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

January 28, 2011

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, UNIT NO. 2, FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL, RELIEF REQUEST N2-I4-CS-001 (TAC NO. ME3317)

Dear Mr. Heacock:

By letter to the U.S. Nuclear Regulatory Commission (NRC), dated February 1, 2010, Virginia Electric and Power Company (the licensee) submitted request for relief N2-I4-CS-001from certain requirements of the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code) at North Anna Power Station, Unit No. 2. Specifically, in accordance with Title 10 of the *Code* of *Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(i), the licensee proposed an alternative, CS-001 for snubber examination and functional testing requirements. The fourth 10-year Inservice Inspection (ISI) interval commenced on December 14, 2010, and ends on December 13, 2020.

The NRC staff finds that the proposed alternative to use Technical Requirements Manual, Section 3.7.5, "Snubbers," for snubber visual inspection and functional testing provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the requested relief pursuant to 10 CFR 50.55a(a)(3)(i) for the fourth 10-year ISI interval. All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized herein by the NRC staff 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 No. 50-339

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INSERVICE INSPECTION (ISI) INTERVAL

RELIEF REQUEST N2-I4-CS-001

NORTH ANNA POWER STATION, UNIT NO. 2

VIRGINA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-339

1.0 INTRODUCTION

By letter dated February 1, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100330125), Virginia Electric and Power Company (the licensee), requested relief from certain requirements of the American Society of Mechanical Engineers (ASME), *Boiler and Pressure Vessel Code* (ASME Code), 2004 Edition, under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(g), for the fourth 10-year ISI Program for North Anna Power Station, Unit No. 2 (NAPS). In response to the Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI), the licensee submitted a response in its letter dated June 24, 2010 (ADAMS Accession No. ML101760220). The NAPS, Unit No. 2, fourth 10-year ISI interval commenced on December 14, 2010, and ends on December 13, 2020.

The NRC staff has evaluated the licensee's Relief Request (RR) and determined that the proposed alternative to use Technical Requirements Manual (TRM), Section 3.7.5, "Snubbers," for snubber visual inspection and functional testing provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the requested relief pursuant to 10 CFR 50.55a(a)(3)(i) for the fourth 10-year ISI interval.

2.0 REGULATORY EVALUATION

Section 50.55a(g), "Inservice Inspection Requirements," requires, in part, that the ISI of ASME Code Class 1, 2, and 3 components (including supports) shall be performed in accordance with Section XI of the ASME Code and applicable addenda incorporated by reference in the regulation. Exceptions to these requirements are allowed where specific written relief has been granted by the NRC, pursuant to 10 CFR 50.55a(g)(6)(i), or alternatives have been authorized pursuant to paragraphs (a)(3)(i) or (a)(3)(ii) of 10 CFR 50.55a.

In proposing an alternative or requesting relief, the licensee must demonstrate that: (1) the proposed alternative provides 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

Enclosure

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(g)(6)(i)). Section 50.55a allows the NRC to authorize alternatives and to grant relief from ASME Code requirements upon making necessary findings.

The NRC's findings with respect to approving the alternative associated with the NAPS relief request N2-I4-CS-001 are given below:

3.0 TECHNICAL EVALUATION

3.1 Licensee's Alternative Request N2-I4-CS-001

3.1.1 Component for Which Relief is Requested

All NAPS safety-related ASME Code Class 1, 2, and 3 snubbers.

3.1.2 ASME Code Requirements

The ASME Code, Section XI, paragraph IWF-1220, "Snubber Inspection Requirements," requires that the ISI requirements for snubbers be in accordance with the requirements of IWF-5000, which provides inservice inspection requirements for snubbers.

Paragraphs IWF-5200(a) and IWF-5300(a) require that snubber preservice and inservice examinations be performed in accordance with ASME/ANSI OM [American National Standards Institute, Operation and Maintenance], Part 4 (OM-4), using the VT-3 visual examination method described in IWA-2213.

Paragraphs IWF-5200(b) and IWF-5300(b) require that snubber preservice and inservice tests be performed in accordance with ASME/ANSI OM, Part 4.

3.1.3 Licensee's Proposed Alternative

The licensee proposes to use NAPS, TRM, Section 3.7.5, "Snubbers," to perform visual examinations and functional testing of ASME Code Class 1, 2, and 3 snubbers in lieu of meeting ASME Code, Section XI requirements.

3.1.4 Licensee's Basis for Requesting Relief (as stated)

NAPS, TRM, Section 3.7.5, "Snubbers" contains specifically developed and approved visual inspection and functional testing requirements for the snubbers at NAPS. The licensee states that:

> The existing TRM test and examination requirements meet the intent of ASME OM Part 4 and provide an acceptable level of quality and safety. Integration of ASME Section XI and ASME OM Part 4 into an effective coherent examination and testing program along with associated required changes to the Technical Requirements Manual (TRM) would require a significant amount of administrative activity (e.g., administrative procedure changes, reconciliation of ASME Code requirement differences, technical procedure changes, etc.).

