Security Related Information
Withhold Under 10 CFR 2.390

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Serial No. NA3-11-034RA
Docket No. 52-017
COL/BCB

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
SRP 09.04.05: RESPONSE TO RAI LETTER 72

On June 3, 2011, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA), which consisted of seven questions. Dominion submitted the responses to three of the Request for Additional Information (RAI) Questions in a letter dated July 7, 2011 (Serial No. NA3-11-034R). The responses to the remaining four RAI Questions are provided in Enclosures 1 through 4:

- RAI 5658, Question 09.04.05-4 Barrier Between ESW Pump and UHS Transfer Pump Rooms
- RAI 5658, Question 09.04.05-5 UHS ESW Pump House Air Intake
- RAI 5658, Question 09.04.05-6 Safety/Seismic Classification of UHS ESW Pump House Ventilation System Components
- RAI 5658, Question 09.04.05-7 Design Input for UHS ESW Pump House Ventilation System

Because the enclosed material contains security related information (SRI), Dominion requests that the SRI identified pages in Enclosure 1 be withheld from public disclosure in accordance with 10 CFR 2.390.

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

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NRO

ENCLOSURE 1 OF THIS LETTER CONTAINS SECURITY RELATED INFORMATION AND MUST BE PROTECTED ACCORDINGLY. UPON SEPARATION OF THE SRI IDENTIFIED PAGES IN ENCLOSURE 1, THIS LETTER IS DECONTROLLED.

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

Enclosures:

1. Response to NRC RAI Letter No. 72, RAI 5658, Question 09.04.05-4.
2. Response to NRC RAI Letter No. 72, RAI 5658, Question 09.04.05-5.
3. Response to NRC RAI Letter No. 72, RAI 5658, Question 09.04.05-6.
4. Response to NRC RAI Letter No. 72, RAI 5658, Question 09.04.05-7.

Commitments made by this letter:

1. This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 22nd day of August, 2011
My registration number is 7173057 and my
Commission expires: August 31, 2012

Wanda K. Marshall
Notary Public

WANDA K. MARSHALL
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

ENCLOSURE 1 OF THIS LETTER CONTAINS SECURITY RELATED INFORMATION AND MUST BE PROTECTED ACCORDINGLY. UPON SEPARATION OF THE SRI IDENTIFIED PAGES IN ENCLOSURE 1, THIS LETTER IS DECONTROLLED.

cc: U. S. Nuclear Regulatory Commission, Region II
C. P. Patel, NRC
T. S. Dozier, NRC
J. T. Reece, NRC

ENCLOSURE 2

Response to NRC RAI Letter No. 72

RAI No. 5658, Question 09.04.05-5

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5658 (RAI LETTER NO. 72)

SRP SECTION: 09.04.05 – ENGINEERED SAFETY FEATURE VENTILATION SYSTEM

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

DATE OF RAI ISSUE: 06/03/2011

QUESTION NO.: 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.

Dominion Response

Under the design-centered review approach, Dominion evaluates R-COLA RAI responses to determine whether the response is standard and can be endorsed, or whether a site-specific response is appropriate. In this instance, the R-COLA RAI Question 09.04.05-9 response contained Essential Service Water (ESW) Pump House elevation data that is site-specific. Thus, the resulting height limitations identified in the R-COLA response are not applicable to the S-COLA. Although the substance of the R-COLA response is retained, a specific response to the S-COLA RAI Question 09.04.05-5 was developed and is provided below.

The UHS ESW pump house does not contain diesel generators or any other electric power systems or components for which GDC 17 is applicable. The UHS ESW pump house ventilation system operation does not affect diesel generator reliability.

The UHS ESW pump house ventilation system design does provide adequate means for controlling airborne particulate material, such as dust, that could otherwise result in electrical equipment failure. The ceiling of the UHS ESW pump house is 16 feet above the floor. The bottom of the fresh air intake for the ESW pump room is located 10 feet above the pump house floor and 42 feet above grade (El. 290'). The air is not filtered. The fresh air intake for the UHS transfer pump room is located 14 feet above the pump house floor and 46 feet above grade. The air is not filtered.

The electrical and instrument enclosures in the UHS ESW pump house are NEMA type 12 (dust tight and drip tight - for indoor use) and any louvered vents on the enclosures are provided with filters to minimize the intake of dust, dirt, and grit. The NEMA type 12 enclosures alone meet the intent of NUREG-CR/0660 and prevent the entry of dust, dirt and grit into electrical and instrument enclosures. The height of the air intake above grade is an additional measure that helps to minimize the level of dust, dirt and grit entering the pump house.

The FSAR will be revised to include a more detailed description of the UHS ESW pump house ventilation system.

Proposed COLA Revision

FSAR Section 9.4.5.2.6 will be revised as indicated on the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

temperature conditions (−21°F to 109°F) using 0 percent annual exceedance temperature values.

9.4.5.2.2 **Class 1E Electrical Room HVAC System**

STD* COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.5.2.2 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.3 **Safeguard Component Area HVAC System**

NAPS COL 9.4(4) Replace the third sentence of the third paragraph in DCD Subsection 9.4.5.2.3 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.4 **Emergency Feedwater Pump Area HVAC System**

STD* COL 9.4(4) Replace the fourth sentence of the second paragraph in DCD Subsection 9.4.5.2.4 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.5 **Safety Related Component Area HVAC System**

NAPS COL 9.4(4) Replace the second sentence of the second paragraph in DCD Subsection 9.4.5.2.5 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

RAI 09.04.05-5 ~~**STD* COL 9.4(6)**~~
RAI 09.04.05-6
RAI 09.04.05-7 **NAPS COL 9.4(6)**

Add the following new subsection after DCD Subsection 9.4.5.2.5.

9.4.5.2.6 **UHS ESW Pump House Ventilation System**

~~The UHS ESW pump house ventilation system is shown in Figure 9.4-201 and the equipment design data is presented in Table 9.4-202.~~

~~There are four separate and independent UHS ESW pump houses and each has its own ventilation system. Each UHS ESW pump house~~

~~ventilation system has an exhaust fan that provides 100 percent of the ventilation requirements for the associated ESW pump room. The UHS transfer pump room within the UHS ESW pump house has an exhaust fan that provides 100 percent of the ventilation requirements for the UHS transfer pump room. The ESW pump room and the UHS transfer pump room each have separate independent supply and exhaust openings to the outside.~~

~~Unit heaters are provided in the UHS transfer pump room and the ESW pump room to maintain a minimum room temperature to prevent the freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station.~~

Each of the four independent UHS structures consists of a UHS ESW pump house and a water basin with a cooling tower. The UHS ESW pump house contains two separate rooms: the ESW pump room and the transfer pump room. Each pump room has an independent ventilation system and each pump room is in a different fire area separated by three-hour fire barriers.

The ESW pump room ventilation has an exhaust fan for cooling and two unit heaters for heating. The transfer pump room has an exhaust fan and one unit heater. The ventilation systems are classified as safety-related equipment Class 3, Seismic Category I, and are capable of performing their safety function under design basis accident coincident with a LOOP.

The UHS ESW pump house ventilation systems are shown in Figure 9.4-201 and the UHS ESW pump house layout arrangement is shown in Figures 1.2-201 through 1.2-210. The UHS ESW pump house ventilation equipment design data is presented in Table 9.4-202.

The UHS ESW pump houses do not contain quantities of airborne radioactive contamination and are not provided with filtering or radiation monitoring capability. The pump house room ventilation systems exhaust directly to atmosphere.

