipment failure. These problems include degraded bearings, improper alignments, and out-of-balance or worn components.

If measured parameters from the Predictive Maintenance Program are found to be outside the normal operating range, or are determined by analysis to be trending towards an unacceptable degraded state, appropriate actions will be taken. These actions include increasing monitoring of the specific pump to establish the rate of degradation, reviewing component-specific information to support identification of the cause(s) of the degradation, and removing the pump from service to perform necessary maintenance. The proposed alternative is consistent with the objective of the IST which is to monitor degradation in safety-related components.

As described above, the NRC staff finds that the alert and required action limits specified in the alternative request sufficiently allows for detection of any pump problems, including identification of degradation through the specified Predictive Maintenance Program. The objective of the North Anna Predictive Maintenance Program is to detect problems involving the mechanical condition, well in advance of when the pump reaches its overall vibration alert limit. Therefore, the licensee's proposed alternative will provide an acceptable level of quality and safety.

(g) Conclusion

Based on a review of the information provided by the licensee, the NRC staff concludes that the licensee's proposed alternative provides adequate indication of pump performance and an acceptable level of quality and safety. Therefore, the alternative to the vibration requirements of ISTB-3300, Table ISTB-5121-1,and Table ISTB-5221-1 of the ASME Code is authorized pursuant

to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety.

3.2 Relief Request P-2

(a) System/Component(s) for Which Relief is Requested

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

Pumps:	1-RH-P-1A	2-RH-P-1A
	1-RH-P-1B	2-RH-P-1B
	Group: A	Group: A
	Class: 2	Class: 2

(b) ASME Code Requirements

In accordance with ISTB-3400, "Frequency of Inservice Tests, an inservice test shall be run on each pump as specified in Table ISTB-3400-1.

Table ISTB-3400-1, "Inservice Test Frequency," requires, in part, that an inservice test be run on each Group A pump quarterly.

ISTB-5121, "Group A Test Procedure" requires, in part, that Group A tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5121(b), states, that 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 Vr. 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.

In accordance with ISTB-5123, "Comprehensive Test Procedure," the comprehensive tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5123(b), states, 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.

(c) Licensee's Request for Relief

Requested relief from the requirements of ISTB-3400, Table ISTB-3400-1, certain requirements of ISTB-5121 and ISTB-5123.

(d) Licensee's Basis for Requesting Relief

(i) Relief Request P-2 (Part-A)

The residual heat removal pumps are located inside containment and are low pressure (600 psig design pressure) pumps that take suction from and discharge to the reactor

coolant system (RCS). The RCS is maintained at 2235 psig and the containment atmosphere is maintained at sub-atmospheric pressure during normal operation. The RHR system is considered to be a low pressure system that could be damaged if exposed to the normal operating RCS pressure of approximately 2235 psig. Therefore, to ensure system integrity or prevent system over pressurization/damage, the Technical Requirements Manual requires 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 open.

(ii) Relief Request P-2 (Part-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 hot shutdowns, cold shutdowns and reactor refueling outages.

Therefore, to permit RHR pump testing during cold shutdown and reactor refueling outage testing without significant system perturbations, 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-16, "Use of a Pump Curve for Testing," will be followed.

Past vibration data for the subject pumps have 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.

(e) Licensee's Proposed Alternative

(i) Relief Request P-2 (Part-A)

These pumps will be tested every cold shutdown outage and reactor refueling outage but not more frequently than once every three months.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3400 and Table ISTB-3400-1 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), Relief Request P-2 requests relief from the specific ISTB requirements identified in this relief request.

(ii) Relief Request P-2 (Part-B)

Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values. The guidelines set forth in Code Case OMN-16 will be followed.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5121 and ISTB-5123 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), Relief Request P-2 requests relief from the specific ISTB Code requirements identified in this relief request.

(f) NRC Staff's Evaluation

(i) Relief Request P-2 (Part-A)

Table ISTB-3400-1, requires that a Group A test be performed quarterly on each Group A pump. The RHR pumps are located inside containment and are low-pressure (600 psig design) pumps which take suction from the RCS, pass flow through the residual heat exchangers, and discharge back to the RCS. The NAPS Unit Nos. 1 and 2 Technical Requirements Manual (TRM) requires that the RHR subsystem be isolated from the RCS before the RCS exceeds 500 psig by closing and de-energizing both remotely operated RHR suction isolation valves and locking the associated breakers. Therefore, testing the RHR pumps during normal operation is not practical and would violate the TRM requirements. Therefore, the quarterly testing of the RHR pumps in accordance with the ASME Code is impractical. Major plant and system modifications would be required to allow quarterly testing of the RHR pumps according to the ASME Code. These RHR pumps will be tested during every cold shutdown and reactor refueling outage but not more frequently than once every 3 months.

Based on the above information, the NRC staff finds that compliance with the ASME Code test frequency requirements is impractical and relief is granted pursuant to 10 CFR 50.55a(f)(6)(i). Granting relief pursuant to 10 CFR 50.55a(f)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The licensee's proposal provides reasonable assurance of the operational readiness of the RHR pumps.

(ii) Relief Request P-2 (Part-B)

As discussed in OMN-16, in cases when testing a centrifugal pump, where adjustment to a specific Vr is impractical, the establishment of additional pump curves for Vr of flow rate and differential pressure is acceptable. OMN-16 has been reviewed by the NRC staff. Although OMN-16 has not yet been incorporated into Regulatory Guide (RG) 1.192, OMN-16 is basically a replacement for OMN-9. OMN-9 is currently an authorized alternative for setting Vr as required by ISTB-5121 and ISTB 5123. Additionally, OMN-16 has incorporated responses to the NRC Staff's comments for OMN-9 listed in RG 1.192. The NRC staff finds that OMN-16 provides an acceptable level of quality and safety for testing the subject pumps, and is an acceptable replacement for OMN-9, which was previously approved for use in RG 1.192.