A second alternative approach to implement these requirements for examination and testing would be to revise the Technical Requirements Manual to directly reference the appropriate paragraphs of OM Part 4. However, many of these requirements, which would require revision of the existing TRM, are already very similar to OM Part 4. Therefore, the benefit to quality and safety due to this clarification is not commensurate with the significant administrative burden.

A third approach, which is proposed, is to implement the existing TRM snubber program, which provides a means to accomplish the examination and testing intended by the ASME Code and regulation with a minimum of burden. The significant technical differences are discussed herein. Administrative controls currently in place are sufficient and accomplish the same purpose.

GENERAL

The current safety related snubber testing requirements of TRM Section 3.7.5 form the basis of the North Anna Unit 2 inservice testing program for snubbers. There are 362 small bore snubbers and 12 large bore snubbers (greater than 50 KIPS) installed in North Anna Unit 2. All the snubbers at NAPS Unit 2 are hydraulic snubbers.

Snubber maintenance and repair are controlled at NAPS by written maintenance procedures that are based on manufacturers' recommendations and industry good practices. These procedural requirements are similar to the requirements of OM Part 4, paragraph 1.5.6. Changing snubber maintenance procedures requires review and approval of the snubber engineer. Design engineering approval is required for any changes that could affect the snubber's ability to meet the functional (operability) test acceptance criteria or affect the snubber's ability to support the design load. Following maintenance and repair, snubbers are required to be functionally tested to demonstrate that they meet the acceptance criteria. Snubbers that are modified or replaced due to visual or functional testing deficiencies are subject to the requirements of IWA-4000 and must be evaluated for suitability as required by OM Part 4, paragraph 1.5.7. Replacement snubbers are functionally tested prior to installation and visually inspected following installation in accordance with the snubber visual inspection criteria.

VISUAL INSPECTIONS

For visual inspections, the TRM states that snubbers are categorized as accessible or inaccessible during reactor operation and may be examined independently. This is the same requirement as OM Part 4, paragraph 1.6.

The TRM does not address snubber preservice examinations. However, snubbers are rotated from service in accordance with IWA-4132 and following replacement a visual examination is required to be performed in accordance with maintenance procedures and the post maintenance testing program. This visual examination is similar to the preservice examination requirements described in OM Part 4, paragraph 2.1.1. Additional preservice operability testing proposed by Virginia Electric and Power Company (Dominion) is described later in this section. Repair/Replacements activities will be performed as required by IWA4000. Replacement snubbers are functionally tested prior to installation to demonstrate that they meet engineering acceptance criteria.

The intervals for snubber visual inspections are conducted in accordance with the TRM visual examination table which meets Generic Letter 90-09. The inspection interval is based on the snubber population and the number of unacceptable snubbers. Historically, the number of unacceptable visual snubber inspections at NAPS Unit 2 is one or less and based on the snubber population, the current inspection interval is 48 months (every other refueling outage). The OM Part 4, paragraph 2.3.2.2 bases the inspection frequency on the number of population. Generic Letter (GL) 90-09 acknowledges that the visual inspection schedule as contained in OM Part 4 is excessively restrictive and that plants with large snubber populations have spent a significant amount of resources and subjected plant personnel to unnecessary radiological exposure to comply with the visual examination requirements of OM Part 4. GL 90-09 states that its alternative schedule for visual inspection provides the same confidence level as that provided in OM Part 4.

TRM requirements in conjunction with procedural inservice visual inspection requirements are similar to OM Part 4, paragraphs 2.3.1.1 and 2.3.1.2 and examinations are conducted with VT-3 Level II or III visually qualified examiners. Visual examinations encompass as a minimum the following inspection items:

> Fluid level, cylinder body defects, tie rod defects, valve block defects, hydraulic leaks, wiper seal deterioration/damage, snubber orientation, snubber misalignment, interferences, freedom of rotational movement, boric acid, bent piston rod, scored piston rod, painted piston rod and structural attachment defects.

The small bore snubbers at NAPS Unit 2 are manufactured by ITT Grinnell and are of similar design. Large bore snubbers are manufactured by Lisega and are also of similar design. Snubbers which fail visual inspections are evaluated and a root cause analysis is completed in accordance with administrative procedures and the corrective action program. Snubber failures are not specifically characterized into failure mode groups as defined in OM Part 4, paragraph 2.3.4.3. However, failures are evaluated to determine if the failure mechanism has the potential to affect other snubbers and whether the cause of the failure is from the application, maintenance practices, manufacturing defect, isolated or unexplained. Snubbers that may be subject to similar failure mechanisms are evaluated for continued service and operability in accordance with the corrective action program.