The ESW pump room ventilation system is powered by the same Class 1E power train that supplies the associated ESW pump in the same room. The transfer pump and transfer pump room ventilation system in the same UHS ESW pump house are supplied by a Class 1E power train different from the one supplying the ESW pump. This is to ensure that the transfer pump is available to transfer UHS basin water to another UHS basin if the ESW pump were to fail. Each Class 1E power

train in the UHS ESW pump house is located in a different fire area separated by a three-hour fire barrier.

The UHS ESW pump house ventilation systems contain no ductwork. In each pump room, a backdraft damper is mounted in each exhaust air opening downstream of the exhaust fan. They are mounted on the Seismic Category I outside wall. A backdraft damper is also installed in each fresh air intake wall opening. The backdraft dampers are safety-related equipment Class 3 and Seismic Category I. The safety functions of the backdraft (gravity) damper are to open in the direction of airflow and close by counterbalance when no airflow is present.

The ceiling height of the UHS ESW pump house is 16 feet above the pump house floor. The bottom of the fresh air intake for the ESW Pump Room is located 10 feet above the pump house floor and 42 feet above grade (Elevation 290 ft). The air is not filtered. The fresh air intake for the Transfer Pump Room is located 14 feet above the pump house floor and 46 feet above grade. The air is not filtered. All the electrical and instrument enclosures in the UHS ESW pump houses are NEMA Type 12 (dust tight and drip tight - for indoor use) and any louvered vents on the enclosures are provided with filters to minimize the intake of dust, dirt, and grit. The NEMA Type 12 enclosures alone prevent the entry of dust, dirt and grit into electrical and instrument enclosures. The height of the air intake above grade is an additional measure that helps to minimize the level of dust, dirt and grit entering the pump house. Also, based on the location of the UHS ESW pump houses fresh air intakes, there is no source of hazardous contaminant that could enter through the outside air openings. The UHS ESW pump houses do not harbor any potential sources of explosive gas or fuel-vapor mixtures on a continuous basis.

The ESW pump room exhaust fan and the transfer pump room exhaust fan provide 100 percent of the ventilation required for their associated rooms during normal and emergency plant operations. The ventilation system is thermostatically controlled by the Protection and Safety Monitoring System (PSMS) to cycle the exhaust fans off and on to maintain design temperatures during the summer and winter. These exhaust fans, mounted in exterior walls, each have independent gravity type backdraft dampers which discharge to the outdoors. Make-up supply air is drawn into each pump room through wall openings with gravity type backdraft dampers mounted in the walls. In the event of the presence of smoke, the exhaust fans may be actuated to purge the smoke.

The unit heaters in each pump room maintain minimum room temperatures during normal and emergency plant operations to prevent freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station. The unit heaters are controlled by the PSMS. When the temperature drops below the setpoint, the heating element and fan will be energized. When the temperature rises above the setpoint, the heating element will de-energize. The ESW pump room and the transfer pump room unit heater elements and fans are designed such that they do not exceed a specified allowable watt density for the unit heater coils. The fan will continue to run, circulating air through the unit until the fan is de-energized by a time delay relay.

Temperature sensors are provided in the ESW and transfer pump rooms, which alarm in the main control room to notify operators of either high or low temperature conditions in these areas. These alarms are an indication of a loss of ventilation or a loss of heating.

The UHS ESW pump houses each contain a wet-pipe sprinkler system, hose station and smoke detection system. These fire protection components are classified as non-safety-related. The wet-pipe sprinkler system and smoke detection system are Seismic Category II. Their failure during a design basis seismic event will not damage any of the safety-related equipment in the areas. The standpipe systems supplying hose stations are Seismic Category I and will remain functional under safe shutdown earthquake loadings for manual fire suppression in areas containing equipment required for safe-shutdown.

RAI 09.04.05-4 ~~STD* COL 9.4(6)~~
NAPS COL 9.4(6)

Add the following new subsection after DCD Subsection 9.4.5.3.5

RAI 09.04.05-4
RAI 09.04.05-7

9.4.5.3.6 **UHS ESW Pump House Ventilation System**

- ~~The ESW pump room exhaust fan and the UHS transfer pump room exhaust fan located in each UHS ESW pump house are powered by the different Class 1E buses.~~
- ~~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.~~

ENCLOSURE 3

Response to NRC RAI Letter No. 72

RAI No. 5658, Question 09.04.05-6

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5658 (RAI LETTER NO. 72)

SRP SECTION: 09.04.05 – ENGINEERED SAFETY FEATURE VENTILATION SYSTEM
QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

DATE OF RAI ISSUE: 06/03/2011

QUESTION NO.: 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.

Dominion Response

Under the design-centered review approach, Dominion evaluates R-COLA RAI responses to determine whether the response is standard and can be endorsed, or whether a site-specific response is appropriate. The R-COLA RAI Question 09.04.05-10 response was determined to be appropriate for endorsement. However, R-COLA RAI Question 09.04.05-18 requested additional detail be provided to supplement the response to R-COLA RAI Question 09.04.05-10. The R-COLA RAI Question 09.04.05-18 response was also evaluated for endorsement. Due to changes resulting from other S-COLA RAI responses, it was determined that the insertion of the R-COLA RAI Question 09.04.05-18 mark-up pages into the affected S-COLA section would result in a confusing narrative and, therefore, was inappropriate for endorsement. In this instance, for clarity of implementation and review, a specific response to the S-COLA RAI Question 09.04.05-6 was developed and is provided below.

(1) FSAR Sections 9.4.5.2.6 and 9.4.5.4.6 will be revised to state the safety/seismic classification of the UHS ESW pump house ventilation system backdraft dampers, to describe their safety function, and to specify the factory testing requirements to demonstrate their capability to withstand tornado wind effects and atmospheric differential pressure loading.

COLA Part 10, Table A.2-2 will be revised to include the backdraft dampers and a footnote will be added to describe the safety function of the dampers.

(2) The temperature switches and associated temperature controllers in the UHS ESW pump houses are safety-related. The temperature controllers are located in series with their respective temperature switches, as shown in FSAR Figure 9.4-201, and are part of a Protection and Safety Monitoring System (PSMS) which starts/stops the associated heaters or exhaust fans. The PSMS used with safety-

related components is described in DCD Chapter 7 and is incorporated by reference in the FSAR.

The ESW pump and UHS transfer pump room temperature switches will be removed from COLA Part 10, Table A.2-3 and added to COLA Part 10, Table A.2-2, consistent with the Comanche Peak R-COLA. In addition, FSAR Figure 9.4-201 will be revised to indicate that the temperature controllers are part of the PSMS, and a new column will be added to Table A.2-2 to indicate the PSMS control condition.

(3) The UHS ESW pump house ventilation system FMEA will be added to the COLA as FSAR Table 9.4-203, and will include the safety-related ESW pump and UHS transfer pump room temperature switches.