To minimize system perturbations and permit RHR pump testing during cold shutdown, 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 on the hydraulic acceptance criteria given in Subsection ISTB and ASME Code Case OMN-16. The licensee's proposed alternative testing complies with the requirements of ASME Code Case OMN-16.

(g) Conclusion

(i) Relief Request P-2 (Part-A)

Based on a review of the information provided by the licensee, the NRC staff finds that compliance with the ASME Code test frequency requirements of ISTB-3400 and Table ISTB-3400-1 for RHR

pumps, 1-RH-P-1A/1B and 2-RH-P-1A/1B is impractical. The NRC staff grants relief pursuant to 10 CFR 50.55a(f)(6)(i) provided the licensee tests these pumps according to the ASME Code test method requirements during every cold shutdown but not more frequently than once every 3 months.

(ii) Relief Request P-2 (Part-B)

Based on a review of the information provided by the licensee, the NRC staff determines that the proposed alternative for RHR pumps 1-RH-P-1A/1B and 2-RH-P-1A/1B, provides an acceptable level of quality and safety. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME Code's requirements.

3.3 Relief Request P-3

(a) System/Component(s) for Which Relief is Requested

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

Pump(s):	1-SW-P-1A	2-SW-P-1A
	1 -SW-P-1B	2 -SW-P-1B
	Group: A	Group: A
	Class: 3	Class: 3

(b) ASME Code Requirements

ISTB-5121, "Group A Test Procedure," requires, in part, that Group A tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5121(b) states that 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 Vr. 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.

ISTB-5123, "Comprehensive Test Procedure," requires, that "comprehensive tests be conducted with the pump operating at a specific reference point." In addition, ISTB-5123(b) states, in part, that 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 Vr. 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.

(c) Licensee's Request for Relief

The licensee has requested relief for service water (SW) pumps, 1-SW-P-1A/1B and 2-SW-P-1A/1B from the ASME Code requirements of paragraph ISTB-5121 and ISTB-5123 and proposes to use ASME Code Case OMN-16 in lieu of the ASME Code requirements. These SW pumps are centrifugal pumps.

(d) Licensee's Basis for Requesting Relief

The licensee states that:

> Plant conditions may not be the same as when the reference values were established. The SW system is dependent on seasonal water temperatures and flow may vary significantly from the cool winter months to the warm summer months. Many reference points must be established to anticipate varying 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 on a portion of the pump curve and the hydraulic acceptance criteria given in ISTB.
>
> Past vibration data for the subject pumps have 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-5121 and ISTB-5123 provides an acceptable level of quality and safety.

(e) Licensee's Proposed Alternative

> Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values. The guidelines set forth in Code Case OMN-16, "Use of a Pump Curve for Testing," will be followed.
>
> Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5121 and ISTB-5123 identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

(f) NRC Staff's Evaluation

As discussed in Code Case OMN-16, in cases, when testing a centrifugal pump, where adjustment to a specific Vr is impractical, the establishment of additional pump curves for Vr of flow rate and differential pressure is acceptable. Code Case OMN-16 has been reviewed by the NRC staff. Although Code Case OMN-16 has not yet been incorporated into RG 1.192, Code Case OMN-16 is basically a replacement for Code Case OMN-9. Code Case OMN-9 is currently an authorized alternative for setting Vr as required by ISTB-5121 and ISTB 5123. Additionally, Code Case OMN-16 has incorporated the responses to the NRC staff's comments for OMN-9 listed in RG 1.192. The NRC staff finds that OMN-16 provides an acceptable level of quality and safety for testing the subject pumps, and is an acceptable replacement for Code Case OMN-9, which was previously approved for use in RG 1.192.

Based on a review of the information provided by the licensee, the NRC staff finds that for SW pumps, 1-SW-P-1A/1B and 2-SW-1A/1B, it is not practical to return to the same flow configuration for each subsequent inservice pump test. In the SW system, temperature and flow are controlled at a variety of locations, it may not be possible to manually control each of the local stations and duplicate the overall system reference conditions, as required by the ASME Code. The licensee

will establish many reference points to anticipate future plant conditions. The pumps will be tested in a range of flows, and the results will be compared to the acceptance criteria based on a portion of the pump curve and on the hydraulic acceptance criteria specified in Code Case OMN-16.

The licensee's proposed alternative testing complies with the requirements of Code Case OMN-16.

(g) Conclusion

Based on a review of the information provided by the licensee, the NRC staff determined that the proposed alternative for SW pumps, 1-SW-P-1A/1B and 2-SW-P-1A/1B in request P-3, provides an acceptable level of quality and safety. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME Code's requirements.

3.4 Relief Request P-4

(a) System/Component(s) for Which Relief is Requested

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

Pump(s):	1-CC-P-1A	2-CC-P-1A
	1-CC-P-1B	2-CC-P-1B
	Group: A	Group: A
	Class: 3	Class: 3

(b) ASME Code Requirements

In accordance with ISTB-5121, "Group A Test Procedure," Group A tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5121(b) states that 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 Vr. 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.

ISTB-5123, "Comprehensive Test Procedure," requires, in part, that the comprehensive tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5123(b) states, in part, that 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 Vr. 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.