FUNCTIONAL TESTING

For the purposes of functional testing, the TRM identifies small bore snubbers (snubbers with load capacities of 50 Kips or less) and large bore snubbers (snubbers with load capacities greater than 50 Kips). This separation of snubbers is based on NRC Generic Letter 84-13, Technical Specification for Snubbers." OM part 4 does not separate snubbers into small and large bore groups.

FUNCTIONAL TESTING OF SMALL BORE SNUBBERS

Functional testing of small bore snubbers is defined in the TRM as follows: At least once per 18 months during shutdown, an initial representative sample of small bore snubbers shall be functionally tested either in-place or in a bench test. The size of the initial sample shall follow the expression:

$Ni = 35[1 + C/2]$

Where:

Ni is the initial number of snubbers to be tested, and

C (C =1) is the **allowable** number of small bore snubbers not meeting the acceptance criteria selected by the operator from the initial sample of Ni snubbers.

For each number of small bore snubbers above "C" which does not meet the functional test criteria, the sample to be functionally tested is expanded according to the expression:

$N = 35(1 + C/2)\,[2/(C + 1)]^2\,(A-C)$

Where:

N is the total number of snubbers to be tested in the expanded sample and

A is the total number of small bore snubbers found inoperable during functional testing of the representative sample; and

C (C = 1) is the allowable number of small bore snubbers not meeting the acceptance criteria selected by the operator from the initial sample of Ni snubbers.

C = 1 is currently the value used in our [the NAPS] TRM and was previously approved for use by the NRC in the third interval. This value was selected to take advantage of the historical performance experienced at NAPS where the number of failures has not exceeded 1 failure per refueling outage surveillance cycle since 1992.

As noted above, the C value establishes, when exceeded, snubber functional test expansion requirements, as well as the initial sample size. When the number of failures exceeds one, the TRM requires that the sample size increase in accordance with the above equation.

COMPARISON OF TRM SAMPLE SIZE TO OM PART 4 FOR SMALL BORE SNUBBERS

OM Part 4 uses different formulas for establishing the number of snubbers to be initially functionally tested. These formulas are referred to as the 10% plan and the 37 and 55 testing sample plans. The determination of which plan to use is determined by the number of snubbers installed in the station. If the number of snubbers is less than 370, the 10% plan is the preferred plan. When the snubber population is over 370 the 37 testing sample plan is used and if the snubber population is over 550 the 55 testing sample plan is used. The total number of snubbers at NAPS for Unit 2 is 362; therefore the 10% plan will be used for comparison to the TRM formula.

OM Part 4 states that for the initial sample lot tested, 10% of the snubbers in the general population shall be selected. The additional sample size shall be at least one-half the size of the original sample. So the total number of snubbers to be tested, including initial test group, is

$N \geq 0.1n + C(0.1n/2)$

Where:

N is the total number of snubbers to be tested;
n is total number of snubbers in defined test group plan; and

C is the number of unacceptable snubbers found through functional testing.

Reviewing the OM Part 4 formula, it can be seen that OM Part 4 does not define a pre-set number of allowable failures as the TRM does. OM Part 4 only requires that a minimum number of snubbers be tested, based on the population [the 0.1n factor], and an additional number of snubbers be tested for scope expansion based on the number found inoperable by testing [the C(0.1n/2) factor]. Substituting the number of small bore snubbers (362) for NAPS Unit 2, this formula reduces to:

$N \geq 36.2 + 18.1C$

The initial sizes and expanded sample sizes, once a functional test failure is found, are provided in the comparison below.

(Note: in the table following the value "A" or functional test failures as defined by the TRM would be equivalent to the value "C" in the OM Part 4 formula.)

[Small Bore Snubbers]	[Small Bore Snubbers Initial Sample Size plus Additional Sampling (Total Tested)]	
Functional Test Failures (number of snubbers)	TRM formula with C=1 (C = allowable test failures before expansion) (number of snubbers)	OM-4 Code (number of snubbers) (Note 3)
A = 0	53 (Note 1)	37
A = 1	53 (Note 2)	55
A = 2	105 (Note 2)	73
A = 3	158 (Note 2)	91

Note 1: TRM formula is $Ni = 35[1 + C/2]$
Note 2: TRM formula is $N = 35(1 + C/2)[2/(C + 1)]^2 (A-C) + 35[1 + C/2]$
[Note 3: OM-4 formula is $N = 36.2 + 18.1C$ and $C = A$]

From the above table, it can be seen that the TRM formula with C = 1 will test similar or more of the snubbers than OM Part 4 depending on the number of failures. This demonstrates that the existing value of C in the TRM formula will provide an adequate degree of testing when compared to the OM Part 4.

