

## PMNorthAnna3COLPEmails Resource

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**From:** Thomas Scarbrough  
**Sent:** Tuesday, May 06, 2008 7:20 AM  
**To:** NorthAnna3COL Resource  
**Subject:** FW: North Anna Talking Points  
**Attachments:** North Anna COLA Talking Points.doc

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**From:** Thomas Scarbrough  
**Sent:** Monday, May 05, 2008 10:55 AM  
**To:** Kimberly Gruss  
**Cc:** David Terao  
**Subject:** North Anna Talking Points

Kim,

Attached are my draft talking points for a meeting with North Anna on the IST program.

Thanks.  
Tom

**Hearing Identifier:** NorthAnna3\_Public\_EX  
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Public Meeting Talking Points

NRC Standard Review Plan Section 3.9.6, “Functional Design, Qualification, and Inservice Testing Program of Pumps, Valves, and Dynamic Restraints”

North Anna Power Station, Unit 3  
Combined License Application

Thomas G. Scarbrough

Division of Engineering  
NRC Office of New Reactors

May 2008

## Background

Paragraph (11) in 10 CFR 52.79(a) requires that an application for a combined license (COL) to construct and operate a nuclear power plant under this part must provide a description of the program(s) and their implementation necessary to ensure that the systems and components meet the requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code) and the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) in accordance with 10 CFR 50.55a.

Final Safety Analysis Report (FSAR) for North Anna Unit 3 COL application incorporates by reference proposed Revision 4 to the ESBWR Design Control Document (DCD) with specific departures and supplemental information. In responses to NRC staff requests for additional information (RAIs), GEH has submitted additional design provisions that will be incorporated into Revision 5 to the ESBWR DCD.

Commission Paper SECY-05-197, "Review of Operational Programs in a Combined License Application and General Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," discusses the Commission's position that Operational Programs should be fully described in COL applications to avoid the need to specify inspections, tests, analyses, and acceptance criteria (ITAAC) for those programs.

In a Staff Requirements Memorandum dated May 14, 2004, the Commission stated that "fully described" should be understood to mean that the program is clearly and sufficiently described in terms of the scope and level of detail to allow a reasonable assurance finding of acceptability. Required programs should always be described at a functional level and at an increased level of detail where implementation choices could materially and negatively affect the program effectiveness and acceptability.

Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," provides guidance for COL applicants in fully describing their Operational Programs, including the IST and MOV Testing programs.

NRC staff is using Standard Review Plan (SRP) Section 3.9.6, "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints," in review of North Anna Unit 3 COL application to determine whether the COL applicant meets the regulatory requirements to provide reasonable assurance that safety-related valves and dynamic restraints will be capable of performing their safety functions.

NRC staff is preparing RAIs to enable the staff to evaluate the functional design, qualification, and IST programs for safety-related valves and dynamic restraints at North Anna Unit 3 to reach a safety conclusion regarding request for COL issuance.

## Functional Design and Qualification of Safety-Related Valves and Dynamic Restraints

In 1980s, operating experience at current nuclear power plants raised concerns regarding capability of motor-operated valves (MOVs) to perform their safety functions under design-basis conditions.

In response to those concerns, NRC issued Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," to request that nuclear power plant licensees develop programs to verify design-basis capability of their safety-related MOVs through dynamic testing where practicable.

Also in response to valve operating experience, NRC issued GL 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," to request that nuclear power plant licensees verify that design and application of their safety-related power-operated gate valves were adequate to avoid pressure locking and thermal binding that might prevent those valves from performing their safety functions.

Testing and research in response to those generic letters by nuclear industry and NRC identified significant inadequacies in valve design, qualification, and testing.

NRC discussed applicability of lessons learned from resolution of MOV concerns to other power-operated valves (POVs) in Regulatory Issue Summary (RIS) 2000-03, "Resolution of Generic Safety Issue 158, Performance of Safety-Related Power-Operated Valves Under Design-Basis Conditions," and Information Notice 96-48, "Motor-Operated Valve Performance Issues."