Proposed COLA Revision

FSAR Sections 9.4.5.2.6, 9.4.5.4.6, and 9.4.7, FSAR Tables 3D-201 and 9.4-203, FSAR Figures 9.4-201 and 9.4-203, and COLA Part 10, Tables A.2-2 and A.2-3 will be revised as described in the response and to incorporate revised UHS ESW pump house ventilation system equipment tag numbers. These changes are reflected in the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

NAPS COL 3.11(5)
NAPS COL 3.11(8)

Table 3D-201 Site-Specific Environmental Qualification Equipment List

	Item Number	Equipment Tag	Description	Location: PCCV, R/B, A/B, O/B, T/B, UHSRS, ESWPT	Purpose: ESF, PAM, Other	Operational Duration	Environmental Conditions: Harsh or Mild	Qualification Process: E=Electrical M=Mechanical	Seismic Category: I, II, Non	Comments
RAI 09.04.05-6	17	VRS-~~OFN~~-MFN-602A	A - ~~UHS~~-Transfer Pump Room Exhaust Fan	UHSRS	ESF	1 yr	Mild	M	I	
	18	VRS-~~OFN~~-MFN-602B	B - ~~UHS~~-Transfer Pump Room Exhaust Fan	UHSRS	ESF	1 yr	Mild	M	I	
RAI 03.11-9	19	VRS-MFN-602C	C - Transfer Pump Room Exhaust Fan	UHSRS	ESF	1 yr	Mild	M	I	
	20	VRS-MFN-602D	D - Transfer Pump Room Exhaust Fan	UHSRS	ESF	1 yr	Mild	M	I	
	21	VRS-MEH-601A	A - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	22	VRS-MEH-601B	B - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	23	VRS-MEH-601C	C - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	24	VRS-MEH-601D	D - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	25	VRS-MEH-602A	A - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	26	VRS-MEH-602B	B - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	27	VRS-MEH-602C	C - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
	28	VRS-MEH-602D	D - ESW Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	

NAPS COL 3.11(5)
NAPS COL 3.11(8)

Table 3D-201 Site-Specific Environmental Qualification Equipment List

Item Number	Equipment Tag	Description	Location	Purpose	Operational Duration	Environmental Conditions	Qualification Process	Seismic Category	Comments
			PCCV, R/B, A/B, O/B, T/B, UHSRS, ESWPT	ESF, PAM, Other		Harsh or Mild	E=Electrical M=Mechanical	I, II, Non	
29	VRS-MEH-603A	A - Transfer Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
30	VRS-~~OEQ~~-MEH-603B	B - ~~UHS~~-Transfer Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
31	VRS-~~OEQ~~-MEH-603C	C - ~~UHS~~-Transfer Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
32	VRS-~~OEQ~~-MEH-603D	D - ~~UHS~~-Transfer Pump Room Unit Heater	UHSRS	ESF	1 yr	Mild	M	I	
33	VRS-TS-803	A - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
34	VRS-TS-804	A - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
35	VRS-TS-805	A - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
36	VRS-TS-806	A - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
37	VRS-TS-812	A - ~~UHS~~-Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
38	VRS-TS-813	A - ~~UHS~~-Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
39	VRS-TS-814	A - ~~UHS~~-Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
40	VRS-TS-815	A - ~~UHS~~-Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	

NAPS COL 3.11(5)
NAPS COL 3.11(8)

Table 3D-201 Site-Specific Environmental Qualification Equipment List

Item Number	Equipment Tag	Description	Location	Purpose	Operational Duration	Environmental Conditions	Qualification Process	Seismic Category	Comments
			PCCV, R/B, A/B, O/B, T/B, UHSRS, ESWPT	ESF, PAM, Other		Harsh or Mild	E=Electrical M=Mechanical	I, II, Non	
41	VRS-TS-823	B - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
42	VRS-TS-824	B - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
43	VRS-TS-825	B - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
44	VRS-TS-826	B - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
45	VRS-TS-832	B - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
46	VRS-TS-833	B - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
47	VRS-TS-834	B - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
48	VRS-TS-835	B - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
49	VRS-TS-843	C - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
50	VRS-TS-844	C - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
51	VRS-TS-845	C - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
52	VRS-TS-846	C - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
53	VRS-TS-852	C -Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	

NAPS COL 3.11(5)
NAPS COL 3.11(8)

Table 3D-201 Site-Specific Environmental Qualification Equipment List

Item Number	Equipment Tag	Description	Location	Purpose	Operational Duration	Environmental Conditions	Qualification Process	Seismic Category	Comments
			PCCV, R/B, A/B, O/B, T/B, UHSRS, ESWPT	ESF, PAM, Other		Harsh or Mild	E=Electrical M=Mechanical	I, II, Non	
54	VRS-TS-853	C - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
55	VRS-TS-854	C - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
56	VRS-TS-855	C - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
57	VRS-TS-863	D - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
58	VRS-TS-864	D - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
59	VRS-TS-865	D - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
60	VRS-TS-866	D - ESW Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
61	VRS-TS-872	D - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
62	VRS-TS-873	D - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
63	VRS-TS-874	D - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
64	VRS-TS-875	D - Transfer Pump Room Temperature	UHSRS	Other	2 wks	Mild	E	I	
65	UHS-OPP-001A	A - UHS Transfer Pump	UHSRS	ESF	1 yr	Mild	M	I	

temperature conditions (–21°F to 109°F) using 0 percent annual exceedance temperature values.

9.4.5.2.2 **Class 1E Electrical Room HVAC System**

STD* COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.5.2.2 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.3 **Safeguard Component Area HVAC System**

NAPS COL 9.4(4) Replace the third sentence of the third paragraph in DCD Subsection 9.4.5.2.3 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.4 **Emergency Feedwater Pump Area HVAC System**

STD* COL 9.4(4) Replace the fourth sentence of the second paragraph in DCD Subsection 9.4.5.2.4 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.5 **Safety Related Component Area HVAC System**

NAPS COL 9.4(4) Replace the second sentence of the second paragraph in DCD Subsection 9.4.5.2.5 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

RAI 09.04.05-5 ~~**STD* COL 9.4(6)**~~
RAI 09.04.05-6 **NAPS COL 9.4(6)**
RAI 09.04.05-7

Add the following new subsection after DCD Subsection 9.4.5.2.5.

9.4.5.2.6 **UHS ESW Pump House Ventilation System**

~~The UHS ESW pump house ventilation system is shown in Figure 9.4-201 and the equipment design data is presented in Table 9.4-202.~~

~~There are four separate and independent UHS ESW pump houses and each has its own ventilation system. Each UHS ESW pump house~~

~~ventilation system has an exhaust fan that provides 100 percent of the ventilation requirements for the associated ESW pump room. The UHS transfer pump room within the UHS ESW pump house has an exhaust fan that provides 100 percent of the ventilation requirements for the UHS transfer pump room. The ESW pump room and the UHS transfer pump room each have separate independent supply and exhaust openings to the outside.~~

~~Unit heaters are provided in the UHS transfer pump room and the ESW pump room to maintain a minimum room temperature to prevent the freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station.~~

Each of the four independent UHS structures consists of a UHS ESW pump house and a water basin with a cooling tower. The UHS ESW pump house contains two separate rooms: the ESW pump room and the transfer pump room. Each pump room has an independent ventilation system and each pump room is in a different fire area separated by three-hour fire barriers.

The ESW pump room ventilation has an exhaust fan for cooling and two unit heaters for heating. The transfer pump room has an exhaust fan and one unit heater. The ventilation systems are classified as safety-related equipment Class 3, Seismic Category I, and are capable of performing their safety function under design basis accident coincident with a LOOP.

The UHS ESW pump house ventilation systems are shown in Figure 9.4-201 and the UHS ESW pump house layout arrangement is shown in Figures 1.2-201 through 1.2-210. The UHS ESW pump house ventilation equipment design data is presented in Table 9.4-202.

The UHS ESW pump houses do not contain quantities of airborne radioactive contamination and are not provided with filtering or radiation monitoring capability. The pump house room ventilation systems exhaust directly to atmosphere.

The ESW pump room ventilation system is powered by the same Class 1E power train that supplies the associated ESW pump in the same room. The transfer pump and transfer pump room ventilation system in the same UHS ESW pump house are supplied by a Class 1E power train different from the one supplying the ESW pump. This is to ensure that the transfer pump is available to transfer UHS basin water to another UHS basin if the ESW pump were to fail. Each Class 1E power

train in the UHS ESW pump house is located in a different fire area separated by a three-hour fire barrier.

