



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

August 2, 2021

Mr. Daniel G. Stoddard
Senior Vice President and Chief Nuclear Officer
Dominion Energy
Innsbrook Technical Center
5000 Dominion Blvd., Floor: IN-2SW
Glen Allen, VA 29060

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION, UNIT 1 – DESIGN BASIS
ASSURANCE INSPECTION (PROGRAMS) INSPECTION REPORT
05000395/2021010

Dear Mr. Stoddard:

On June 25, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Virgil C. Summer Nuclear Station, Unit 1. On July 29, 2021, the NRC inspectors discussed the results of this inspection with Mr. G. Lippard and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at Virgil C. Summer Nuclear Station, Unit 1.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

James B. Baptist, Chief
Engineering Branch 1
Division of Reactor Safety

D. Stoddard

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Docket No. 05000395
License No. NPF-12

Enclosure:
As stated

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ASSURANCE INSPECTION (PROGRAMS) INSPECTION REPORT
05000395/2021010 Dated August 2, 2021

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NAME	P. Braxton	J. Nicely	G. Ottenberg	J. Baptist	
DATE	7/30/2021	7/29/2021	7/30/2021	8/2/2021	

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Number: 05000395

License Number: NPF-12

Report Number: 05000395/2021010

Enterprise Identifier: I-2021-010-0036

Licensee: Dominion Energy

Facility: Virgil C. Summer Nuclear Station, Unit 1

Location: Jenkinsville, SC

Inspection Dates: June 07, 2021 to June 25, 2021

Inspectors: P. Braxton, Reactor Inspector
G. Nicely, Contractor
G. Ottenberg, Senior Reactor Inspector

Approved By: James B. Baptist, Chief
Engineering Branch 1
Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a design basis assurance inspection (programs) inspection at Virgil C. Summer Nuclear Station, Unit 1, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

Failure to Fully Address Previous NCV Related to Maximum Expected Differential Pressure for the XVG08811A(B)-SI and XVG08812A(B)-SI Valves			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000395/2021010-01 Open/Closed	None (NPP)	71111.21N.02
The inspectors identified a Green finding and associated Non-cited Violation (NCV) of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," when the licensee failed to correct a condition adverse to quality associated with the calculation of the maximum expected differential pressure (DP) for the containment sump valves.			

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), inspectors were directed to begin telework. In addition, regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.21N.02 - Design-Basis Capability of Power-Operated Valves Under 10 CFR 50.55a Requirements

POV Review (IP Section 03) (9 Samples)

The inspectors:

- a. Evaluated whether the sampled POVs are being tested and maintained in accordance with NRC regulations along with the licensee's commitments and/or licensing bases.
- b. Evaluated whether the sampled POVs are capable of performing their design-basis functions.
- c. Evaluated whether testing of the sampled POVs is adequate to demonstrate the capability of the POVs to perform their safety functions under design-basis conditions.
- d. Evaluated maintenance activities including a walkdown of the sampled POVs (if accessible).

- (1) XVG03111B-SW; RBCU 1B & 2B CI System Return Isolation Valve
- (2) XVG08811B-SI; Containment Sump RH Pump B Suction Isolation Valve
- (3) LCV00115C-CS; Volume Control Tank Outlet Isolation Valve
- (4) XVG08000A-RC; Pressurizer PORV Inlet Isolation Valve
- (5) XVB03116A-SW; Service Water Pump A Discharge Valve
- (6) XVB09503A-CC; RH Heat Exchanger A CC Inlet Valve
- (7) PCV00444B-RC; Pressurizer Power Operated Relief Valve (PORV)
- (8) IFV02030-MS; EF Pump Turbine Steam Supply Flow Control Valve
- (9) XVG06067-HR; Alternate Purge Exhaust Isolation Valve

INSPECTION RESULTS

Failure to Fully Address Previous NCV Related to Maximum Expected Differential Pressure for the XVG08811A(B)-SI and XVG08812A(B)-SI Valves