In response to valve qualification weaknesses, ASME revised its QME-1 Standard, "Qualification of Active Mechanical Equipment used in Nuclear Power Plants," in 2007 to incorporate valve lessons learned into provisions for POV functional qualification. The updated ASME standard also provides guidance for functional qualification of check and relief valves, pumps, and dynamic restraints.

Subsection 3.9.6, "In-Service Testing of Pumps and Valves," in Section 3.9, "Mechanical Systems and Components," of Chapter 3, "Design of Structures, Components, Equipment, and Systems," in the North Anna Unit 3 FSAR incorporates by reference Revision 4 of the ESBWR DCD with supplemental information.

In its response to an RAI on the ESBWR design certification application in a letter dated February 17, 2008 (MFN 08-131), GEH provides a modification to Subsection 3.9.3.5, "Valve Operability Assurance," in the ESBWR DCD Tier 2, Revision 4.

In the modification to ESBWR DCD Tier 2, Subsection 3.9.3.5 states that the ASME QME-1-2007 standard is used as guidance in performing the qualification of valves with active safety-related functions, and provides examples of the design and qualification considerations.

Subsection 3.9.3.7, "Component Supports," in the ESBWR DCD Tier 2 states that ASME Section III component supports shall be designed, manufactured, installed, and tested in accordance with all applicable codes and standards.

Guidance for COL applications is provided in Paragraph C.III.3.9.3.3, "Pump and Valve Operability Assurance," of RG 1.206, including:

- (1) identification of all active ASME Code Class 1, 2, and 3 valves;
- (2) criteria to be employed in a test program, or a program consisting of tests and analysis, to ensure operability of valves that are required to open or close to perform a safety function during or after specified plant event;
- (3) features of program, including conditions of test, scale effects (if appropriate), loadings for specified plant event, transient loads (including seismic component, dynamic coupling to other systems, stress limits, and deformation limits), and other information pertinent to assurance of operability;
- (4) design stress limits; and
- (5) program results, summarizing stress and deformation levels and environmental qualification, as well as maximum test envelope conditions for which each component qualifies, including end connections loads and operability results.

Additional guidance for COL applications is provided in Paragraph C.III.3.9.6.1, “Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints,” of RG 1.206, including:

- (1) provisions for testing at maximum flow rates;
- (2) provisions for functional design and qualification of each safety-related valve that demonstrate capability to perform its intended functions for full range of system differential pressures and flows, and ambient temperatures, and available voltage (as applicable) from normal operating to design-basis conditions;
- (3) qualification program for safety-related valves that demonstrates that these valves do not experience leakage from loading;
- (4) provisions for functional design and qualification of dynamic restraints in safety-related systems and access for performing IST program activities; and
- (5) consideration of flow-induced loading in functional design and qualification to incorporate degraded flow conditions

Discussion areas include:

- (1) Implementation of ESBWR provisions for functional design and qualification of safety-related valves provided in Subsection 3.9.3.5;
- (2) Implementation of the ASME QME-1-2007 standard referenced as guidance in the ESBWR DCD;
- (3) Verification that solenoid-operated valves will meet their Class 1E electrical requirements for the appropriate electrical power supply amperage and voltage; and
- (4) Implementation of functional design and qualification provisions for safety-related dynamic restraints provided in Subsection 3.9.3.7 of the ESBWR DCD Tier 2.

## Inservice Testing of Pumps and Valves Introduction

Subsection 3.9.6 of the North Anna 3 FSAR incorporates by reference Subsection 3.9.6, "In-Service Testing of Pumps and Valves," in the ESBWR DCD Tier 2.

Subsection 3.9.10, "References," in the ESBWR DCD Tier 2 lists the ASME OM Code, 2001 Edition with the 2003 Addenda.

Discussion areas include:

- (1) Edition and addenda of the ASME OM Code that will be the basis for the IST program description for North Anna 3; and
- (2) Any relief from impractical Code requirements necessary to meet revisions of ASME OM Code from 2001 Edition/2003 Addenda to edition and addenda that will be basis for IST program description for North Anna 3.

## Valve Testing

Subsection 3.9.6 of the North Anna 3 FSAR incorporates by reference Subsection 3.9.6.1, “In-Service Testing of Valves,” of the ESBWR DCD Tier 2.