Thus, the proposed TRM Section 3.7.5 (C=1) functional testing requirements provides an acceptable level of quality and safety for inservice testing of small bore snubbers.

FUNCTIONAL TESTING OF LARGE BORE SNUBBERS

At least once per 18 months during shutdown, the TRM requires that 10% or two large bore snubbers (snubbers greater than 50 Kips) be functionally tested.

For each large bore snubber that does not meet the functional test criteria, an engineering evaluation is required to determine the failure mode. If the failure is determined to be generic, an additional 10% or two snubbers will be tested. If the failure is determined to be non-generic, an additional 10% or two snubbers will be tested the next functional test period (next refueling outage). A nongeneric failure has the same meaning as an isolated failure as defined in OM Part 4, paragraph 1.4. A generic failure is any failure that is not determined to be non-generic. A comparison of the TRM requirements for large bore snubbers to the OM Part 4 10% sample plan is as follows:

[Large Bore Snubbers]	[Large Bore Snubbers Initial Sample Size plus Additional Sampling (Total Tested)]	
Generic functional test failures (number of snubbers)	TRM (number of snubbers)	OM-4 Code (number of snubbers)
A = 0	2	2
A = 1	4	3
A = 2	6	3
A = 3	8	3

From the above table, it can be seen that the TRM formula with generic failures will test a greater number of large bore snubbers than OM Part 4. The OM Code paragraph 3.2.5.1 (b) does not count isolated (non-generic) for the purpose of determining the number of additional sample lots. This demonstrates that the existing TRM formula will provide an adequate degree of testing large bore snubbers when compared to OM Part 4.

PRESERVICE OPERABILITY TESTING

To comply with the preservice testing requirements of OM Part 4, section 3.1 verbatim, additional testing activity is required beyond the above proposal for inservice activities. Therefore Dominion proposes the inclusion of the preservice operability testing requirements into the current snubber surveillance as follows:

General, Preservice Operational readiness testing shall be performed on all snubbers. Testing may be performed at the manufacturer's facility.

Test Parameters, Tests shall verify the following:

(a) activation is within the specified range of velocity or acceleration in tension and in compression.

(b) Release rate, when applicable, is within the specified range in tension and in compression. For units specifically required not to displace under continuous load, ability of the snubber to withstand load without displacement.

(c) For mechanical snubbers, drag force is within specified limits in tension and compression.

(d) For hydraulic snubbers, if required to verify proper assembly drag force is within specified limits in tension and in compression.

Test Failure Evaluations, Snubbers that fail the preservice operational readiness test shall be evaluated for the cause(s) of failures.

Design Deficiency, If a design deficiency in a snubber is found, it shall be corrected by changing the design or specification, or by other appropriate means.

Other Deficiencies, Other deficiencies shall be resolved by adjustment, modification, repair, replacement, or other appropriate means.

Retest Requirements, Adjusted, modified, repaired, or replacement snubbers shall be tested to meet the requirements of the **Test Parameters** stated above.

The inclusion of these requirements into the current snubber surveillance program provides an alternative to OM Part 4, section 3.1 with an acceptable level of safety and quality for the preservice testing requirements with only small administrative impact.

Thus, the proposed TRM Section 3.7.5 visual and functional testing requirements provide an acceptable level of quality and safety for inservice inspection and testing of small and large bore snubbers. Additionally the continued implementation of a program based on the TRM requires minimal administrative program change or TRM changes.

3.2 NRC Staff's Evaluation

The licensee proposed that the inservice visual examinations and functional testing of ASME Code Class 1, 2, and 3 snubbers be performed in accordance with the requirements of the NAPS TRM, Section 3.7.5, "Snubbers." The licensee requested relief from meeting the requirements in ASME Code, Section XI, paragraphs IWF-5200(a) and (b), and IWF-5300(a) and (b).

Paragraphs IWF-5200(a) and (b), and IWF-5300(a) and (b), references OM-4, 1987 Edition with OMa-1988 Addenda. OM-4 specifies the requirements for visual examination and functional testing of snubbers. NAPS, TRM Section 3.7.5 incorporates Generic letter (GL) 90-09 for the snubber visual inspection schedule. GL 90-09 acknowledges that the visual inspection schedule (as noted in OM-4) is excessively restrictive that its alternative schedule for visual inspections provides the same confidence level as that provided by OM-4.

TRM, Section 3.7.5 defines,

> Inservice examination requirements as follows: (1) visual examination, (2) visual examination interval frequency, (3) method of visual examination, (4) subsequent examination intervals, and (5) inservice examination failure evaluation.
>
> Inservice operability testing requirements are also defined through the: (1) inservice operability or functional test, (2) initial snubber sample size and additional sampling, (3) failure evaluation, (4) test failure mode groups, and (5) corrective actions for the 10% sample, 37 sample, and 55 sample plans that are similar to those provided by OM-4.