The UHS ESW pump house ventilation systems contain no ductwork. In each pump room, a backdraft damper is mounted in each exhaust air opening downstream of the exhaust fan. They are mounted on the Seismic Category I outside wall. A backdraft damper is also installed in each fresh air intake wall opening. The backdraft dampers are safety-related equipment Class 3 and Seismic Category I. The safety functions of the backdraft (gravity) damper are to open in the direction of airflow and close by counterbalance when no airflow is present.

The ceiling height of the UHS ESW pump house is 16 feet above the pump house floor. The bottom of the fresh air intake for the ESW Pump Room is located 10 feet above the pump house floor and 42 feet above grade (Elevation 290 ft). The air is not filtered. The fresh air intake for the Transfer Pump Room is located 14 feet above the pump house floor and 46 feet above grade. The air is not filtered. All the electrical and instrument enclosures in the UHS ESW pump houses are NEMA Type 12 (dust tight and drip tight - for indoor use) and any louvered vents on the enclosures are provided with filters to minimize the intake of dust, dirt, and grit. The NEMA Type 12 enclosures alone prevent the entry of dust, dirt and grit into electrical and instrument enclosures. The height of the air intake above grade is an additional measure that helps to minimize the level of dust, dirt and grit entering the pump house. Also, based on the location of the UHS ESW pump houses fresh air intakes, there is no source of hazardous contaminant that could enter through the outside air openings. The UHS ESW pump houses do not harbor any potential sources of explosive gas or fuel-vapor mixtures on a continuous basis.

The ESW pump room exhaust fan and the transfer pump room exhaust fan provide 100 percent of the ventilation required for their associated rooms during normal and emergency plant operations. The ventilation system is thermostatically controlled by the Protection and Safety Monitoring System (PSMS) to cycle the exhaust fans off and on to maintain design temperatures during the summer and winter. These exhaust fans, mounted in exterior walls, each have independent gravity type backdraft dampers which discharge to the outdoors. Make-up supply air is drawn into each pump room through wall openings with gravity type backdraft dampers mounted in the walls. In the event of the presence of smoke, the exhaust fans may be actuated to purge the smoke.

The unit heaters in each pump room maintain minimum room temperatures during normal and emergency plant operations to prevent freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station. The unit heaters are controlled by the PSMS. When the temperature drops below the setpoint, the heating element and fan will be energized. When the temperature rises above the setpoint, the heating element will de-energize. The ESW pump room and the transfer pump room unit heater elements and fans are designed such that they do not exceed a specified allowable watt density for the unit heater coils. The fan will continue to run, circulating air through the unit until the fan is de-energized by a time delay relay.

Temperature sensors are provided in the ESW and transfer pump rooms, which alarm in the main control room to notify operators of either high or low temperature conditions in these areas. These alarms are an indication of a loss of ventilation or a loss of heating.

The UHS ESW pump houses each contain a wet-pipe sprinkler system, hose station and smoke detection system. These fire protection components are classified as non-safety-related. The wet-pipe sprinkler system and smoke detection system are Seismic Category II. Their failure during a design basis seismic event will not damage any of the safety-related equipment in the areas. The standpipe systems supplying hose stations are Seismic Category I and will remain functional under safe shutdown earthquake loadings for manual fire suppression in areas containing equipment required for safe-shutdown.

RAI 09.04.05-4 ~~STD* COL 9.4(6)~~
NAPS COL 9.4(6)

Add the following new subsection after DCD Subsection 9.4.5.3.5

RAI 09.04.05-4
RAI 09.04.05-7

9.4.5.3.6 UHS ESW Pump House Ventilation System

- ~~The ESW pump room exhaust fan and the UHS transfer pump room exhaust fan located in each UHS ESW pump house are powered by the different Class 1E buses.~~
- ~~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.~~

rooms in the event of internal flooding, allowing the floor drain in the unaffected room to maintain the water below the flood level.

As shown in Table 9.4-203, failure of a single active component in one of the UHS ESW pump house ventilation system does not result in a loss of the system's safety function.

The UHS ESW pump house ventilation system components are protected from tornado generated missiles by their location inside a Seismic Category I structure.

Backdraft dampers are designed to be capable of withstanding the effects of tornado wind and atmospheric differential pressure loading.

The UHS ESW pump house air intakes and air outlets are protected from tornado missiles as described in Section 3.8.4.1.3.2.

STD* COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.4.5.

9.4.5.4.6 **UHS ESW Pump House Ventilation System**

RAI 09.04.05-6

In addition to the general requirements in DCD Subsection 9.4.5.4, the backdraft dampers are factory tested to demonstrate their capability to withstand the tornado wind effects and atmospheric differential pressure loading.

The general requirements in Subsection 9.4.5.4 apply.

STD* COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.5.5.

9.4.5.5.6 **UHS ESW Pump House Ventilation System**

The following instrumentation serving the UHS ESW pump houses includes:

- Alarm on low airflow for ESW pump room or UHS transfer pump room.
- Indication of the status of the exhaust fans.
- Alarm on high room temperature in ESW pump room or UHS transfer pump room.
- Alarm on low room temperature in ESW pump room or UHS transfer pump room.

9.4.6.2.4.1 **Containment Low Volume Purge System**

STD* COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.6.2.4.1 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.6.2.4.2 **Containment High Volume Purge System**

STD* COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.6.2.4.2 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.7 Combined License Information

Replace the content of DCD Subsection 9.4.7 with the following.

9.4(1) ***Deleted from the DCD.***

9.4(2) ***Deleted from the DCD.***

9.4(3) ***Deleted from the DCD.***

STD* COL 9.4(4)
NAPS COL 9.4(4)

9.4(4) ***Capacity of cooling and heating coils that are affected by site specific conditions***

This COL item is addressed in Subsections 9.4.1.2, 9.4.3.2.1, 9.4.3.2.2, 9.4.3.2.3, 9.4.3.2.4, 9.4.5.2.2, 9.4.5.2.3, 9.4.5.2.4, 9.4.5.2.5, 9.4.6.2.4.1, 9.4.6.2.4.2 and Table 9.4-201.

9.4(5) ***Deleted from the DCD.***

STD* COL 9.4(6)
NAPS COL 9.4(6)

9.4(6) ***Information of UHS ESW pump house ventilation system***

RAI 09.04.05-6

This COL item is addressed in Subsections 9.4.5, 9.4.5.1.1.6, 9.4.5.2.6, 9.4.5.3.6, 9.4.5.4.6, 9.4.5.5.6, ~~Table 9.4-202~~ Tables 9.4-202 and 9.4-203, and Figure 9.4-201.