(c) Licensee's Request for Relief

The licensee has requested relief for component cooling pumps, 1-CC-P-1A/1B and 2-CC-P-1A/1B from the ASME Code requirements of paragraphs ISTB-5121 and ISTB-5123 and proposes to use ASME Code Case OMN-16 in lieu of the ASME Code requirements. These component cooling water pumps are centrifugal pumps.

(d) Licensee's Basis for Requesting Relief

> Plant conditions may not be the same as when the reference values were established. Many reference points must be established to anticipate varying 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 on a portion of the pump curve and the hydraulic acceptance criteria given in ISTB.
>
> Past vibration data for the subject pumps have 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-5121 and ISTB-5123 provides an acceptable level of quality and safety.

(e) Licensee's Proposed Alternative

> Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values. The guidelines set forth in Code Case OMN-16, "Use of a Pump Curve for Testing," will be followed.
>
> Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5121 and ISTB-5123 identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

(f) NRC Staff's Evaluation

As discussed in Code Case OMN-16, in cases, when testing a centrifugal pump, where adjustment to a specific Vr is impractical, the establishment of additional pump curves for Vr of flow rate and differential pressure is acceptable. Code Case OMN-16 has been reviewed by the NRC staff. Although this code case has not yet been incorporated into RG 1.192, Code Case OMN-16 is a replacement for Code Case OMN-9 "Use of a Pump Curve for Testing." OMN-9 is currently an authorized alternative for setting Vr as required by ISTB-5121 and ISTB 5123. Additionally, OMN-16 has incorporated the responses to the NRC staff's comments for OMN-9 listed in RG 1.192. The NRC staff finds that OMN-16 provides an acceptable level of quality and safety for testing the subject pumps, and is an acceptable replacement for OMN-9, which was previously approved for use in RG 1.192.

Based on a review of the information provided by the licensee, the NRC staff finds that for component cooling pumps, 1-CC-P-1A/1B and 2-CC-1A/1B, it is not practical to return to the same flow configuration for each subsequent inservice pump test. In the component cooling water system, reproducing one of these reference flow points is difficult with large butterfly valves

installed. The pumps will be tested in a range of flows, and the results will be compared to the acceptance criteria based on a portion of the pump curve and on the hydraulic acceptance criteria specified in ASME Code Case OMN-16.
The licensee's proposed alternative testing complies with the requirements of ASME Code Case OMN-16.

(g) Conclusion

Based on a review of the information provided by the licensee, the NRC staff determines that the proposed alternative for component cooling pumps, 1-CC-P-1A/1B and 2-CC-P-1A/1B in request P-4, provides an acceptable level of quality and safety. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME Code's requirements.

3.5 Relief Request P-5

(a) System/Component(s) for Which Relief is Requested

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 and the boric acid storage tanks.

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

Group: A
Class: 2

(b) ASME Code Requirements

Table ISTB-3000-1, "Inservice Test Parameters," requires, in part, that the flow rate for a pump be measured during a Group A test.

Table ISTB-3400-1, "Inservice Test Frequency," requires, in part, that a Group A test be run on each Group A pump quarterly.

ISTB-5121, "Group A Test Procedure," requires, in part, that that Group A tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5121(b) requires that the resistance at the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to its Vr. 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.

(c) Licensee's Request for Relief

The licensee has requested relief for boric acid transfer pumps 1-CH-P-2A/2B and 1-CH-P-2C/ 2D from the ASME Code requirements of Table ISTB-3000-1 and Table ISTB-3400-1.

(d) Licensee's Basis for Requesting Relief

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 in preparation for refueling when the boron concentration is low. The test cannot be conducted during mid-cycle cold shutdowns because the boron concentration in the RCS too high. The potential for over boration under these 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-3000-1, Table ISTB-3400-1 and ISTB-5121 is not considered practical.

(e) Licensee's Proposed Alternative

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 rate and vibration will be performed.

The removal of quarterly flow testing of these pumps has been deemed acceptable per NRC Generic Letter 89-04, Position 9, which allows elimination of minimum flow test line flow rate measurements providing inservice tests are performed during cold shutdowns or refueling periods under full or substantial flow conditions where pump flow rate is recorded and evaluated. The proposed alternate testing is consistent with this philosophy and the intent of Position 9. Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3000-1, Table ISTB-3400-1 and ISTB-5121 identified above, which have been identified to be impractical, will provide adequate indication of pump performance.

(f) NRC Staff's Evaluation

Table ISTB-3000-1 requires that flow rate for a pump be measured during a Group A test and Table ISTB-3400-1 requires that a Group A test to be run on each Group A pump quarterly.

The boric acid transfer pumps supply boric acid to the suction of the charging pumps for emergency boration. During normal operation, the pumps circulate the contents to the boron injection tank. As stated in the NAPS Updated Final Safety Analysis Report, boric acid is stored in three boric acid storage tanks (shared by both Unit Nos. 1 and 2). There are four boric acid transfer pumps. Pumps 1-CH-P-2A and 2B are for Unit 1 and 1-CH-P-2C and 2D are for Unit 2. One pump per unit is normally aligned with one boric acid storage tank. Each aligned pump runs continuously at low speed to provide recirculation between the boric acid storage tank and the

boron injection tank of the emergency core cooling system. The second pump in each unit is normally used for boric acid batching and transfer and serves as a standby for the normal running pump. Manual or automatic initiation of the reactor makeup control system activates the continuously running pump to a higher speed to provide the makeup of boric acid solution, as required.

The Group A pump test requires an extended period of boric acid injection and should only be performed when borating the reactor to cold shutdown conditions in preparation for refueling. Conducting the test during a midcycle cold-shutdown evaluation, when the initial boron concentration in the RCS can be significantly higher, may delay the plant restart until the excess boron is diluted.