The criteria for the OM-4 requirements and TRM 3.7.5 are compared in the following table:

	Criteria	OM-4 -1987 through OMa-1988 Addenda	North Anna Power Station, TRM, Section 3.7.5
Inservice Examination			
1.	Visual Examination	Paragraph 2.3.1.1, Visual Examination, provides visual examination acceptance criteria.	TRM, Table 3.7.5-1, Section (b), provides visual inspection (examination) acceptance criteria.
2.	Visual Examination Interval Frequency	Paragraph 2.3.2.2 provides visual examination interval frequency.	TRM,Table 3.7.5-1, Section (a) provides visual inspection (examination) interval frequency.
3.	Method of Visual Examination	IWF-5200(a) and IWF-5300(a) require use of the VT-3 visual examination method described in IWA-2213.	Examinations shall be conducted with VT-3 Level II or III visually qualified examiners.
4.	Subsequent Examination Intervals	Paragraph 2.3.2 provides guidance for subsequent inservice examination intervals.	TRM, Table 3.7.5-1, Section (a) provides subsequent visual inspection intervals.
5.	Inservice Examination Failure Evaluation	Paragraph 2.3.4 provides details about the snubber inservice examination failure evaluation.	TRM, Table 3.7.5-1, Section (b), provides details related to snubber inservice examination failure evaluation.
Inservice Operability Test			
1.	Inservice Operability Test Requirements	Paragraph 3.2.1.1, Operability Test, provides details about snubber operability test requirements either with an in-place or bench test.	TRM, Table 3.7.5-1, Sections (d) and (e) provide details about snubber inservice operability test requirements. The licensee states in their relief request that snubbers will be tested either with an in-place or a bench test.

	Criteria	OM-4 -1987 through OMa-1988 Addenda	North Anna Power Station, TRM, Section 3.7.5
2.	Snubber Sample Size and Additional Sampling	Paragraph 3.2.3 requires that each defined test plan group shall use either a 10% sampling plan, a 37 sample plan, or a 55 sample plan during each refueling outage. Paragraphs 3.2.2.1(b) and 3.2.3.2(b) provide additional sampling requirements.	TRM Table 3.7.5-1, Section (c), provides a snubber sample plan and additional sampling requirements.
3.	Inservice Operability Failure Evaluation	Paragraph 3.2.4.1 provides snubber inservice operability failure evaluation.	TRM, Table 3.7.5-1, Section (c) provides details about inservice operability failure evaluations.
4.	Test Failure Mode Groups	Paragraph 3.2.4.2 requires that unacceptable snubber(s) shall be categorized into failure mode group(s).	The licensee states in their relief request that failure mode grouping is not incorporated into the TRM. However, plant procedures do require the determination of the extent of condition of failures and the failure grouping for sample expansion.
5.	Corrective Actions for 10% Sample Plan or 37 Sample Plan or 55 Sample Plan	Paragraphs 3.2.5.1 and 3.2.5.2 requires that unacceptable snubbers during functional tests shall be repaired, modified, or replaced.	The licensee states in their relief request that all of the unacceptable snubbers found during functional tests shall be repaired or replaced, as required by ASME Code, Section XI Code Case N-508-3 and IWA-4000.

The following paragraphs contain detailed reviews of the comparison between the OM-4 and the TRM, Section 3.7.5 requirements as summarized in the above Table.

Inservice Examination Requirements

(1) Visual Examination

OM-4, paragraph 2.3.1.1 requires snubber visual examinations to identify impaired functional ability due to physical damage, leakage, corrosion, or degradation. TRM, Section 3.7.5 snubber visual examination requirements are equivalent to snubber visual examination requirements of OM-4 paragraph 2.3.1.1. TRM, Table 3.7.5-1, Section (b), states that visual inspections shall verify that (1) there are no visible indications of damage or impaired operability; (2) attachments to the foundations or supporting structure are secure; (3) fasteners for attachment of the snubber to the component and to the snubber anchorage are functional; and (4) in those locations where snubber movement which can be manually induced without disconnecting the snubber, that the snubber has freedom of movement and is not frozen up. The visual examination per Table 3.7.5-1 verifies visible indication of damage or impaired operability of snubbers as well as its attachments

and anchorages. The NRC staff finds that the TRM requirements are equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(2) Visual Examination Interval Frequency