NAPS COL 9.4(6)

Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 1 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
ESW Pump Room Exhaust Fans VRS-MFN-601A,B,C,D	Draws outside air through ESW Pump Room to provide cooling	All	Fails to start on t'sat command	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	One Train out due to maintenance does not affect safety function, because a minimum of two ESW pumps and two transfer pumps are required.
			Fails to stop on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Air Intake Gravity Type Backdraft Dampers VRS-OTD-601A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Air Discharge Gravity Type Backdraft Dampers VRS-OTD-602A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	

NAPS COL 9.4(6)

Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 2 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
ESW Pump Room Unit Heaters VRS-MEH-601A,B,C,D	Provides heating to ESW Pump Room	All	Fails to energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room high temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Unit heater fan fails	High heating element temperature alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Unit Heaters VRS-MEH-602A,B,C,D	Provides heating to ESW Pump Room	All	Fails to energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room high temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Unit heater fan fails	High heating element temperature alarm in MCR	None, Remaining three ESW pump houses are available	

NAPS COL 9.4(6)

Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 3 of 4)

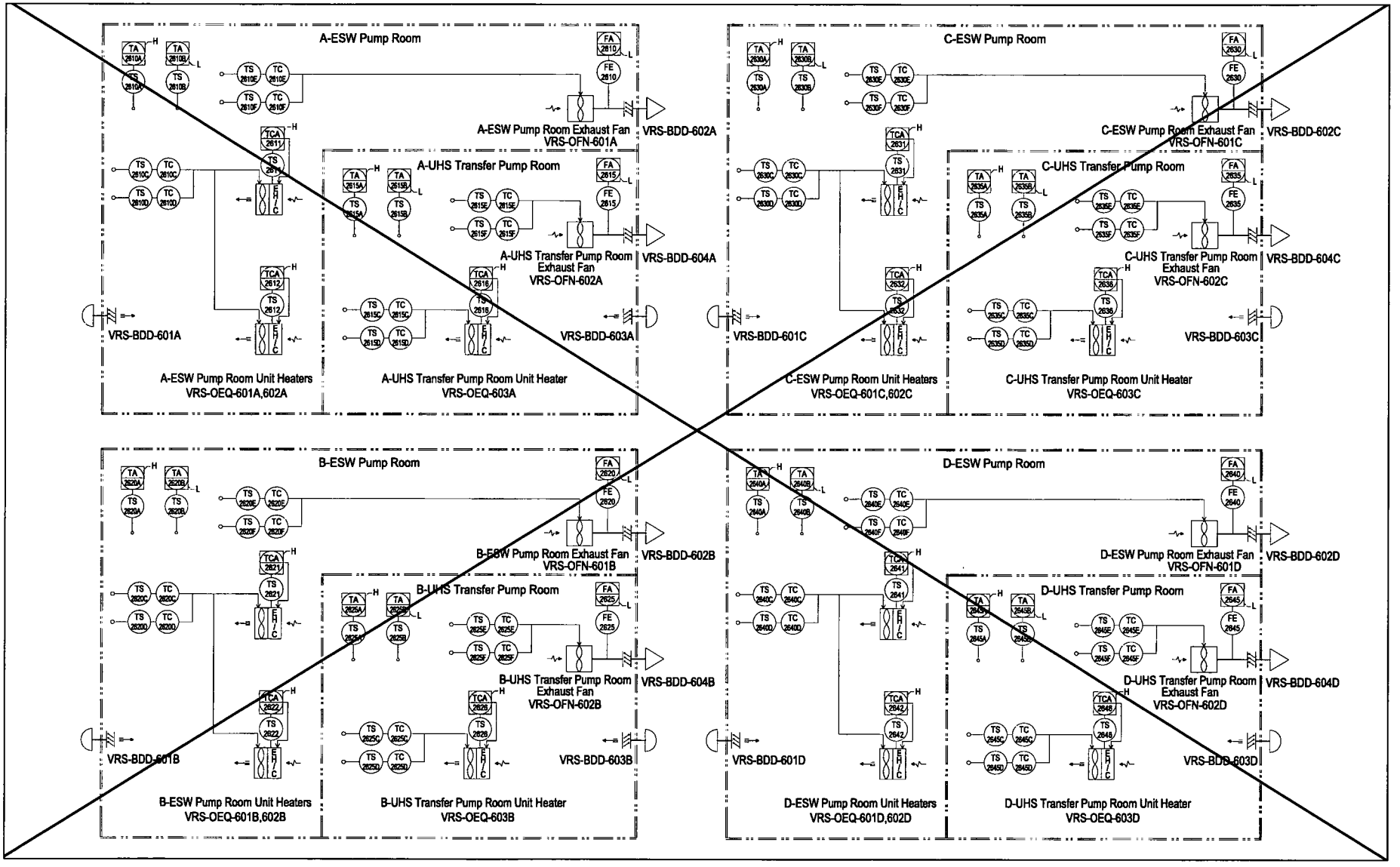
Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
Transfer Pump Room Exhaust Fans VRS-MFN-602A,B,C,D	Draws outside air through Transfer Pump Room to provide cooling	All	Fails to energize on t'sat command	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
Transfer Pump Room Air Intake Gravity Type Backdraft Dampers VRS-OTD-603A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
Transfer Pump Air Discharge Gravity Type Backdraft Dampers VRS-OTD-604A,B,C,D	Opens to provide air flow path	All	Fails to open	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to close	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	

NAPS COL 9.4(6)

Table 9.4-203 UHS ESW Pump House Ventilation System Failure Modes and Effects Analysis (Sheet 4 of 4)

Description of Component	Safety Function	Plant Operating Mode	Failure Mode(s)	Method of Failure Detection	Failure Effect on System Safety Function Capability	General Remarks
Transfer Pump Unit Heaters VRS-MEH-603A,B,C,D	Provides heating to Transfer Pump Room	All	Fails to energize on t'sat command	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Fails to de-energize on t'sat command	Room high temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Trips for any reason	Room low temperature alarm in MCR	None, Remaining three ESW pump houses are available	
			Unit heater fan fails	High heating element temperature alarm in MCR	None, Remaining three ESW pump houses are available	
ESW Pump Room Temperature Switch VRS-TS-803,804,805,806 VRS-TS-823,824,825,826 VRS-TS-843,844,845,846 VRS-TS-863,864,865,866	Provides input signal to temperature controller for the starting and stopping of the unit heaters and exhaust fan	All	Fails to sent input signal to temperature controller for the unit heaters and exhaust fan	Room low temperature alarm in MCR Room high temperature alarm in MCR Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	
Transfer Pump Room Temperature Switch VRS-TS-812,813,814,815 VRS-TS-832,833,834,835 VRS-TS-853,853,854,855 VRS-TS-872,873,874,875	Provides input signal to temperature controller for the starting and stopping of the unit heaters and exhaust fan	All	Fails to sent input signal to temperature controller for the unit heaters and exhaust fan	Room low temperature alarm in MCR Room high temperature alarm in MCR Low air flow alarm in MCR	None, Remaining three ESW pump houses are available	

~~STD* COL 9.4(6)~~ **Figure 9.4-201 ~~UHS ESW Pump House Ventilation System Flow Diagram~~**



NAPS COL 9.4(6) **Figure 9.4-201 UHS ESW Pump House Ventilation System Flow Diagram**