As such, only the recirculation flow path is available and will be used to perform the quarterly pump tests. However, flow rate cannot be measured because there is no flow instrumentation in the recirculation loop piping. Compliance with the ASME Code requirements would require system modifications and installation of online flow instrumentation, and would therefore cause a hardship for the licensee. In lieu of the ASME Code required test, the licensee proposed to test these pumps every quarter on the recirculation loops and measure the differential pressure and vibration. In addition, at every reactor refueling outage, the licensee will perform a comprehensive pump test to measure differential pressure, flow, and vibration. This alternative testing of the boric acid transfer pumps is consistent with NRC Generic Letter 89-04, Position 9.

Based on the above information, the NRC staff finds that requiring the licensee to perform flow testing during the Group A pump tests for boric acid transfer pumps, 1-CH-P-2A/2B and 1-CH-P-2C/2D, as required by the ASME Code, would cause hardship due to the lack of permanent flow instrumentation in the recirculation piping required for quarterly pump testing. Requiring pump flow testing during the quarterly tests would not provide a compensating increase in the level of quality and safety. However, comprehensive pump testing of the boric acid transfer pumps, measuring flow, differential pressure and vibration will be performed every refueling outage.

(g) Conclusion

Based on a review of the information provided by the licensee, the NRC staff concludes that the licensee's proposed alternative to the ASME Code requirements of ISTB-3000-1 and Table-3400-1 for the boric acid transfer pumps, 1-CH-P-2A/2B and 1-CH-P-2C/2D are authorized pursuant to 10 CFR 50.55a(a)(3)(ii). This alternative is authorized on the basis that compliance with the specified requirements results in hardship without a compensating increase in the level of quality and safety. The NRC staff determined that the alternative described above provides reasonable assurance of operational readiness of the boric acid transfer pumps.

3.6 Relief Request P-7

(a) System/Component(s) for Which Relief is Requested

Various digital instruments used for IST of pumps.

(b) ASME Code Requirements

ISTB-3510(b)(2) "Range," requires that digital instruments shall be selected such that the Vr does not exceed 70% of the calibrated range of the instrument.

(c) Licensee's Request for Relief

The licensee has requested relief for the various digital instruments used for IST of pumps from the ASME Code requirements of paragraph ISTB-3510(b)(2). The licensee proposes to use ASME Code Case OMN-6 in lieu of ISTB-3510(b)(2) requirements for digital instruments.

(d) Licensee's Basis for Requesting Relief

> Code Case OMN-6 allows the use of digital instruments where the reference value does not exceed 90% of the calibrated range of the instrument. Code Case OMN-6 applies to the 1990 Edition through the 1997 Addenda. North Anna is subject to the requirements of the ASME OM Code, 2004 Edition during the Fourth Inservice Testing Interval.
>
> Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(2) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

(e) Licensee's Proposed Alternative

> By using Code Case OMN-6, greater flexibility in the selection of instruments would be achieved, thus preventing the installation of multiple instruments to monitor the same parameter during testing. Digital instruments will be selected such that the reference value does not exceed 90% of the calibrated range of the instrument.
>
> NUREG-1482, Revision 1, Section 5.5 states in part that the NRC has accepted Code Case OMN-6 as specified in RG 1.192, which allows each digital instrument to be such that the reference values do not exceed 90 percent of the calibrated range of the instrument.
>
> Use of Code Case OMN-6, approved by the NRC in RG 1.192, will provide at least equivalent instrumentation accuracy requirements for the required pump testing parameters to be measured in the IST program and will provide results consistent with code requirements. This will provide adequate assurance of acceptable pump performance.
>
> Using the provisions of this relief request as an alternative to the specific requirements of ISTB- 3510(b)(2) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

(f) NRC Staff's Evaluation

The licensee proposes to use ASME Code Case OMN-6 requirements in lieu of the ISTB-3510(b)(2) requirements for digital instruments used for IST of pumps. ASME Code Case OMN-6 allows the use of digital instruments where the Vr does not exceed 90% of the calibrated

range of the instrument. The licensee's IST program is based upon the 2004 Edition of the ASME Code, and ASME Code Case OMN-6 contained in this edition expired on March 30, 2007.

ASME Code Case OMN-6 was reaffirmed in the 2006 Addenda to the 2004 Edition of the ASME Code with a new expiration date of March 30, 2008. This reaffirmed ASME Code Case OMN-6 was modified to reference the 1998 Edition up to and including OMa-2005 Addenda of the ASME Code. In the 2009 Edition of the ASME Code, ASME Code Case OMN-6 was once again reaffirmed through OMa-2005 Addenda. Application of ASME Code cases is also addressed in 10 CFR 50.55a(b)(6) through reference to RG 1.192, which lists acceptable and conditionally acceptable ASME Code Cases for implementation in IST programs. RG 1.192, Table 1, approves the use of ASME Code Case OMN-6 in lieu of provisions for digital instruments used in ISTB-3510(b)(2) of the ASME Code. There is no technical reason for prohibiting the use of ASME Code Case OMN-6 with the 2004 Edition of the ASME Code. Therefore, the NRC staff finds that use of ASME Code Case OMN-6 is consistent with RG 1.192 and the ASME Code.

(g) Conclusion

The NRC staff concludes that the licensee's proposed alternative, use of ASME Code Case OMN-6 for the digital instruments is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety for IST of pumps. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable.

3.7 Relief Request P-8

(a) System/Component(s) for Which Relief is Requested

Chemical and Volume Control System Changing Pumps

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

(b) ASME Code Requirements

ISTB-5121, "Group A Test Procedure," requires, in part, that Group A tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5121(b) states that 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 Vr. 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.