OM-4, paragraph 2.3.2.2 provides visual examination interval frequency. TRM, Table 3.7.5-1, Section (a) provides snubber visual inspection interval frequency requirements which are different than the OM-4 visual inspection interval requirements, but similar to the visual inspection interval frequency as specified in GL 90-09. GL 90-09 acknowledges that the visual inspection interval frequency (as noted in OM-4) is excessively restrictive and that licensees with large snubber populations have spent a significant amount of resources and have subjected plant personnel to unnecessary radiological exposure to comply with the visual examination requirements. GL 90-09 states that its alternative schedule (interval frequency) for visual inspection provides the same confidence level as that provided by OM-4. The NRC staff finds that the TRM requirements are equivalent to the guidance provided in GL 90-09, and provide the same confidence level as OM-4. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(3) Method of Visual Examination

IWF-5200(a) and IWF-5300(a) require that preservice and inservice examinations be performed in accordance with OM-4, using the VT-3 visual examination method described in IWA-2213. IWA-2213 states that, "VT-3 examinations are conducted to determine the general mechanical and structural condition of components and their supports by verifying parameters such as clearance, settings, and physical displacements; and to detect discontinuities and imperfections, such as loss of integrity at bolts and welded connections, loose or missing parts, debris, corrosion, wear, or erosion. VT-3 includes examinations for conditions that could affect operability or functional adequacy of snubbers and constant load and spring type supports."

In the submitted relief request under the reason for request, the licensee states that the TRM requirements, in conjunction with procedural inservice visual inspection requirements, are similar to OM-4, paragraphs 2.3.1.1 and 2.3.1.2, and examinations are conducted with VT-3 Level II or III visually qualified examiners.

The intent and scope of NAPS, TRM visual examination requirements are equivalent to the OM-4, VT-3 examination requirements. The NRC staff finds that the TRM requirements are equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(4) Subsequent Examination Intervals

OM-4, paragraph 2.3.2 provides the subsequent examination interval based on the number of unacceptable snubbers discovered. TRM, Table 3.7.5-1, Section (a), establishes subsequent snubber visual inspection intervals based on the number of unacceptable snubbers discovered using the guidance in GL 90-09, in lieu of OM-4 paragraph 2.3.2 requirements. The NRC staff finds that the TRM requirements are equivalent to the guidance provided in GL 90-09, and provide the same confidence level as OM-4. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(5) Inservice Examination Failure Evaluation

OM-4, paragraph 2.3.4.1 requires that snubbers not meeting examination criteria be evaluated to determine the cause of unacceptability. Paragraph 2.3.4.2 states that snubbers found unacceptable may be tested in accordance with the requirements of paragraph 3.2. TRM Table 3.7.5-1, Section (b), states that snubbers which appear inoperable as a result of visual inspections shall be classified as unacceptable and may be reclassified as acceptable for the purpose of establishing the next visual inspection interval, provided that (1) the cause of the rejection is clearly established and remedied for that particular snubber and for other generically susceptible snubbers, and (2) the affected snubber is functionally tested in the as-found condition and determined to be operable per the acceptance criteria of Table 3.7.5-1, Sections (d) and (e). The NRC staff finds that the TRM requirements are considered to be equivalent to the requirements of OM-4. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

Inservice Operability Testing Requirements

(1) Inservice Operability Test

OM-4, paragraph 3.2.1.1 requires that snubber operational readiness tests verify the activation, release rate, and breakaway force or drag force of the tested snubbers by either an in-place or bench test. TRM, Table 3.7.5-1, Sections (d) and (e), state that the snubber functional test is to verify that (1) activation (restraining action) is achieved within specified range of velocity or acceleration in both tension and compression; (2) snubber bleed rate, or release rate, where required, is within the specified range in compression and tension; and (3) for snubbers specifically required not to displace under continuous load, the snubbers maintain the ability to withstand load without displacement, and (4) for mechanical snubbers, the force that initiates free movement of the snubber rod in either tension or compression is less than the specified maximum drag force; and the drag force shall not increase more than 50% since the last functional test. The licensee states in their relief request that the snubbers shall be tested either with an in-place or bench test. The NRC staff finds that the TRM requirements are equivalent to the snubber operability test requirements of OM-4. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(2) Snubber Sample Size and Additional Sampling

OM-4, paragraph 3.2.3 requires either a 10% sampling plan, a 37 sample plan, or a 55 testing sample plan. There are 12 large bore snubbers (capacities ≥ 50 Kips) and 362 small bore snubbers (capacities ≤ 50 Kips) installed in NAPS. All the snubbers at NAPS are hydraulic snubbers. TRM, Table 3.7.5-1, Section (c), states that snubbers shall be functionally tested using one of the following sample plans:

(a) Sample Plan for Small Bore Snubbers (capacities ≤ 50 Kips):

TRM, Table 3.7.5-1, Section (c) states that an initial representative sample of the small bore snubber population shall follow the expression, $Ni = 35\ [1+ C/2]$, where Ni is the initial number of snubbers to be tested; and C (C=1) is the number of snubbers not meeting the acceptance criteria. The TRM will use C=1 in all cases, even before initial sample testing, whereas OM-4 does not specify any assumed number of snubber failures.