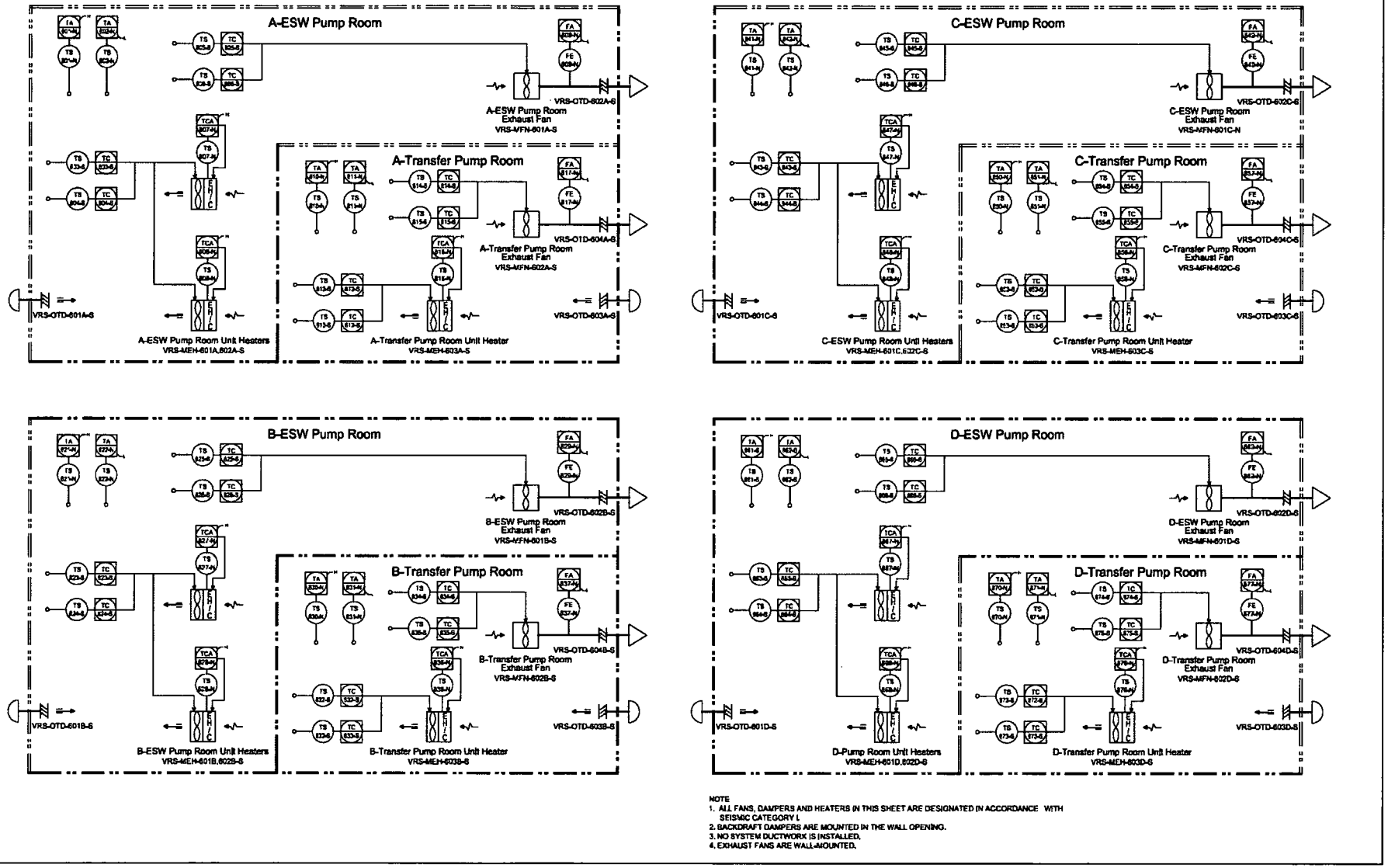


Table A.2-2 UHS ESW Pump House Ventilation System Equipment Characteristics

Equipment Name	Tag No.	ASME Code Section III Class	Seismic Category I	Remotely Operated ~~Valve~~ Damper	Class 1E/ Qual. For Harsh Envir.	PSMS Control	Active Safety Function	Loss of Motive Power Position
ESW Pump Room Exhaust Fan	VRS-~~OFN-~~MFN-601A,B,C,D	—	Yes	-	Yes/No	High Temperature	Start	-
~~UHS-~~Transfer Pump Room Exhaust Fan	VRS-~~OFN-~~MFN-602A,B,C,D	—	Yes	-	Yes/No	High Temperature	Start	-
ESW Pump Room Unit Heater	VRS-~~OEQ-~~MEH-601A,B,C,D, VRS-~~OEQ-~~MEH-602A,B,C,D	—	Yes	-	Yes/No	Low Temperature	Start	-
~~UHS-~~Transfer Pump Room Unit Heater	VRS-~~OEQ-~~MEH-603A,B,C,D	—	Yes	-	Yes/No	Low Temperature	Start	-
ESW Pump Room Temperature Switches	VRS-TS-803,804,805,806 VRS-TS-823,824,825,826 VRS-TS-843,844,845,846 VRS-TS-863,864,865,866	—	Yes	—	Yes/No	—	—	—
Transfer Pump Room Temperature Switches	VRS-TS-812,813,814,815 VRS-TS-832,833,834,835 VRS-TS-852,853,854,855 VRS-TS-872,873,874,875	—	Yes	—	Yes/No	—	—	—
ESW Pump Room Air Intake Gravity Type Backdraft Dampers	VRS-OTD-601A,B,C,D	—	Yes	—	No/No	—	(1)	—
ESW Pump Room Air Discharge Gravity Type Backdraft Dampers	VRS-OTD-602A,B,C,D	—	Yes	—	No/No	—	(1)	—
Transfer Pump Room Air Intake Gravity Type Backdraft Dampers	VRS-OTD-603A,B,C,D	—	Yes	—	No/No	—	(1)	—
Transfer Pump Room Air Discharge Gravity Type Backdraft Dampers	VRS-OTD-604A,B,C,D	—	Yes	—	No/No	—	(1)	—

1. The backdraft dampers have the safety functions to open in the direction of air flow and close by counterbalance when no air flow is present.

Table A.2-3 UHS ESW Pump House Ventilation System Equipment Alarms, Displays, and Control Functions

Equipment/Instrument Name	MCR Alarm	MCR Display	Control Function	RSC Display
ESW Pump Room Exhaust Fan (VRS-~~OFN~~-MFN-601A,B,C,D)	No	Yes	Yes	Yes
~~UHS~~-Transfer Pump Room Exhaust Fan (VRS-~~OFN~~-MFN-602A,B,C,D)	No	Yes	Yes	Yes
ESW Pump Room Unit Heater (VRS-~~OEQ~~-MEH-601A,B,C,D, VRS-~~OEQ~~-MEH-602A,B,C,D)	No	Yes	Yes	Yes
~~UHS~~-Transfer Pump Room Unit Heater (VRS-~~OEQ~~-MEH-603A,B,C,D)	No	Yes	Yes	Yes
~~ESW Pump Room Temperature (VRS-TS-2610C,D,E,F, VRS-TS-2620C,D,E,F, VRS-TS-2630C,D,E,F, VRS-TS-2640C,D,E,F)~~	~~Yes~~	~~No~~	~~Yes~~	~~No~~
~~UHS Transfer Pump Room Temperature (VRS-TS-2615C,D,E,F, VRS-TS-2625C,D,E,F, VRS-TS-2635C,D,E,F, VRS-TS-2645C,D,E,F)~~	~~Yes~~	~~No~~	~~Yes~~	~~No~~

ENCLOSURE 4

Response to NRC RAI Letter No. 72

RAI No. 5658, Question 09.04.05-7

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5658 (RAI LETTER NO. 72)

SRP SECTION: 09.04.05 – ENGINEERED SAFETY FEATURE VENTILATION SYSTEM
QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

DATE OF RAI ISSUE: 06/03/2011

QUESTION NO.: 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 the 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 sided 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.

Dominion Response

Under the design-centered review approach, Dominion evaluates R-COLA RAI responses to determine whether the response is standard and can be endorsed, or whether a site-specific response is appropriate. The R-COLA RAI Question 09.04.05-7 response contained outdoor temperature ranges and structure heat load data that is site-specific. Although the substance of the R-COLA response is retained, a specific response to the S-COLA RAI Question 09.04.05-7 was developed and is provided below.

1) In response to item 1) above, FSAR Sections 9.4.5.1.1.6, 9.4.5.2 6 and 9.4.5.3.6 will be revised to include a more detailed description of the UHS ESW pump house ventilation system.

