

## PMNorthAnna3COLPEmails Resource

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**From:** Patel, Chandu  
**Sent:** Friday, June 03, 2011 3:28 PM  
**To:** 'na3raidommailbox@dom.com'  
**Cc:** Weisman, Robert; NorthAnna3COL Resource; Nold, David; Jackson, Christopher; Kallan, Paul  
**Subject:** RAI Letter No. 72, RAI 5658, Section 9.4.5, North Anna 3 COLA  
**Attachments:** RAI Letter 72 RAI 5658.doc

By letter dated November 26, 2007, Dominion Virginia Power (Dominion) submitted a Combined License Application for North Anna, Unit 3, pursuant to Title 10 of the *Code of Regulations*, Part 52. The U.S. Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this COLA.

The NRC staff has identified that additional information is needed to continue portions of the review and a Request for Additional Information (RAI), is enclosed. To support the review schedule, Dominion is requested to respond within 30 days of the date of this request. If the RAI response involves changes to the application documentation, Dominion is requested to include the associated revised documentation with the response.

Sincerely,  
Chandu Patel  
Lead Project Manager for NA3 COLA

**Hearing Identifier:** NorthAnna3\_Public\_EX  
**Email Number:** 979

**Mail Envelope Properties** (8C658E9029C91D4D90C6960EF59FC0D62A523B769E)

**Subject:** RAI Letter No. 72, RAI 5658, Section 9.4.5, North Anna 3 COLA  
**Sent Date:** 6/3/2011 3:28:07 PM  
**Received Date:** 6/3/2011 3:28:12 PM  
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<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	823	6/3/2011 3:28:12 PM
RAI Letter 72 RAI 5658.doc	56314	

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

RAI Letter No. 72  
6/3/2011  
North Anna, Unit 3  
Dominion  
Docket No. 52-017  
SRP Section: 09.04.05 - Engineered Safety Feature Ventilation System  
Application Section: 9.4.5

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

Request for Additional Information No. 5658

09.04.05-1

The staff notes that the applicant chose to designate FSAR sections 9.4.5.2.3 and 9.4.5.2.5 as NAPS COL 9.4(4) while the other FSAR sections referencing "The capacity of the heating coils..." are designated as STD COL 9.4(4). When compared, the actual sizes of heating coils to be used at North Anna Unit 3 as captured in Table 9.4-201 "Equipment Design Data" are consistently larger in capacity than the RCOLA applicant's heating coils. Only the heating coil capacities as listed on Table 9.4-201 is unique to North Anna 3 from the RCOLA. The staff requests additional information as to the reasoning behind labeling FSAR sections 9.4.5.2.3 and 9.4.5.2.5 as NAPS COL 9.4(4)?

09.04.05-2

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant did not endorse the RCOL applicant's response to RAI #3219, (CP RAI # 63) Question #09.04.01-1. There was no note provided in the letter's "Endorsement Clarification" column that would explain the SCOL applicant's reasons for non endorsement. The staff requests that the SCOL applicant provide resolutions to the following issues documented in Question #09.04.01-1.

In combined license application SCOL FSAR subsection 9.4.1.2 and FSAR Table 9.4-201, Dominion assigns a heating coil capacity value of 45 kW to the heaters of the four Main Control Room (MCR) Air Handling Units (AHU).

During its review, using the guidance of NUREG-800 Standard Review Plan (SRP) 9.4.1, the NRC staff found that the SCOL applicant did not include a reference in COLA FSAR Section 9.4.8 that would provide the basis and calculations used in the sizing of the heaters (i.e. 45 KW) for the MCR AHU.

The staff acknowledges that DCD ITAAC Item 4.a of Tier 1 Table 2.7.5.1-3 establishes clear performance criteria for the heaters and a means of verifying that heaters have been sized adequately.

- What is the plant specific design basis for the sizing of the heaters?
- What is the design basis MCR temperature that the heaters are designed to maintain?

These design bases should be clearly stated in the SCOL FSAR.

#### 09.04.05-3

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant did not endorse the RCOL applicant's response to RAI #3230, (CP RAI # 110) Question #09.04.05-1. There was no note provided in the letter's "Endorsement Clarification" column that would explain the SCOL applicant's reasons for non endorsement. The staff requests that the SCOL applicant provide resolutions to the following issues documented in Question #09.04.05-1.