ISTB-5123, "Comprehensive Test Procedure," requires, in part, that the comprehensive tests be conducted with the pump operating at a specific reference point. In addition, ISTB-5123(b) states, in part, that 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 Vr. 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.

(c) Licensee's Request for Relief

The licensee has requested relief for chemical and volume control system (CVCS) charging pumps, 1-CH-P-1A/1B/1C and 2-CH-P-1A/1B/1C from the ASME Code requirements of paragraphs ISTB-5121 and ISTB-5123 and proposes to use ASME Code Case OMN-16 in lieu of the ASME Code requirements. These charging pumps are centrifugal pumps.

(d) Licensee's Basis for Requesting Relief

> Plant conditions may not be the same as when the reference values were established. In the Chemical and Volume Control System, charging system flow must be balanced with seal injection, letdown and seal return flows to maintain a constant pressurizer level and pressure. Adjusting the charging flow rate to a specific reference test flow rate and then returning the charging system to the original flow rate places an unnecessary transient on the charging system and causes undesirable perturbations within the Reactor Coolant System.
>
> 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. Past vibration data for the subject pumps have 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-5121(b) and ISTB-5123(b) provides an acceptable level of quality and safety.

(e) Licensee's Proposed Alternative

> Acceptance criteria will be based on a portion of the pump curve and not on discreet reference values. The guidelines set forth in Code Case OMN-16, "Use of a Pump Curve for Testing," will be followed.
>
> Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5121(b) and ISTB-5123(b) identified above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

(f) NRC Staff's Evaluation

As discussed in OMN-16, in cases when testing a centrifugal pump where adjustment to a specific Vr is impractical, the establishment of additional pump curves for Vr of flow rate and differential pressure is acceptable. OMN-16 has been reviewed by the NRC staff. Although OMN-16 has not yet been incorporated into RG 1.192, OMN-16 is basically a replacement for OMN-9. OMN-9 is currently an authorized alternative for setting Vr as required by ISTB-5121 and ISTB 5123. Additionally, OMN-16 has incorporated the responses to the NRC staff's comments for OMN-9 listed in RG 1.192. The staff finds that OMN-16 provides an acceptable level of quality and safety for testing the subject pumps, and is an acceptable replacement for OMN-9, which was previously approved for use in RG 1.192.

Based on a review of the information provided by the licensee, the NRC staff finds that for CVCS charging pumps, 1-CH-P-1A/B/C and 2-CH-P-1A/B/C, it is not practical to return to the same flow configuration for each subsequent inservice pump test. In the CVCS, charging system flow must be balanced with seal injection, letdown and seal return flows to maintain a constant pressurizer level and pressure. Adjusting the charging flow rate to a specific reference test flow rate and then returning the CVCS charging system to the original flow rate places an unnecessary transient on the system and causes undesirable perturbations within the RCS. The pumps will be tested in a range of flows, and the results will be compared to the acceptance criteria based on a portion of the pump curve and on the hydraulic acceptance criteria specified in ASME Code Case OMN-16.

The licensee's proposed alternative testing complies with the requirements of ASME Code Case OMN-16.

(g) Conclusion

Based on a review of the information provided by the licensee, the NRC staff determined that the proposed alternative for CVCS charging pumps, 1-CH-P-1A/1B/1C and 2-CH-P-1A/1B/1C, in request P-8 provides an acceptable level of quality and safety. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME Code's requirements.

3.8 Relief Request V-1

(a) System/Component(s) for Which Relief is Requested

Refueling Water Storage Tank (RWST) Isolation Valves, CVCS Injection System

Refer to Table V-1

(b) ASME Code Requirements

ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves," requires, in part, that Category A valves with a leakage requirement not based on an Owner's 10 CFR 50, Appendix J program, shall be tested to verify that their seat leakages within the acceptable limits.

ISTC-3630(a), "Frequency," states that tests shall be conducted at least once every 2 years.

ISTC-3630(e), "Analysis of Leakage Rate," requires, in part, that leakage rate measurements shall be compared with the permissible leakage rates specified by the plant Owner for a specific valve or valve combination.

ISTC-3630(f), "Corrective Action," requires, valves or valve combinations with leakage rates exceeding the values specified by the Owner per ISTC-3630(e) shall be declared inoperable and either repaired or replaced. A retest demonstrating acceptable operation shall be performed following any required corrective action before the valve is returned to service.

(c) Licensee's Request for Relief

The licensee has requested relief for the valves listed in Table V-1 from the ASME Code requirements of paragraph ISTC-3630(f).

Table V-1

Valves Numbers		OM Category	System
Unit- 1	**Unit -2**		
1-CH-MOV-1115B 1-CH-MOV-1115D	2-CH-MOV-2115B 2-CH-MOV-2115D	A	Chemical and Volume Control
1-SI-MOV-1885A 1-SI-MOV-1885B 1-SI-MOV-1885C 1-SI-MOV-1885D	2-SI-MOV-2885A 2-SI-MOV-2885B 2-SI-MOV-2885C 2-SI-MOV-2885D	A	Safety Injection (SI)
1-SI-47	2-SI-18	AC	Safety Injection

(d) Licensee's Basis for Requesting Relief

Valves 1-CH-MOV-1115B and D, and 1-SI-47, 2-CH-MOV-2115B and D, and 2-SI-18 are in the supply line to the charging pumps from the RWST. Valves 1-SI-MOV-1885A and 2-SI-MOV-2885A, and C are in series, and 1-SI-MOV-1885B, 2-SI-MOV-2885B and D are in series, and 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-3630(f) provides an acceptable level of quality and safety.