The TRM, Table 3.7.5-1 sample method is similar to the OM-4, 37 sample plan. OM-4, Appendix C, Section C1.2 states that the 37 sample plan has an accept line criteria approximately represented by $N \geq 0.1n + C(0.1n/2)$, where N is the total number of snubbers to be tested; n is the total number of snubbers in the defined test plan group; and C is the number of unacceptable snubbers found through functional testing. OM-4 does not define a pre-set number of allowable failures for snubbers as required by the TRM for small bore snubbers. OM-4 only requires that a minimum number of snubbers be tested, based on the population (the 0.1n factor), and an additional number of snubbers be tested for scope expansion based on the number of failures found by testing (the C(0.1n/2) factor). Substituting the number of small bore snubbers (362) at NAPS, this formula reduces to:

$N \geq 36.2 + 18.1C$

The initial sizes and expanded sample sizes, once a functional test failure is found, are provided in the comparison between the TRM and OM-4 methods noted below:

Small Bore Snubbers	Small Bore Snubbers Initial Plus Additional Sampling (Total Tested)	
Functional test failures (number of snubbers)	TRM formula with C=1 (C = allowable test failures before expansion) (number of snubbers)	OM-4 Code (number of snubbers) (Notes 3 and 4)
A = 0	53 (Note 1)	37
A = 1	53 (Note 2)	55
A = 2	105 (Note 2)	73
A = 3	158 (Note 2)	91

Note 1: TRM formula is $Ni = 35[1 + C/2]$
Note 2: TRM formula is $N = 35(1 + C/2)[2/(C + 1)]^2 (A-C) + 35[1 + C/2]$
Note 3: OM-4 formula is $N = 36.2 + 18.1C$
Note 4: The value "A" or functional test failures as defined by the TRM would be equivalent to the value "C" in the OM-4 formula.)

This table shows that the numbers of snubbers tested by using the TRM formula is generally greater than the number tested using the OM-4 formula. This demonstrates that the value of C=1 in the TRM formula will provide an adequate degree of testing when compared to the OM-4 requirements. The NRC staff finds that the TRM,Table 3.7.5-1 testing sample plans and additional sampling requirements for small bore snubbers are considered to be equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(b) 10% Sample Plan for Large Bore Snubbers (capacities ≥ 50 Kips):

TRM, Table 3.7.5-1, Section (c) requires that 10% of the large bore snubbers be functionally tested. This sample plan is similar to the OM-4 defined 10% sampling plan. The TRM requires that for each large bore snubber generic failure, an additional 10% or 2 snubbers will be tested. A generic failure is any failure that is not considered to be an isolated failure. OM-4, paragraph 3.2.3.1(b), requires that an additional sample size must be at least one-half the size of the initial sample size of the "defined test plan group" of snubbers. A comparison of the TRM test

requirements for large bore snubbers to the OM-4, 10% sampling plan plus additional sample size is noted as follows:

Large Bore Snubbers	Large Bore Snubbers Initial Plus Additional Sampling (Total Tested)	
Generic functional test failures (number of snubbers)	TRM Table 3.7.5 (number of snubbers)	OM-4 Code (number of snubbers)
A = 0	2	2
A = 1	4	3
A = 2	6	3
A = 3	8	3
Note: A is the number of snubbers failed in generic functional test.		

The sample sizes noted in the above table show that the number of large bore snubbers tested by using of the TRM formula with generic failures will be greater than or equal to the number required by the OM-4. The NRC staff finds that the TRM, Table 3.7.5-1 testing sample plans and additional sampling requirements for large bore snubbers are considered to be equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(3) Inservice Operability Failure Evaluation

OM-4, paragraph 3.2.4.1 requires that snubbers not meeting the operability testing acceptance criteria in paragraph 3.2.1 shall be evaluated to determine the cause of the failure. TRM, Table 3.7.5-1, Section (c), states that if any snubber selected for functional testing either fails to lockup or fails to move (i.e. is frozen in place), the cause will be evaluated, and if caused by a manufacturer or design deficiency, all snubbers of the same design, subject to the same defect, shall be functionally tested. The NRC staff finds that the TRM requirements related to inservice operability failure evaluation are equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(4) Test Failure Mode Groups

OM-4, paragraph 3.2.4.2 requires that unacceptable snubber(s) be categorized into failure mode group(s). A test failure mode group shall include all unacceptable snubbers that have a given failure mode, and all other snubbers subject to the same failure mode. The licensee states that the failure mode grouping is a method to determine the extent of condition of failure, and the population or grouping for sample expansion. Failure mode grouping in not incorporated into the TRM; however, plant procedures do address determining the extent of condition and determining failure grouping for sample expansion. The licensee states that snubber failures are evaluated and a root cause analysis is completed in accordance with administrative procedures and the corrective action program. Snubber failures are not specifically characterized into failure mode groups as defined in OM-4, however, failures are evaluated to determine if the failure mechanism has the potential to affect other snubbers and whether the cause of the failure is from inservice usage, maintenance practices, a manufacturing defect, or is isolated or unexplained failures. Snubbers that may be subject to similar failure mechanisms are evaluated for continued service and operability in accordance with the corrective action program.