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a letter dated March 28, 2008 (MFN 08-282), ESBWR DCD Tier 2 Subsection 3.9.6, “In-Service Testing of Pumps and Valves,” states that the design of the nuclear power plant structures, systems, and components will provide access for the performance of IST and inservice inspection (ISI) as required by the applicable ASME Code.

Subsection 3.9.6.1 of the ESBWR DCD Tier 2 specifies general provisions for satisfying the ASME OM Code IST requirements.

Table 3.9-8, “In-Service Testing,” lists the valves within the IST program for the ESBWR design with indication of valve type, actuator, Code class, valve function, valve positions, containment isolation function, test parameters, and test frequency.

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a letter dated February 11, 2008 (MFN 08-109), Table 3.9-8 includes justifications for cold shutdown and refueling outage test schedules. However, some of the test intervals appear to exceed the refueling outage frequency.

Guidance for COL applications is provided in Paragraph C.III.3.9.6.3, “Inservice Testing Program for Valves,” including

- (1) IST Program (including test requirements, procedures, and acceptance criteria) for valve preservice tests, valve replacement, valve repair and maintenance, and indication of valve position;
- (2) proposed methods for measuring the reference values and IST values for POVs; and
- (3) valve test procedures and schedules and whether this information will be included in plant technical specifications.

Discussion areas include:

- (1) Incorporation of IST provisions in ESBWR DCD Tier 2 and RAI responses on DCD Revision 4 into North Anna Unit 3 IST program description;
- (2) Reference and IST values, and test procedures; and
- (3) IST test intervals beyond ASME OM Code frequencies.

## Motor-Operated Valves with Active Safety Functions

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a letter dated February 17, 2008 (MFN 08-131), GEH stated that the ESBWR design would replace the four safety-related motor-operated valves (MOVs) with other power-operated valves.

North Anna 3 FSAR includes references to MOVs.

Discussion areas include clarification of use of power-operated valves (other than MOVs) for safety functions at North Anna 3 in light of modification to Revision 4 to the ESBWR DCD that no MOVs will have safety functions.

## Power-Operated Valve IST Program

Subsection 3.9.6 of the North Anna 3 FSAR incorporates by reference the IST provisions for power-operated valves (POVs) specified in Subsection 3.9.6 of the ESBWR DCD Tier 2.

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a GEH letter dated February 17, 2008 (MFN 08-131), Subsection 3.9.6.8, "Non-Code Testing of Power-Operated Valves," specifies testing of POVs for the ESBWR design.

Subsection 3.9.6.8 of the ESBWR DCD Tier 2 states that additional valve testing may be performed by the COL holder, for example, as part of the plant's air-operated valve program in response to RIS 2000-03 or as part of the plant's preventive maintenance program.

Guidance for COL applications is provided in Paragraph C.III.3.9.6.3.2, "Inservice Testing Program for Power-Operated Valves Other Than Motor-Operated Valves," including

- (1) describe how the POVs are qualified to perform their design-basis functions either before installation or as part of preoperational testing;
- (2) describe the POV IST program and show how program incorporates lessons learned from MOV analysis and tests performed in response to GL 89-10; and
- (3) explain how solenoid-operated valves are verified to meet their Class 1E electrical requirements by performing their safety functions for appropriate electrical power supply amperage and voltage.

Discussion areas include:

- (1) Incorporation of IST provisions for POVs in ESBWR DCD and RAI responses in North Anna 3 IST program description;
- (2) Application of Code IST specific testing requirements for POVs;
- (3) Implementation of optional guidance in ESBWR DCD for IST programs; and
- (4) Incorporation of MOV lessons learned in IST program description for POVs.

## Check Valve Tests

Subsection 3.9.6 of North Anna 3 FSAR incorporates by reference check valve IST provisions specified in ESBWR DCD.

ESBWR DCD Tier 2 provides general provisions for the IST program for check valves.