(f) NRC Staff's Evaluation

The ISTC-3630 leakage test is intended to verify the operational readiness of individual components. Failure of a valve to meet the acceptance criteria indicates that the valve is potentially degraded and may be incapable of performing its safety function. However, the leakage rate limits assigned to individual RWST isolation valves are artificially derived values because the critical leakage limit for these valves is the limit for the overall leakage to the RWST. Although an individual isolation valve may exceed its leakage rate limit, exceeding an individual rate limit does not indicate that the group of all RWST isolation valves cannot meet their leak-tight safety function unless the leakage limit to the RWST is exceeded. Applying the analysis of leakage rates and corrective action requirements of paragraphs ISTC-3630(e) and ISTC-3630(f) for an individual valve in this situation may not be appropriate because the group of valves can still meet their leak tight-safety function.

If a particular isolation valve has significant leakage beyond the design leakage rate or ISTC-3630(e) requirements, that valve could be significantly degraded and may not be able to perform its safety function, even if the group of isolation valves still meet the specified overall leakage requirements. The continued plant operation before valve repair or replacement may not be justified, unless a detailed evaluation, including root-cause analysis, is performed. In order to make this determination, it is necessary to ascertain the root cause of the increased leakage rate and establish the rate at which valve degradation could progress. This detailed evaluation needs to be documented and retained in plant records. This evaluation is a very important aspect of this relief request and should be performed in a manner that provides a high level of assurance that delaying the repair or replacement of individual valves with high leakage rates will not result in exceeding the overall leakage limit before the next 2-year leakage rate test.

Based on the above information, the NRC staff finds that requiring the licensee to delay plant startup or to shut down the plant to repair or replace a valve listed in Table V-1 that exceeds its individual leakage limit would cause hardship and would not provide a compensating increase in the level of quality and safety. This finding is valid as long as the individual leakage rate does not indicate the probability of severe valve degradation and the overall leakage rate is less than the established limit.

This alternative does not apply to isolation valves that perform another leakage control function, in addition to the limiting leakage to the RWST (e.g., pressure isolation). This is because the basis for the leakage limits of isolation valves with another leakage control function is different than the leakage limits for valves with an overall leakage rate limit to the RWST, as discussed above.

(g) Conclusion

Based on a review of the information provided by the licensee, the NRC staff concludes that the licensee's proposed alternative to the ASME Code valve corrective requirements for valve leakage, as specified in ISTC 3630(f), is authorized pursuant to 10 CFR 50.55a(a)(3)(ii), for the valves listed in Table V-1. This alternative is based on the determination that compliance with

ASME Code requirements will result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The NRC staff determined that the alternative described above provides reasonable assurance of operational readiness of the Table V-1 valves. This alternative does not apply to isolation valves that perform another leakage control function, in addition to the limiting leakage to the RWST (e.g., pressure isolation).

3.9 Relief Request V-2

(a) System/Component(s) for Which Relief is Requested

Refer to Table V-2

(b) ASME Code Requirements

ISTA-3130(b), "Application of ASME Code Cases," states, in part, that ASME Code Cases shall be applicable to the edition and addenda specified in the test plan.

In addition licensee states:

> The edition and addenda specified in the test plan for the fourth Ten-Year interval for the North Anna Nuclear Power Plant is the ASME Code 2004 Edition.

(c) Licensee's Request for Relief

The licensee requested relief from the requirements of ASME Code ISTA-3130(b) for certain safety-related control valves specified in Table V-2.

(d) Licensee's Basis for Requesting Relief

> Code Case OMN-8 "Alternative Rules for Preservice and Inservice Testing of Power-Operated Valves That Are Used for System Control and Have a Safety Function per OM-10," contains no applicability statement. In the latest edition/addenda incorporated by reference in 10 CFR 50.55a(b)(3) (i.e., the 2001 Edition with Addenda through the OMb-2003), the expiration date given for OMN- 8 is November 20, 2006. OMN-8 is included in the 2006 Addenda to the 2004 Edition of the OM Code with a new expiration date of November 20, 2009; however, neither the 2004 Edition of the OM Code nor any subsequent Addenda have been incorporated by reference in 10 CFR 50.55a(b)(3). Paragraph 10 CFR 50.55a(b)(6) references RG 1.192, which approves the use of Code Case OMN-8. Code Case OMN-8 provides an alternative to stroke time testing power operated control valves that have only a fail safe safety function. The pneumatically power-operated control valves listed in Table V-2 have only a fail safe safety function.

Table V-2

Valves Numbers		OM Category	System
Unit- 1	**Unit -2**		
1-CH-FCV-1113A	2-CH-FCV-2113A	B	Chemical and Volume Control
1-CH-FCV-1114A	2-CH-FCV-2114A	B	Chemical and Volume Control
1-FW-HCV-100A 1-FW-HCV-100B 1-FW-HCV-100C	2-FW-HCV-200A 2-FW-HCV-200B 2-FW-HCV-200C	B	Auxiliary Feedwater
1-FW-PCV-159A 1-FW-PCV-159B	2-FW-PCV-259A 2-FW-PCV-259B	B	Auxiliary Feedwater
1-HV-PCV-1235A1 1-HV-PCV-1235B1 1-HV-PCV-1235C1	2-HV-PCV-2235A1 2-HV-PCV-2235B1 2-HV-PCV-2235C1	B	Control Room Air Conditioning
1-HV-PCV-1235A2 1-HV-PCV-1235B2 1-HV-PCV-1235C2	2-HV-PCV-2235A2 2-HV-PCV-2235B2 2-HV-PCV-2235C2	B	Control Room Air Conditioning
1-MS-PCV-101A 1-MS-PCV-101B 1-MS-PCV-101C	2-MS-PCV-201A 2-MS-PCV-201B 2-MS-PCV-201C	B	Main Steam
1-SI-HCV-1936	2-SI-HCV-2936	A	Safety Injection
1-SW-TCV-102A 1-SW-TCV-102B 1-SW-TCV-102C	2-SW-TCV-202A 2-SW-TCV-202B 2-SW-TCV-202C	B	Service Water

(e) Licensee's Proposed Alternative

The requirements of OMN-8 will be applied to the valves listed in Table V-2 in lieu of the provisions for power-operated control valve testing specified in paragraphs ISTC-5131, ISTC-5132 and ISTC-5133(b) in Subsection ISTC of the 2004 Edition of the ASME OM Code.

