August 1, 2008

Mr. Eugene S. Grecheck
Vice President - Nuclear Development
Dominion
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 022 (SRP SECTIONS: 03.09.06 AND 03.11) RELATED TO THE NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION

Dear Mr. Grecheck:

By letter dated November 26, 2007, Dominion Virginia Power (Dominion) submitted a combined license application for North Anna Unit 3 pursuant to 10 CFR Part 52. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application.

The staff has identified that additional information is needed to continue portions of the review and the request for additional information (RAI) is contained in the enclosure to this letter. To support the review schedule, Dominion is requested to respond within 45 days of the date of this letter. If the RAI response involves changes to application documentation, Dominion is requested to include the associated revised documentation with the response.

Should you have questions, please contact me at (301) 415-0224 or Thomas.Kevern@nrc.gov.

Sincerely,

/RA/

Thomas A. Kevern, Senior Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-017

Enclosure: Request for Additional Information

August 1, 2008

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DATE	07/16/08	07/16/08	07/25/08	08/01/08

*Approval captured electronically in the electronic RAI system.

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Request for Additional Information
North Anna, Unit 3
Dominion
Docket Number 52-017
SRP Sections: 03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints; 03.11 - Environmental Qualification of Mechanical and Electrical Equipment
Application: FSAR Sections 3.9.6 and 3.11

QUESTIONS

03.09.06-1

Section 3.9, "Mechanical Systems and Components," of Chapter 3, "Design of Structures, Components, Equipment, and Systems," provided in the proposed revision to the North Anna Unit 3 FSAR submitted in a letter from Dominion dated June 26, 2008, incorporates by reference Revision 5 of the ESBWR DCD with supplemental information. Subsection 3.9.3.5, "Valve Operability Assurance," in ESBWR DCD Tier 2 (Revision 5) specifies that valve designs not previously qualified will meet the requirements of the American Society of Mechanical Engineers (ASME) Standard QME-1-2007, "Qualification of Active Mechanical Equipment used in Nuclear Power Plants." For valve designs that were previously qualified to standards other than ASME QME-1-2007, ESBWR Tier 2 (Revision 5) Subsection 3.9.3.5 specifies an approach for valve qualification that follows the key principals of the ASME QME-1-2007 standard. The NRC staff is performing its review of the COL application for the functional design and qualification of safety-related valves and dynamic restraints using the acceptance criteria in SRP Section 3.9.6 and other applicable SRP sections. Please discuss the process, such as by component examples, for implementing the provisions specified in the ESBWR DCD Tier 2 Subsection 3.9.3.5 for the functional design and qualification of valves and dynamic restraints. As part of the RAI response, please discuss the verification that solenoid-operated valves will meet their Class 1E electrical requirements for the appropriate electrical power supply amperage and voltage.

03.09.06-2

FSAR Subsection 3.9.6 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. Please clarify the edition and addenda of the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) that will be the basis for the IST program description for North Anna Unit 3 for COL issuance.

03.09.06-3

In a proposed revision to the North Anna Unit 3 FSAR submitted by Dominion on June 26, 2008, FSAR Subsection 3.9.6 incorporates by reference the POV IST provisions specified in Subsection 3.9.6 of the ESBWR DCD Tier 2 (Revision 5) with a supplemental description of the POV IST program. The revised Subsection 3.9.6 in the FSAR describes the incorporation of lessons learned from valve experience at operating nuclear power plants into the air-operated valve (AOV) IST program. In the

Enclosure

revised FSAR section, Dominion states that periodic static testing will be performed on high-risk AOVs unless those valves are stroked during plant operation. Dominion also states that periodic dynamic testing of AOVs is performed if required by valve qualification. Please discuss this provision in the FSAR for the periodic verification of AOV capability. In addition, please discuss the application of valve performance lessons learned to POVs other than AOVs. Discuss the basis for the statement in Subsection 3.9.6 of the proposed revision to the FSAR that post-maintenance procedures are applied where high-risk valve performance could be affected. For example, quality assurance criteria in 10 CFR Part 50, Appendix B, require the use of procedures when performing activities affecting safety-related valves regardless of their risk ranking.

03.09.06-4

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. Revision 5 to the ESBWR DCD Tier 2 in Subsection 3.9.3.7.1 also 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. Table 1.9-203, "Conformance with the FSAR Content Guidance in RG 1.206," in the FSAR on page 1-109 states that the COL application conforms with Paragraph C.III.1.3.9.6.4 of RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," with the exception that a plant-specific snubber table will be prepared in conjunction with closure of ITAAC Table 3.1-1. In a letter dated June 26, 2008, Dominion submitted a proposed revision to Section 3.9 of the FSAR that describes the snubber inservice examination and testing program, including specifying that the program will satisfy ASME OM Code, Section ISTD, and providing specific examples of the program content to supplement the ESBWR DCD. Please clarify the reference to the ASME *Boiler and Pressure Vessel Code*, Section XI, with respect to snubbers at North Anna Unit 3 in paragraph 3(b) of Subsection 3.9.3.7.1 of the ESBWR DCD Tier 2.

03.09.06-5

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 associated implementation milestones, and the FSAR section in which the operational program per the guidance in RG 1.206. FSAR Table 13.4-201 specifies the implementation milestone for the Preservice Testing Program as "prior to fuel load." Please discuss the commencement of the Preservice Testing Program such as tying its commencement to construction activities for the component, system, or elevation.

03.09.06-6

The FSAR incorporates by reference Section 3.9.2, "Dynamic Testing and Analysis of Systems, Components, and Equipment," in the ESBWR DCD Tier 2, which 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. ESBWR DCD Tier 2 Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," addresses methods of test and analysis employed to ensure the operability of mechanical and electrical equipment under the full range of normal and accident loadings to ensure conformance

with the NRC regulations. 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. Please describe the implementation of the program to address potential adverse flow effects on safety-related valves and dynamic restraints.