2) Within the text of Question 09.04.05-7, four bullet items request the applicant to provide information that pertains to the basis and design inputs for the UHS ESW pump house ventilation system. These bullet items overlap, in part, the second numbered request in the restated question above. The following response is intended to address the design input request of item 2) above and to ensure the information requested by the text bullets are also addressed. Parenthetical annotations are used to identify the text bullet response information.

(1st Bullet) As stated in FSAR 9.4.5.1.1.6, the UHS ESW pump house ventilation system is designed to provide and maintain the proper environmental conditions within the required temperature range (40°F to 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 event and LOOP. The heating requirements for the ESW pump and UHS transfer pump rooms are based on maintaining the rooms at or above the minimum design temperature (40°F), with the outside air at the site-specific minimum design temperature. The system heating and ventilation capacity is based on the site-specific outside ambient temperatures specified in FSAR Table 2.0-201 (-21°F to 109°F). Table 1 (attached) summarizes the input and output values for the design calculations used in the derivation of the sizing of the heating coils.

The exhaust ventilation requirements for the ESW pump and UHS transfer pump rooms are determined based on the heat load from the motor and the heat gain from solar heat. Table 1 summarizes the input and output values for the design calculations used in the derivation of the sizing of the ventilation system.

(2nd bullet) The unit heaters in the ESW pump and UHS transfer pump rooms are supplied by a vendor in compliance with a procurement specification. The specification requires a maximum allowable watt density for a specific coil design. The vendor that is responsible for the design of the heaters specifies the airflow capacity for the heater fan to ensure the maximum allowable watt density of the heater coils is not exceeded. FSAR Section 9.4.5.2.6 will be revised to describe the operation of the unit heaters.

(3rd and 4th bullets) The impact of the combination of the maximum water temperature in the UHS and the maximum outside air temperature has been accounted for in the design of the UHS ESW pump house ventilation system. FSAR Table 7.5-201 provides the indication range for the instruments that monitor the cooling water system as 32°F to 140°F. FSAR Table 9.2.5-201 indicates that the maximum water temperature (outlet) in the UHS basin is 95°F.

The maximum design room temperature is 120°F. The design inputs provided in Table 1 show that the value of 115°F is used as the maximum room temperature to provide margin in the ventilation system design. At these design conditions, the expected room temperature would be 115°F. The room temperature is less than the maximum design value of 120°F which ensures the proper operation of the instrumentation and control equipment and components, the ESF equipment would remain operable.

Proposed COLA Revision

FSAR Sections 9.4.5.1.1.6, 9.4.5.2 6 and 9.4.5.3.6 will be revised as indicated on the attached markup.

Attachment

Table 1: Design Information

		ESW Pump Room	UHS Transfer Pump Room
Input Values	Heat load from motor (BTU/h)	221,305	6,290
	Heat gain from solar (BTU/h)	23,213	8,015
	Temperature differential between maximum outside and maximum room temperatures (deg F)	6 (Note 1)	6 (Note 1)
	Concrete wall thickness (in)	24	24
	Cross-sectional area normal to heat flow (ft^2)	3902	800
	Temperature differential between minimum outside and minimum room temperatures (deg F)	61	61
Output Values	Ventilation air flow, Q (CFM)	37,048	2,167
	Q value used (CFM)	40,000	2,180
	Heat loss, q (BTU/h)	127,666	22,326
	q (kW)	37.4	6.54
	q value used (kW)	40	7.5

Note 1: A maximum room temperature of 115 degrees F is used to provide margin in the ventilation fan design capacity.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

9.4.3.2.3 Main Steam/Feedwater Piping Area HVAC System

STD* COL 9.4(4)

Replace the second sentence of the first paragraph in DCD Subsection 9.4.3.2.3 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.3.2.4 Technical Support Center HVAC System

STD* COL 9.4(4)

Replace the second sentence of the first paragraph in DCD Subsection 9.4.3.2.4 with the following.

The capacity of cooling and heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5 Engineered Safety Feature Ventilation System

NAPS COL 9.4(6)

Delete the fifth paragraph and insert the following text to the end of the list of ESF ventilation systems in first paragraph of DCD Subsection 9.4.5.

- UHS ESW Pump House Ventilation System

RAI 09.04.05-3 **NAPS SUP 9.5(1)**

Add the following after the third paragraph in DCD Subsection 9.4.5.

The ESF ventilation system AHU heating coils are sized to maintain the respective area minimum design temperature specified in DCD Table 9.4-1, considering the heat loss from the area and the heating requirement for the outside makeup air (where used) at the site-specific minimum design outside air temperature specified in Table 2.0-201.

~~**STD* COL 9.4(6)**~~
NAPS COL 9.4(6)

Add the following new subsection after DCD Subsection 9.4.5.1.1.5.

9.4.5.1.1.6 UHS ESW Pump House Ventilation System

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.~~ The ventilation system is designed based on the outside ambient design

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temperature conditions (–21°F to 109°F) using 0 percent annual exceedance temperature values.

9.4.5.2.2 **Class 1E Electrical Room HVAC System**

STD* COL 9.4(4) Replace the second sentence of the first paragraph in DCD Subsection 9.4.5.2.2 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.3 **Safeguard Component Area HVAC System**

NAPS COL 9.4(4) Replace the third sentence of the third paragraph in DCD Subsection 9.4.5.2.3 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.4 **Emergency Feedwater Pump Area HVAC System**

STD* COL 9.4(4) Replace the fourth sentence of the second paragraph in DCD Subsection 9.4.5.2.4 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

9.4.5.2.5 **Safety Related Component Area HVAC System**

NAPS COL 9.4(4) Replace the second sentence of the second paragraph in DCD Subsection 9.4.5.2.5 with the following.

The capacity of heating coils that are affected by site specific conditions is shown in Table 9.4-201.

RAI 09.04.05-5 ~~**STD* COL 9.4(6)**~~
RAI 09.04.05-6
RAI 09.04.05-7 **NAPS COL 9.4(6)**

Add the following new subsection after DCD Subsection 9.4.5.2.5.

9.4.5.2.6 **UHS ESW Pump House Ventilation System**

~~The UHS ESW pump house ventilation system is shown in Figure 9.4-201 and the equipment design data is presented in Table 9.4-202.~~

~~There are four separate and independent UHS ESW pump houses and each has its own ventilation system. Each UHS ESW pump house~~

~~ventilation system has an exhaust fan that provides 100 percent of the ventilation requirements for the associated ESW pump room. The UHS transfer pump room within the UHS ESW pump house has an exhaust fan that provides 100 percent of the ventilation requirements for the UHS transfer pump room. The ESW pump room and the UHS transfer pump room each have separate independent supply and exhaust openings to the outside.~~

~~Unit heaters are provided in the UHS transfer pump room and the ESW pump room to maintain a minimum room temperature to prevent the freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station.~~

Each of the four independent UHS structures consists of a UHS ESW pump house and a water basin with a cooling tower. The UHS ESW pump house contains two separate rooms: the ESW pump room and the transfer pump room. Each pump room has an independent ventilation system and each pump room is in a different fire area separated by three-hour fire barriers.

The ESW pump room ventilation has an exhaust fan for cooling and two unit heaters for heating. The transfer pump room has an exhaust fan and one unit heater. The ventilation systems are classified as safety-related equipment Class 3, Seismic Category I, and are capable of performing their safety function under design basis accident coincident with a LOOP.

The UHS ESW pump house ventilation systems are shown in Figure 9.4-201 and the UHS ESW pump house layout arrangement is shown in Figures 1.2-201 through 1.2-210. The UHS ESW pump house ventilation equipment design data is presented in Table 9.4-202.