Note that paragraphs ISTC 4.2.4, ISTC 4.2.8, ISTC 4.2.9(b) and ISTC 1.2(b) identified in OMN-8 are from the 1995 Edition of Subsection ISTC and correspond to paragraphs ISTC-5131, ISTC-5132, ISTC-5133(b), and ISTC- 1200(b) from the 2004 Edition for pneumatically power-operated valves, respectively.

Using the provisions of this relief request' as an alternative to the specific requirements of ISTC-3630(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), Relief Request V-2 requests relief from the specific ISTC Code requirements identified in this relief request.

(f) NRC Staff's Evaluation

Application of ASME Code Cases is addressed in 10 CFR 50 55a(b)(6) through references to RG 1.192, which lists acceptable and conditionally acceptable ASME Code Cases for implementation in the IST program. RG 1.192, Table 1, approves the use of ASME Code Case OMN-8 without any condition and the ASME Code Case is applicable to the 2000 Addenda and certain earlier editions and addenda of the ASME Code. There is no technical reason for prohibiting the use of ASME Code Case OMN-8 with the 2004 Edition. Although the current expiration date for OMN-8 is November 20, 2006, in the 2004 Edition of ASME Code, this ASME Code Case is included in the 2006 Addenda to the 2004 Edition of the ASME Code, and approved for use with a new expiration date of November 20, 2009. Additionally ASME Code Case OMN-8 is included without any expiration date in the 2009 Edition of the ASME Code. Therefore, use of ASME Code Case OMN-8 is consistent with RG 1.192 and the ASME Code, and provides an acceptable level of quality and safety for testing of certain safety-related power-operated control valves.

(g) Conclusion

The NRC staff concludes that the licensee's proposed alternative of using ASME Code Case OMN-8, for valves listed in Table V-2, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the alternative provides an acceptable level of quality and safety. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable.

3.10 Relief Request V-3

(a) System/Component(s) for Which Relief is Requested

Refer to Table V-3

(b) ASME Code Requirements

ASME Code, Mandatory Appendix I, I-8120 (h), "Time Between Valve Opening," requires that A minimum of 5 minutes shall elapse between successive openings.

ASME Code, Mandatory Appendix I, I-8130(g), Time Between Valve Opening," requires that A minimum of 5 minutes shall elapse between successive openings.

(c) Licensee's Request for Relief

The licensee requested relief from the above ASME Code 5-minute wait period requirement during lift setpoint tests, when using water or nitrogen at ambient conditions, as the test medium for the Class 2 and 3 safety and relief valves listed in Table V-3.

(d) Licensee's Basis for Requesting Relief

The ASME OM Code requires a minimum of two consecutive valve actuations to establish the lift setpoint of safety and relief valves and that a minimum of 5 minutes elapse between successive tests. For the valves listed in Table V-3, the requirement for verifying temperature stability by waiting 5 minutes between successive lift setpoint tests is inappropriate and adds no value. Lift setpoint testing is conducted using water or nitrogen as the test medium, and the tests are performed when the valve and the test medium are at the same temperature. There is a negligible effect on lift setpoint due to minor temperature deviations that might occur during testing.

Eliminating the 5-minute wait time will minimize system outage times and radiation exposure. Class 2 and 3 safety and relief valves associated with contaminated systems are bench tested in the hot shop, located within the RCA in the Auxiliary Building, to prevent contamination.

Entry into the testing facility often requires full Anti-C's. During the test, personnel are exposed to low background radiation levels present in the Auxiliary Building hot shop as well as the radiation levels associated with the specific valve being tested. The proposed elimination of the hold time between successive tests for Class 2 and 3 safety/relief valves tested under ambient conditions using a test medium at ambient conditions reduces the duration of each test. Most importantly, reducing the hold times reduces the length of time that the test personnel must spend in close proximity to the valve. As a result, personnel radiation exposure is reduced.

For all safety and relief valves, including those located in "clean areas" that are bench-tested in the Mechanical Maintenance Shop, the proposed elimination of the hold time between successive tests will reduce the duration of each test. Since there are numerous safety/relief valve tests for both units and most require at least two people, the proposed elimination of the hold time between successive tests is expected to also result in a significant cumulative reduction in limited manpower resources.