In combined license application SCOL FSAR subsections 9.4.5.2.2, 9.4.5.2.3, 9.4.5.2.4, 9.4.5.2.5 and FSAR Table 9.4-201, the SCOL applicant assigns a heating coil capacity values to the heaters of the air handling units for the following systems:

- Class 1E Electrical Room HVAC System;
- Safeguard Component Area HVAC System;
- Emergency Feedwater Pump Area HVAC System; and
- Safety Related Component Area HVAC System

Class 1E power supplies provides the staff assurance of the ability of the engineered safety features (ESF) air handling unit heaters to provide this safety function during and subsequent to postulated accidents, including loss of offsite power.

The staff acknowledges that DCD ITAAC Items 4.b, 4.d, 4.c and 4.f of Tier 1 Table 2.7.5.2-3 establishes clear performance criteria for the heaters and a means of verifying that heaters have been sized adequately.

During its review, per the guidance of NUREG-800 Standard Review Plan (SRP) 9.4.5, the NRC staff found that the SCOL applicant did not include in the FSAR a reference section (9.4.8 in the DCD) or references that would provide the bases and calculations used in the sizing of the heaters for these ESF systems' air handling units.

- What is the plant specific design basis (i.e. external ambient conditions) for the sizing of the heaters?
- What is the design basis temperature that the heaters are designed to maintain within their respective rooms?

These design bases should be clearly stated in the SCOL FSAR.

#### 09.04.05-4

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant does not endorse the RCOL applicant's response to RAI #3232, (CP RAI # 123) Question #09.04.05-5. The staff views the RCOL applicant's response to Question #09.04.05-5 as incomplete and considers this to be an Open Item in the RCOLA. Subsequently, the staff in March, 2011 issued a follow-up NRC RAI ID No. 5585, Q#20497, Question #09.04.05-17 to the RCOL applicant to resolve the outstanding design issues.

Given that the SCOL applicant did not endorse the RCOL applicant's resolution to Question #09.04.05-5, the staff submits the near original RCOL Question to the SCOL applicant for additional information about their intended resolution of the following questions.

#### Internal Flooding – GDC 4

Section II of SRP section 9.4.5 provides the "Technical Rationale" behind the acceptance criteria for GDC 4. An excerpt from this passage reads: "Compliance with GDC 4 requires that structures, systems, and components important to safety be designed to accommodate the effects of, and be compatible with, environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be protected against dynamic effects (e.g., those of missiles, pipe whipping, and discharging fluids) that may result from equipment failure and from events and conditions outside the nuclear power unit."

Two of the "Review Interfaces" from SRP section 9.4.5 that these "dynamic effects" refer to are captured in SRP section 3.4.1 "Internal Flood Protection For Onsite Equipment Failures" and SRP section 3.6.1 "Plant Design For Protection Against Postulated Piping Failures In Fluid Systems Outside Containment".

The NRC staff notes that US-APWR DCD subsection 3.4.1.1 contains the following excerpt:

"Safety-related SSCs are protected from flooding by external and internal sources. The US-APWR design includes the following:

- The separation of redundant trains of safety-related SSCs as addressed in Chapters 1
- Protective barriers and enclosures, where necessary, as addressed in this section
- The placement of essential SSCs above internal flood levels
- SSCs are mounted above the flood level. While safety-related SSCs that are environmentally protected in accordance with Section 3.11 are permitted below the potential flood level, no components requiring active operation to achieve their intended safety function are located below the potential flood level."

The safety-related design basis contained in the second bullet of the North Anna 3 FSAR subsection 9.4.5.3.6 reads: "*The ESW pump room exhaust fan and the UHS transfer pump room exhaust fan are separated by a three-hour fire rated barrier. Therefore, each fan powered by different Class 1E power supplies is protected and remains functional in the event of a fire in either room.*"

The NRC staff requests additional information about the barrier between the ESW pump room and the UHS transfer pump room. SCOL FSAR Appendix 9A "Fire Hazard Analysis" indicates that there may be 3-hour fire rated passages between the two rooms. With respect to the issue of internal flooding, the staff could find no information contained in the SCOL applicant's FSAR subsection 3.4. Please clarify, is there a flood barrier between the UHS ESW pump and the UHS Transfer Pump? Please update the FSAR as appropriate.

09.04.05-5

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant does not endorse the RCOL applicant's response to RAI #3232, (CP RAI # 123) Question #09.04.05-9.