03.11-1

FSAR Section 3.11, "Environmental Qualification of Mechanical and Electrical Equipment," incorporates by reference Section 3.11 of the ESBWR DCD Tier 2, with supplemental information. The process for implementation of the provisions for environmental qualification of safety-related mechanical equipment (such as by procurement specifications) is not described in the FSAR. Please provide or reference the following information, or indicate the status of and schedule for its availability, related to the environmental qualification (EQ) operational program for safety-related mechanical equipment including (a) a description of the process to determine the suitability of environmentally sensitive mechanical equipment needed for safety-related functions and to verify that the design of such materials, parts, and equipment is adequate, such as (i) identifying safety-related mechanical equipment located in harsh environmental areas, (ii) identifying nonmetallic subcomponents of such equipment, (iii) identifying environmental conditions and process parameters for which this equipment must be qualified, (iv) identifying nonmetallic material capabilities, and (v) evaluating the environmental effects on the nonmetallic components of the equipment; and (b) a description of the approach to document the successful completion of qualification tests and/or analysis, and qualification status for each type of equipment.

03.11-2

Subsection 3.11.2.2, "Qualification Program, Methods and Documentation," of the ESBWR DCD Tier 2 states that safety-related mechanical equipment that is located in a harsh environment is qualified by analysis of materials data, which are generally based on test and operating experience. Subsection 3.11.2.2 further states that safety-related equipment located in a mild environment is qualified per IEEE 323. The North Anna Unit 3 FSAR does not discuss the implementation of the environmental qualification approach identified in the ESBWR DCD. Discuss the plan for the implementation of the environmental qualification approach, including the application of industry standards

03.11-3

FSAR Subsection 3.11.2.2 states that following implementation of the environmental qualification program, ESBWR DCD Table 3.11-1 will be supplemented, as necessary, in a subsequent FSAR update to include additional equipment covered by the program but not identified in the table. The reference to additional equipment is not clear if the ESBWR design is complete when certified in 10 CFR Part 52. Clarify the statement in Subsection 3.11.2.2 of the North Anna Unit 3 FSAR that an FSAR update will include additional equipment not identified in the ESBWR DCD Tier 2 Table 3.11-1.

03.11-4

Subsection 3.11.2.2 of the ESBWR DCD Tier 2 states that the qualification program and methodology are described in the NRC approved proprietary licensing Topical Report NEDE-24326-1-P. In a letter dated November 19, 2007 (MFN 07-174, Supplement 2), GEH stated that the NRC staff review of NEDE-24326-1-P was addressed in NUREG-1503, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design." On page 3-90 of NUREG-1503, the NRC staff found that the topical report conforms to 10 CFR 50.49 and its associated standards, except for the position on time margin. The COL applicant is requested to discuss its implementation of the topical report including the exception to its acceptance indicated in NUREG-1503. Describe the plan for the implementation of NEDE-24326-1-P, "General Electric Environmental Qualification Program," for environmental qualification of safety-related mechanical equipment.

03.11-5

Section 3.10, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," in the ESBWR DCD Tier 2 addresses methods of test and analysis employed to ensure the operability of mechanical and electrical equipment under the full range of normal and accident loadings to ensure conformance with the NRC regulations. Operating experience from nuclear power plants has revealed the potential for adverse flow effects during normal plant operation that can impact safety-related components (such as safety relief valves). As a result, equipment qualification programs need to address these adverse flow effects to provide confidence in the capability of safety-related equipment to be capable of performing their safety functions. The FSAR does not specifically address the consideration of potential adverse flow effects for the equipment qualification program. Describe the consideration of flow-induced vibration in the qualification of safety-related mechanical equipment, such as valves, actuators, and piping, resulting from acoustic resonance and hydraulic loading.

03.11-6

FSAR Subsection 3.11.2.2 states that the implementation of the environmental qualification program, including development of the plant specific Equipment Qualification Document (EQD), will be in accordance with the milestone defined in Section 13.4 "Operational Program Implementation." FSAR Section 13.4 indicates 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 Environmental Qualification Program as "prior to fuel load." This milestone is not sufficiently clear to establish the commencement of the Environmental Qualification Program and its subsequent transition to an ongoing program during plant operation. For example, will commencement of this program be tied to the completion of construction activities for the component, system, or elevation? What will be the process for turnover of the EQ program to plant operations staff? Please clarify the plans for the commencement of the Environmental Qualification Program and its transition into an operating reactor program

03.11-7

ESBWR DCD Tier 1 Section 3.8, “Environmental Qualification of Mechanical and Electrical Equipment,” specifies the environmental qualification ITAAC for safety-related mechanical and electrical equipment in Table 3.8-1, “ITAAC for Environmental Qualification of Mechanical and Electrical Equipment.” The inspections, tests, and analyses for safety-related mechanical equipment located in a harsh environment states that (i) analysis will be performed to identify the environmental design bases including the definition of anticipated operational occurrences and normal, accident, and post-accident environments, (ii) type tests and/or analyses of material data will be performed on safety-related mechanical equipment identified as located in a harsh environment; and (iii) inspection will be performed to verify proper non-metallic materials of the as-installed safety-related mechanical equipment located in a harsh environment. FSAR Section 3.11 does not address implementation of the ITAAC for safety-related mechanical equipment specified in the ESBWR DCD Tier 1. Please describe the plan for the implementation of the inspections, tests, analyses, and acceptance criteria (ITAAC) for safety-related mechanical equipment located in a harsh environment specified in the ESBWR DCD Tier 1.