Table V-3

Valves Numbers Unit- 1	Unit -2	System
1-CC-RV-124A	2-CC-RV-224A	Component Cooling
1-CC-RV-124B	2-CC-RV-224B	
1-CC-RV-124C	2-CC-RV-224C	
1-CC-RV-125A	2-CC-RV-225A	
1-CC-RV-125B	2-CC-RV-225B	
1-CC-RV-125C	2-CC-RV-225C	
1-CC-RV-126	2-CC-RV-226	
1-CC-RV-128A	2-CC-RV-228A	
1-CC-RV-128B	2-CC-RV-228B	
1-CC-RV-131A	2-CC-RV-231A	
1-CC-RV-131B	2-CC-RV-231B	
1-CH-RV-1203	2-CH-RV-2203	Chemical & Volume Control
1-CH-RV-1382A	2-CH-RV-2382A	
1-CH-RV-1382B	2-CH-RV-2382B	
1-FW-RV-100	2-FW-RV-200	Auxiliary Feedwater
1-HV-RV-1200	2-HV-RV-2200	Control Room Chilled Water
1-HV-RV-1201	2-HV-RV-2201	
1-HV-RV-1202A	2-HV-RV-2202A	
1-HV-RV-1202B	2-HV-RV-2202B	
1-HV-RV-1202C	2-HV-RV-2202C	
1-HV-RV-1205A	2-HV-RV-2205A	Control Room Condenser Water
1-HV-RV-1205B	2-HV-RV-2205B	
1-HV-RV-1205C	2-HV-RV-2205C	
1-RH-RV-1721A	2-RH-RV-2721A	Residual heat removal
1-RH-RV-1721B	2-RH-RV-2721B	
1-SI-RV-1845A	2-SI-RV-2845A	Safety Injection
1-SI-RV-1845B	2-SI-RV-2845B	
1-SI-RV-1845C	2-SI-RV-2845C	
1-SI-RV-1857	2-SI-RV-2857B	
1-SI-RV-1858A	2-SI-RV-2858A	
1-SI-RV-1858B	2-SI-RV-2858B	
1-SI-RV-1858C	2-SI-RV-2858C	
1-SW-RV-100A	2-SW-RV-200A	Service Water
1-SW-RV-100B	2-SW-RV-200B	
1-SW-RV-100C	2-SW-RV-200C	
1-SW-RV-100D	2-SW-RV-200D	
1-SW-RV-101A	2-SW-RV-201A	
1-SW-RV-101B	2-SW-RV-201B	

(e) Licensee's Proposed Alternative

For Class 2 and 3 safety and relief valves, excluding the MSSVs, tested under ambient conditions using test medium at ambient conditions, the 5-minute hold requirement between successive openings will be deleted.

In accordance with 1-8120(a), and 1-8130(a), the test medium used will be the same as the normal system operating fluid and temperature for which the valves in Table V-3 were designed. For liquid service this will be water. For compressible fluid services other than steam, this will be nitrogen. In both cases, the test stand and surrounding environment ambient temperature conditions are relatively fixed with negligible changes occurring over the set pressure and seat tightness test determinations. There is a negligible effect on valve setpoint due to minor temperature deviations that might occur at these conditions.

Using the provisions of this relief request as an alternative to the specific requirements of 1-8120(h) and 1-8130(g) identified above will provide adequate indication of valve performance and continue to provide an acceptable level of quality and safety.

(f) NRC Staff's Evaluation

The NRC staff notes that the 5-minute wait time requirement is based on the assumption that the temperature of the test medium is different than the temperature of the valve. Lift setpoint testing with different valve and test medium temperatures would cause the temperature of the valve to change once the valve opens; therefore, the setpoint could be affected. However, when the test medium and valve temperatures are the same during safety and relief valve testing, the thermal stabilization allows for the elimination of the wait period between tests, without affecting the setpoints of the valves. At NAPS, many of the Class 2 and 3 safety and relief valves are bench-tested in the hot shop located in the Auxiliary Building within the RCA.

According to the licensee, those tests are performed under ambient conditions using a test medium of water or nitrogen at ambient conditions. As a result, there is no thermal differential between the valves and the test medium that might affect the test results. Thus, the NRC staff finds that elimination of the 5-minute wait period between lift setpoint tests, for the ASME Class 2 and 3 safety and relief valves listed in Table V-3, provides an adequate method of accurately and repeatedly determining setpoints when using water or nitrogen as the test medium. Therefore, the NRC staff finds that the licensee's proposed alternative testing provides an acceptable alternative to the 5-minute wait period requirement in Mandatory Appendix I, paragraphs I-8120(h), and I-8130(g), and provides an acceptable level of quality and safety for testing of the safety and relief valves listed in Table V-3.

(g) Conclusion

The licensee's proposed alternative to the ASME Code testing requirement (i.e. eliminating the 5-minute wait between consecutive setpoint tests), for the ASME Code Class 2 and 3 safety and relief valves listed in Table V-3, is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the alternative provides an acceptable level of quality and safety. All other ASME Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable.

4.0 CONCLUSION

Based on the review of the information the licensee provided, the NRC staff concludes pursuant to 10 CFR, Section 50.55a(a)(3)(i), RR Nos. P-1, P-2 (Part-B), P-3, P-4, P-7, P-8, V-2, and V-3 are authorized on the basis that the proposed alternatives would provide an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(ii), RR Nos. P-5 and V-1 are authorized on the basis that compliance with the specified requirements of the ASME Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Pursuant to 10 CFR 50.55a(f)(6)(i), RR No. P-2 (Part-A) is granted and alternative requirements are imposed on the basis that the ASME Code requirements are impractical for the facility. RR No. P-6 will be included in a separate safety evaluation. All other ASME Code requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Therefore, the NRC staff authorizes the alternatives and relief noted above, at NAPS Unit Nos. 1 and 2, for the fourth 10-year IST interval, which starts on December 15, 2010, and ends on December 14, 2020.

Principal Contributor: Gurjendra S. Bedi, NRR/DCI

Date: September 30, 2010

If you have any questions concerning this matter, please contact Dr. Sreenivas, at (301) 415-2597.

Sincerely,

/RA/

Gloria Kulesa, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-338 and 50-339

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