Guidance for COL applications is provided in Paragraph C.III.3.9.6.3.3, "Inservice Testing Program for Check Valves," of RG 1.206 including:

- (1) describe the preservice and IST program for each check valve (including diagnostic equipment or nonintrusive techniques, testing performed under temperature and flow conditions, how test results identify flow necessary to open the check valve, and how testing includes effects of rapid pump starts and stops and other reverse flow conditions);
- (2) describe the nonintrusive diagnostic techniques to periodically assess degradation and performance characteristics;
- (3) describe how successful completion of pre-service testing and IST is assessed (including demonstrating that the disk fully opens or closes, determining disk positions without disassembly, verifying free disk movement, and demonstrating disk is stable in open position);
- (4) confirm system design features accommodate check valve testing Code requirements; and
- (5) show how IST program, if applicable, meets the guidelines of Appendix II to ASME OM Code.

Discussion areas include:

- (1) Preservice and IST program description for check valves;
- (2) Nonintrusive diagnostic techniques;
- (3) Successful completion of preservice and IST;
- (4) System design features for check valve testing; and
- (5) Implementation of ASME OM Code, Appendix II, if applicable.

## Pressure/Vacuum Relief Devices

Subsection 3.9.6 of the North Anna 3 FSAR incorporates by reference the IST provisions for pressure relief valves specified in Subsection 3.9.6 of the ESBWR DCD Tier 2.

In a letter dated February 17, 2008 (MFN 08-131), Revision 4 to the ESBWR DCD Tier 2 is modified to address vacuum breakers and pressure relief valves in Paragraph (3), "Vacuum Breaker Tests," and Paragraph (4), "Pressure Relief Valve Tests," of Subsection 3.9.6.1.5, "Specific Valve Test Requirements," respectively.

Guidance for COL applications is provided in Paragraph C.III.3.9.6.3.4 of RG 1.206, including type of safety and relief valves to be used at North Anna 3.

Discussion areas include types of safety relief valves.

## Component and Piping Supports

Subsection 3.9.3.7.1, "Piping Supports," in the ESBWR DCD Tier 2 specifies provisions for snubber design, testing, installation, and pre-service examination and testing.

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a letter dated March 28, 2008 (MFN 08-282), ESBWR DCD Tier 2 Subsection 3.9.3.7.1 states that the design of the nuclear power plant structures, systems, and components will provide access for the performance of IST and inservice inspection as required by the applicable ASME Code.

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a letter dated February 21, 2008 (MFN 08-147), ESBWR DCD Tier 2 Subsection 3.9.3.7.1 states in paragraph e, "Snubber Pre-service and In-service Examination and Testing," that the COL applicant will provide a full description of the snubber inspection and test program.

North Anna 3 FSAR incorporates by reference ESBWR DCD Tier 2 Subsection 3.9.3.7.1 with supplemental information.

Table 1.9-203, "Conformance with the FSAR Content Guidance in RG 1.206," in the North Anna 3 FSAR on page 1-109 states that the COL application conforms with C.III.1.3.9.6.4 of RG 1.206 with the exception that a plant-specific snubber table will be prepared in conjunction with closure of ITAAC Table 3.1-1.

A similar statement is made in Subsection 3.9.3.7.1(3)f, "Snubber Audit Support Data," of the North Anna 3 FSAR, which also states that the information in this section will be included in the FSAR as part of a subsequent FSAR update.

Guidance for COL applications is provided in Paragraph C.III.3.9.6.4, "Inservice Testing Program for Dynamic Restraints," including

- (1) identification of safety-related components that use snubbers in their support systems; and
- (2) test frequency and duration and examination methods to be used in the IST program related to visual inspections and functional testing of dynamic restraints and basis for testing.

Discussion areas include

- (1) Description of snubber inspection and test program; and
- (2) Status of identification of components using snubbers.

## Relief Requests

In a modification to Revision 4 to the ESBWR DCD provided in a letter dated February 17, 2008 (MFN 08-131), Subsection 3.9.6.6, "10 CFR 50.55a Relief Requests and Code Cases," does not identify any relief from or alternatives to the ASME OM Code.

Paragraph C.III.3.9.6.5, "Relief Requests and Alternative Authorization to ASME OM Code," of RG 1.206 provides guidance for COL applications in this area if relief requests or alternatives are planned.