Given that the SCOL applicant did not endorse the RCOL applicant's resolution to Question #09.04.05-9, the staff submits the near original Question to the SCOL applicant for their own resolution to the following request for additional information.

Proper Functioning of the Essential Electric Power System – GDC 17

The second paragraph from Section II "Acceptance Criteria" of SRP section 9.4.5 "Technical Rationale" item 4 reads:

"With regard to the ESFVS, the plant design should ensure that electrical contacts and relays in diesel generator rooms are protected from dust, dirt, and grit. For example, contacts and relays must be enclosed in dust-tight cabinets with fully gasketed openings and ventilation louvers must be equipped with filters. In addition, air used for ventilation should be filtered and should be taken from a height of at least 7 meters (20 feet) above ground level."

The NRC staff notes that NUREG-CR/0660 "Enhancement of Onsite Emergency Diesel Generator Reliability" addresses this issue.

The staff could find no information in the SCOL FSAR about the spatial positioning of the fresh air intake dampers. More specifically, to limit the flow of airborne particulate (dust) into the two rooms of the UHS ESW Pump House, the bottom of the fresh air intakes are to be positioned 20 feet above grade elevation. Alternately, or in addition to, the electrical and instrumentation cabinets are to be provided with suitable seals or gaskets to prevent dust from entering the cabinets.

The NRC staff requests additional information about how the design of the UHS ESW Pump House satisfies these GDC 17 required design attributes.

09.04.05-6

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant endorsed the RCOL applicant's response to RAI #3232, (CP RAI # 123) Question #09.04.05-10. The staff views the RCOL applicant's response to Question #09.04.05-10 as incomplete and considers this to be an Open Item in the RCOLA. Subsequently, the staff in March, 2011 issued a follow-up NRC RAI ID No. 5585, Q#20517, Question #09.04.05-18 to the RCOL applicant to resolve the outstanding design issues.

The staff submits to the SCOL applicant for their own resolution the following residual issues (i.e. Open Item) with the RCOL application. Alternatively, the SCOL applicant can wait for the RCOL applicant to resolve these issues and notify the staff that they endorse that resolution.

(1) The staff disagrees with the statement contained in 2b of the applicant's response "... do not perform an active safety function". During the summer months these dampers must change state

from the normally closed position to the open position whenever the exhaust fans are running. This change of state function, allows the ESW Pump House rooms to remain below the design basis limiting temperature of 120°F in support of running the safety related UHS ESW pumps. Conversely during the winter months, these dampers must fail to the closed position to ensure that the ESW Pump House rooms remain above the design basis lower limiting temperature of 40°F. This change of state function, helps to ensure that the safety related UHS ESW pumps remain operable while in standby during normal plant operations. The staff requests that the applicant re-evaluate this sentence and amend the FSAR as necessary and in particular ITAAC Table A.2-2 and FSAR 9.4.5.2.6, with greater clarity.

- (2) The staff notes that Part 10 ITAAC Table A.2-2 lists the safety related temperature switches (e.g. VRS-TS-2610C,D,E,F) for the “ESW Pump Room Temperature” and “UHS ESW pump Room Temperature” but not their in series Temperature Controllers (e.g. VRS-TC-2610C,D,E,F). The staff requests additional information about the this series safety related/non-safety arrangement and the Class 1E and non Class 1E control circuits.
- (3) The staff notes that the safety related temperature switches (e.g. VRS-TS-2610C,D,E,F) do not appear in FMEA Table 9.4-203. The staff requests that these safety related components be added to the Table 9.4-203.

#### 09.04.05-7

Dominion indicated in its letter (ML103160406) to the staff of November 10, 2010 (Serial No. NA3-10-019), that the SCOL applicant did not endorse the RCOL applicant’s response to RAI #3232, (CP RAI # 123) Question #09.04.05-7. There was no note provided in the letter’s “Endorsement Clarification” column that would explain the SCOL applicant’s reasons for non endorsement. The staff notes that the RCOL applicant’s response to Question #09.04.05-7 results in significant changes to the RCOL FSAR (i.e. pgs 9.4-2 and 9.4-5).

The staff requests that the SCOL applicant provide resolutions to the issues documented in Question #09.04.05-7.

Question #09.04.05-7 as submitted to the RCOL applicant follows verbatim:

Section II “Acceptance Criteria” of SRP 9.4.5 for GDC 4 contains the following excerpt: “...The evaluation with respect to GDC 4 also includes evaluation of the adequacy of environmental support provided to structures, systems, and components important to safety located within areas served by the ESFVS.”