The UHS ESW pump houses do not contain quantities of airborne radioactive contamination and are not provided with filtering or radiation monitoring capability. The pump house room ventilation systems exhaust directly to atmosphere.

The ESW pump room ventilation system is powered by the same Class 1E power train that supplies the associated ESW pump in the same room. The transfer pump and transfer pump room ventilation system in the same UHS ESW pump house are supplied by a Class 1E power train different from the one supplying the ESW pump. This is to ensure that the transfer pump is available to transfer UHS basin water to another UHS basin if the ESW pump were to fail. Each Class 1E power

train in the UHS ESW pump house is located in a different fire area separated by a three-hour fire barrier.

The UHS ESW pump house ventilation systems contain no ductwork. In each pump room, a backdraft damper is mounted in each exhaust air opening downstream of the exhaust fan. They are mounted on the Seismic Category I outside wall. A backdraft damper is also installed in each fresh air intake wall opening. The backdraft dampers are safety-related equipment Class 3 and Seismic Category I. The safety functions of the backdraft (gravity) damper are to open in the direction of airflow and close by counterbalance when no airflow is present.

The ceiling height of the UHS ESW pump house is 16 feet above the pump house floor. The bottom of the fresh air intake for the ESW Pump Room is located 10 feet above the pump house floor and 42 feet above grade (Elevation 290 ft). The air is not filtered. The fresh air intake for the Transfer Pump Room is located 14 feet above the pump house floor and 46 feet above grade. The air is not filtered. All the electrical and instrument enclosures in the UHS ESW pump houses are NEMA Type 12 (dust tight and drip tight - for indoor use) and any louvered vents on the enclosures are provided with filters to minimize the intake of dust, dirt, and grit. The NEMA Type 12 enclosures alone prevent the entry of dust, dirt and grit into electrical and instrument enclosures. The height of the air intake above grade is an additional measure that helps to minimize the level of dust, dirt and grit entering the pump house. Also, based on the location of the UHS ESW pump houses fresh air intakes, there is no source of hazardous contaminant that could enter through the outside air openings. The UHS ESW pump houses do not harbor any potential sources of explosive gas or fuel-vapor mixtures on a continuous basis.

The ESW pump room exhaust fan and the transfer pump room exhaust fan provide 100 percent of the ventilation required for their associated rooms during normal and emergency plant operations. The ventilation system is thermostatically controlled by the Protection and Safety Monitoring System (PSMS) to cycle the exhaust fans off and on to maintain design temperatures during the summer and winter. These exhaust fans, mounted in exterior walls, each have independent gravity type backdraft dampers which discharge to the outdoors. Make-up supply air is drawn into each pump room through wall openings with gravity type backdraft dampers mounted in the walls. In the event of the presence of smoke, the exhaust fans may be actuated to purge the smoke.

The unit heaters in each pump room maintain minimum room temperatures during normal and emergency plant operations to prevent freezing of instrument lines, the wet pipe sprinkler system, and the standpipe hose station. The unit heaters are controlled by the PSMS. When the temperature drops below the setpoint, the heating element and fan will be energized. When the temperature rises above the setpoint, the heating element will de-energize. The ESW pump room and the transfer pump room unit heater elements and fans are designed such that they do not exceed a specified allowable watt density for the unit heater coils. The fan will continue to run, circulating air through the unit until the fan is de-energized by a time delay relay.

Temperature sensors are provided in the ESW and transfer pump rooms, which alarm in the main control room to notify operators of either high or low temperature conditions in these areas. These alarms are an indication of a loss of ventilation or a loss of heating.

The UHS ESW pump houses each contain a wet-pipe sprinkler system, hose station and smoke detection system. These fire protection components are classified as non-safety-related. The wet-pipe sprinkler system and smoke detection system are Seismic Category II. Their failure during a design basis seismic event will not damage any of the safety-related equipment in the areas. The standpipe systems supplying hose stations are Seismic Category I and will remain functional under safe shutdown earthquake loadings for manual fire suppression in areas containing equipment required for safe-shutdown.

RAI 09.04.05-4 ~~STD* COL 9.4(6)~~
NAPS COL 9.4(6)

Add the following new subsection after DCD Subsection 9.4.5.3.5

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9.4.5.3.6 UHS ESW Pump House Ventilation System

- ~~The ESW pump room exhaust fan and the UHS transfer pump room exhaust fan located in each UHS ESW pump house are powered by the different Class 1E buses.~~
- ~~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 safety function of the UHS ESW pump house ventilation system is assured by the physical separation provided by the four separate and independent UHS ESW pump houses. All ventilation system equipment and components are classified as equipment class 3, seismic category I.~~
- ~~The ESW pump room exhaust fans and the UHS transfer pump room exhaust fans are capable of performing its safety function under all associated design basis accidents coincident with LOOP.~~
- ~~Failure of a single active component in one of the UHS ESW pump house ventilation system exhaust fans does not result in a loss of the system's safety function.~~
- ~~The UHS ESW pump house ventilation system components are protected from tornado generated missiles by their location inside a seismic category I structure.~~
- ~~Backdraft dampers are capable of withstanding the affects of tornado wind and atmospheric differential pressure loading.~~

The ESW pump room ventilation system and the transfer pump room ventilation system located in each UHS ESW pump house are each powered by a different Class 1E bus.

The transfer pump and the ESW pump in each UHS ESW pump house are powered from different Class 1E power supplies and are located in different fire areas separated by three-hour fire barriers. The two Class 1E power supply trains in a UHS ESW pump house are physically separated by a three-hour fire barrier.

The safety function of the UHS ESW pump house ventilation system is assured by the physical separation provided by the four separate and independent UHS ESW pump houses. All ventilation system components are classified as equipment Class 3, Seismic Category I.

The ESW pump room ventilation system and the transfer pump room ventilation system are capable of performing their safety function under all associated design basis accidents coincident with a LOOP.

The ESW pump room exhaust fans and transfer pump room exhaust fans are capable of performing required safety functions under all postulated internal flooding events as described in Section 3.4.1.3. While not a flood barrier, the 3-hour fire rated doors and walls that separate the UHS ESW pump and transfer pump rooms will reduce the flow of water between the

rooms in the event of internal flooding, allowing the floor drain in the unaffected room to maintain the water below the flood level.

As shown in Table 9.4-203, failure of a single active component in one of the UHS ESW pump house ventilation system does not result in a loss of the system's safety function.

The UHS ESW pump house ventilation system components are protected from tornado generated missiles by their location inside a Seismic Category I structure.

Backdraft dampers are designed to be capable of withstanding the effects of tornado wind and atmospheric differential pressure loading.

The UHS ESW pump house air intakes and air outlets are protected from tornado missiles as described in Section 3.8.4.1.3.2.

STD* COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.4.5.

9.4.5.4.6 **UHS ESW Pump House Ventilation System**

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In addition to the general requirements in DCD Subsection 9.4.5.4, the backdraft dampers are factory tested to demonstrate their capability to withstand the tornado wind effects and atmospheric differential pressure loading.

The general requirements in Subsection 9.4.5.4 apply.

STD* COL 9.4(6) Add the following new subsection after DCD Subsection 9.4.5.5.5.

9.4.5.5.6 **UHS ESW Pump House Ventilation System**

The following instrumentation serving the UHS ESW pump houses includes:

- Alarm on low airflow for ESW pump room or UHS transfer pump room.
- Indication of the status of the exhaust fans.
- Alarm on high room temperature in ESW pump room or UHS transfer pump room.
- Alarm on low room temperature in ESW pump room or UHS transfer pump room.