Discussion areas include

- (1) Need, if any, for the NRC staff to review relief from or alternatives to the ASME OM Code edition and addenda used as the basis for the IST program description in North Anna 3 COL application; and
- (2) Clarification of statement in Subsection 3.9.6.6, "10 CFR 50.55a Relief Requests and Code Cases," of the North Anna FSAR that no relief from or alternative to ASME OM Code is being requested beyond what is identified in the ESBWR DCD.

## Operational Program Descriptions

North Anna 3 FSAR incorporates by reference Subsection 3.9.3.7, “Component Supports,” and Subsection 3.9.6, “In-Service Testing of Pumps and Valves,” of ESBWR DCD Tier 2 without supplemental program description information.

In a modification to Revision 4 to the ESBWR DCD Tier 2 provided in a letter dated February 21, 2008 (MFN 08-147), Subsection 3.9.9-3-A, “In-Service Testing Programs,” states that the COL applicant shall provide a full description of the IST program and a milestone for full program implementation.

In that same letter, Subsection 3.9.9-4-A, “Snubber Inspection and Test Program,” states that the COL applicant shall provide a full description of the snubber inspection and test program and a milestone for program implementation, including development of a data table identified in ESBWR DCD Tier 2 Subsection 3.9.3.7.1(3).

Discussion areas include implementation of the provisions for IST and snubber inspection and test program descriptions in accordance with Subsections 3.9.9-3-A and 3.9.9.4-A in the ESBWR DCD Tier 2.

## Operational Program Implementation

North Anna 3 FSAR Section 13.4, "Operational Program Implementation," states that FSAR Table 13.4-201, "Operational Programs Required by NRC Regulations," lists each operational program, the regulatory source for the program, the FSAR section in which the operational program is described, and the associated implementation milestones.

FSAR Table 13.4-201 specifies the implementation milestone for the Preservice Testing Program as "prior to fuel load."

Discussion areas include clarification of the commencement of the Preservice Testing Program for North Anna Unit 3. For example, will commencement of this program be tied to the completion of construction activities for the component, system, or elevation?

## Flow-Induced Vibration

North Anna 3 FSAR incorporates by reference Section 3.9.2, “Dynamic Testing and Analysis of Systems, Components, and Equipment,” in the ESBWR DCD Tier 2.

ESBWR DCD Tier 2 Section 3.9.2 addresses criteria, testing procedures, and dynamic analyses employed to ensure the structural and functional integrity of piping systems, mechanical equipment, reactor internals, and their supports under vibratory loadings, includes those due to fluid flow and postulated seismic events discussed in SRP 3.9.2.

ESBWR DCD Tier 2 Subsection 14.2.8.1.42, “Expansion, Vibration and Dynamic Effects Preoperational Test,” states that its objective is to verify that critical components and piping runs are properly installed and supported such that expected steady-state and transient vibration and movement due to thermal expansion does not result in excessive stress or fatigue to safety-related plant systems and equipment.

Nuclear power plant operating experience has revealed the potential for adverse flow effects from vibration caused by hydrodynamic loads and acoustic resonance within reactor coolant, steam, and feedwater systems.

Discussion areas include planned implementation of the ESBWR DCD provisions to address potential adverse flow effects on safety-related valves and dynamic restraints within the IST program in the reactor coolant, steam, and feedwater systems at North Anna 3 from hydraulic loading and acoustic resonance during plant operation.

## Applicable ASME Codes

Section 1.9.2, "Applicability to Regulatory Criteria," on page 1-24 of the North Anna 3 FSAR states that Table 1.9-204, "Industrial Codes and Standards," identifies the Industrial Codes and Standards that are applicable to those portions of the North Anna 3 design that are beyond the scope of the DCD or the SSAR, and to the operational aspects of the facility.

Table 1.9-204 lists the ASME BPV Code, Section IX, but not other sections of the ASME BPV Code (such as Section XI) or the ASME OM Code, which are related to operational aspects of North Anna 3.

Discussion areas include application of the ASME BPV Code and OM Code with regard to Table 1.9-204 of North Anna 3 FSAR.