The “Design Bases” from COL FSAR subsection 9.4.5.1.1.6 “UHS ESW Pump House Ventilation System” reads:

“The UHS ESW pump house ventilation system provides and maintains the proper environmental conditions within the required temperature range (40 °F – 120 °F) to support the operation of the instrumentation and control equipment and components in the individual UHS ESW pump houses during a design basis accident and LOOP with outside ambient design temperature condition of 0% temperature exceedance values.”

During its review of the guidance of NUREG-800 SRP 9.4.5, the NRC staff found that the COL applicant did not include references in FSAR Section 9.4.8 that would provide the bases for the calculations used in sizing the capacities of the heaters and of the exhaust fans for the UHS ESW Pump House Ventilation System. (Reference: COL FSAR Table 9.4-202 "UHS EXW Pump House System Equipment Design Data").

The applicant is requested to either establish clear performance criteria for the ESW Pump House Ventilation System and a means (ITAAC and/or startup testing) of verifying that heaters have been sized adequately or provide the following information to justify the value selected.

- What is the basis for the sizing of the ventilation system?

In order to facilitate confirmatory calculations please provide the inputs to the design calculations used in the derivation of the sizing of the ventilation system.

- Each of the room heaters has an attendant fan displayed in COL FSAR Figure 9.4.201 "UHS ESW Pump House Ventilation System Flow Diagram". However, FSAR Table 9.4-202 does not list a design specification air flow rate for these unit heater fans. Please explain why there is no air flow rate for these unit heater fans.

- What is the impact on the UHS ESW Pump House room temperature when the effect of a 140°F UHS Basin temperature (COL FSAR Table 7.5-201) is combined with the effects of the most severe summertime ambient conditions for the plant site and the heat load from the ESW pump motor?

- What is the expected room temperature in this scenario? Will the ESF equipment within the room remain operable?

Regulatory Guide 1.206 section C.I.9.4.5.1 "Design Bases" reads:

"The design bases for the air handling and treatment system for areas that house ESF equipment should include the criteria and/or features to ensure the system's performance (i.e., flow rates, temperature limits, humidity limits, filtration) and reliability (i.e., single failure, redundancy, seismic design, environmental qualification) for all modes of operation, including normal, abnormal, and SBO conditions. The design bases should also include requirements for manual or automatic actuation, system isolation, monitoring for radiation, and other controls essential to the performance of the system functions. In addition, the applicant should provide details concerning the means used to protect system vents and louvers from externally and internally generated missiles."

The NRC staff found the "System Description" of COL FSAR subsection 9.4.5.2.6 lacking significant detail when compared to the prescriptive guidance of Regulatory Guide 1.206 section C.I.9.4.5.1 "Design Bases".



SRP 9.4.5 section IV. "Evaluation Findings" permits the staff to perform confirmatory calculations on a select basis to provide reasonable assurance of the plant's overall integrity with respect to safety-related component design. More specifically, section IV reads: "The reviewer verifies that the applicant has provided sufficient information and that the review and calculations (if applicable) support conclusions of the following type to be included in the staff's safety evaluation report. The reviewer also states the bases for those conclusions."

In addition, the NRC staff notes that the "Technical Rationale" section of SRP 9.4.5 provides the reasoning behind the acceptance criteria contained in the SRP. In particular, the staff invokes the following clause from Technical Rationale 2: "...The function of the ESFVS is to provide a suitable and controlled operating environment for engineered safety feature components during normal operation, during adverse environmental occurrences, and during and subsequent to postulated accidents, including loss of offsite power. This requirement is imposed to ensure that engineered safety features function through the course of operating and accident events. In addition, the ESFVS design must withstand dynamic effects associated with postulated accidents.

Meeting these requirements provides assurance that engineered safety features will not fail to operate as designed, thus providing protection against loss of core cooling and/or containment integrity."

Based on the review requirements and technical rationale of SRP 9.4.5, the staff:

- 1) requests the COL Applicant provide the level of detail in the FSAR consistent with the guidance of Regulatory Guide 1.206; and
- 2) requests that the COL Applicant provide, for the purposes of conducting confirmatory calculations, the inputs to design calculations used in the derivation of the heater and exhaust flow capacity values for these components of the UHS ESW Pump House Ventilation System.