The NAPS, TRM does not specifically address "Failure Mode Groups." However, plant procedures that address extent of condition and failure grouping for sample expansion accomplish the same intent as "Failure Mode Grouping," in OM-4. The NRC staff finds that the TRM requirements, along with plant implementing procedures are considered to be equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

(5) Corrective Actions for a 10% Sample Plan or a 37 Sample Plan or 55 Sample Plan

OM-4, paragraphs 3.2.5.1 and 3.2.5.2 require that unacceptable snubbers be adjusted, repaired, modified, or replaced. The licensee stated in their relief request that all the snubbers that are considered unsatisfactory for functional testing shall be repaired or replaced, as required by plant procedures. All snubber maintenance and repair activities are controlled at NAPS by written procedures that are based on manufacturers' recommendations and industry good practices. These procedural requirements are similar to the requirements of OM-4, paragraph 1.5.6. Following maintenance and repair, snubbers are required to be functionally tested to demonstrate that they meet the acceptance criteria. The licensee also noted in their relief request that snubbers that are modified or replaced due to visual or functional testing deficiencies are subject to the requirements of ASME Code, Section XI, Code Case N-508-3 and IWA-4000 and must be evaluated for suitability as required by OM-4, paragraph 1.5.7. Replacement snubbers are functionally tested prior to installation and visually inspected following installation in accordance with the snubber visual inspection criteria. The NRC staff finds that the TRM requirements, along with the plant implementing procedures for corrective actions associated with unacceptable snubbers at NAPS, are considered to be equivalent to the OM-4 requirements. Therefore, this alternative provides an acceptable level of quality and safety and is acceptable.

Based on the above reviews of the comparison of the OM-4 and the TRM, Section 3.7.5 requirements, the NRC staff finds that snubber inservice visual examinations and functional testing, conducted in accordance with NAPS, TRM, Section 3.7.5, provides reasonable assurance of snubber operability equivalent to that of ASME Code, Section XI, paragraphs IWF-5200(a) and (b), and IWF-5300(a) and (b). Therefore, the staff finds that the licensee's proposed alternative provides an acceptable level of quality and safety. It should be noted that in authorizing Relief Request N2-I4-CS-001, NAPS, TRM Section 3.7.5 becomes a regulatory requirement that may be used in lieu of ASME Code, Section XI requirements for performing ISI and testing of snubbers. Changes to these requirements must be reviewed and approved by the NRC staff for authorization pursuant to 10 CFR 50.55a(a)(3).

4.0 CONCLUSION

As set forth above, the NRC staff determines that the proposed alternative in N2-I4-CS-001, provides an acceptable level of quality and safety. 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. 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, for the fourth 10-year ISI interval, which commenced on December 14, 2010, and ends on December 13, 2020.

Principal Contributor: G. Bedi, DCI/CPTB

Date: January 28, 2011

January 28, 2011

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, UNIT NO. 2, FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL, RELIEF REQUEST N2-I4-CS-001 (TAC NO. ME3317)

Dear Mr. Heacock:

By letter to the U.S. Nuclear Regulatory Commission (NRC), dated February 1, 2010, Virginia Electric and Power Company (the licensee) submitted request for relief N2-I4-CS-001from certain requirements of the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code) at North Anna Power Station, Unit No. 2. Specifically, in accordance with Title 10 of the *Code* of *Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(i), the licensee proposed an alternative, CS-001 for snubber examination and functional testing requirements. The fourth 10-year Inservice Inspection (ISI) interval commenced on December 14, 2010, and ends on December 13, 2020.

The NRC staff finds that the proposed alternative to use Technical Requirements Manual, Section 3.7.5, "Snubbers," for snubber visual inspection and functional testing provides an acceptable level of quality and safety. Therefore, the NRC staff authorizes the requested relief pursuant to 10 CFR 50.55a(a)(3)(i) for the fourth 10-year ISI interval. All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized herein by the NRC staff 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,

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

Docket No. 50-339

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Safety Evaluation

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ADAMS Accession No.: ML110260022 *by email dated January 12, 2011 **email

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