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000395/2021010-01 Open/Closed	None (NPP)	71111.21N.02
<p>The inspectors identified a Green finding and associated Non-cited Violation (NCV) of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," when the licensee failed to correct a condition adverse to quality associated with the calculation of the maximum expected differential pressure (DP) for the containment sump valves.</p>			
<p><u>Description:</u> One of the required safety functions of the residual heat removal (RHR) system is to establish long-term recirculation reactor cooling after loss of coolant accidents (LOCAs). The RHR pump containment sump suction valves, XVG08811A/B-SI and XVG08812A/B-SI, must open to establish a suction path from the containment sump to the RHR pumps. NRC inspection report 2006008 (ADAMS ML062080036) identified a 10 CFR 50, Appendix B, Criterion XVI violation (NCV 2006008-01), for the licensee's failure to identify a condition adverse to quality that was discussed in industry OE20884. The OE identified that small break (SB) LOCAs could produce more limiting DP scenarios for the RHR pump containment sump suction valves due to the potential for the RHR pump to operate under minimum flow conditions. The higher DPs require higher MOV actuator thrust to successfully operate.</p> <p>Condition report, CER 06-02041, was written in response to NCV 2006008-01, but it was closed relying on actions to be taken in another condition report, CER-05-03241. Following issuance of NCV 2006008-01, CER-05-03241 re-evaluated the increase in differential pressure across the XVG08811A/B-SI and XVG08812A/B-SI valves, and stated:</p> <p style="padding-left: 40px;">“The maximum possible SBLOCA opening differential pressures was re-estimated to be ~ 460 psid for XVG08812A/B-RH & ~ 455 psid for XVG08811A/B-RH assuming the RHR pump suction pressure is controlled at the RHR inlet relief valve setpoint. Based on current design basis assumptions, all of the RHR sump MOVs, except XVG08811B, were found to have sufficient open thrust capability for their maximum expected differential pressure. Further review indicates that the voltage drop calculations for XVG08811B are overly conservative and that the use of more realistic assumptions results in a 30 V increase in terminal voltage. When crediting the higher terminal voltage, the open thrust capability for XVG08811B was found to exceed the minimum required opening thrust for the SBLOCA scenario by approximately 4.35%. This re-confirmed the prior conclusion that the existing containment sump valves/actuators can successfully perform their design function of opening during the transition to CL recirculation during a SBLOCA.”</p> <p>At the time of this inspection, the station's record calculation identified the maximum expected DP in the open direction as 49 psid as opposed to the 460 & 455 psid identified above.</p> <p>While the higher DP condition had been evaluated in CER-05-03241 as acceptable, it initially resulted in negative calculated margin for the XVG08811B-SI valve. The DP calculation, DC01520-049, the associated minimum required thrust calculation, DC01520-059, and the actuator capability calculation, DC01520-067, were planned to be updated to reflect the evaluation in CER-05-03241. However, the calculations were never updated because engineering change request ECR 72009 was not implemented as intended, explaining why the station's record calculation still incorrectly identified 49 psid as the design basis assumption. As a result, the licensee was over-estimating the margin available for the MOVs to perform their safety functions. The MOV program relies on the calculated margins to determine valve operability and the required periodic verification test intervals.</p>			

Corrective Actions: Upon the inspector's discovery, the licensee reconfirmed that the XVG08811A/B-SI and XVG08812A/B-SI valves remained capable of performing their intended functions, and would have positive margin after accounting for the higher DP and taking credit for adjustments to the actuator capability.

Corrective Action References: CR -21-01620

Performance Assessment:

Performance Deficiency: The licensee's failure to correct a condition adverse to quality associated with the calculation of maximum expected differential pressure for the containment sump valves, was a performance deficiency.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee had to change assumptions to obtain favorable results as they revised the actuator capability calculations for the XVG08811B-SI valve in order to demonstrate the valve had positive design margin.

Significance: The inspectors assessed the significance of the finding using Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Specifically, the inspectors used IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," and determined the finding was a deficiency affecting the design or qualification of a mitigating structure, system, or component (SSC), and the SSC maintained its operability or PRA functionality.

Cross-Cutting Aspect: Not Present Performance. No cross cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action", required "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected." Contrary to this, the licensee failed to assure that a condition adverse to quality was promptly identified and corrected. Specifically, previously identified incorrect calculation of the maximum expected differential pressures was not corrected.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On July 29, 2021, the inspectors presented the design basis assurance inspection (programs) inspection results to Mr. G. Lippard and other members of the licensee staff.

- On June 25, 2021, the inspectors presented the initial inspection results to Mr. R. Justice and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N.02	Calculations	DC 08200-001	ESF Degraded Voltage Logic and Settings	Rev. 29
		DC01520-035	Maximum Differential Pressures for SW GL 89-10 Motor Operated Butterfly Valves	Rev. 3
		DC01520-039	Maximum Differential Pressures for CCWS Quarter-turn MOV Operation	Rev. 1
		DC01520-049	Maximum Differential Pressure for Safety Injection System MOV Operation	Revs. 3, 4, & 5
		DC01520-050	Motor Operated Valve Weak Link Analysis Reports	Revs. 0, 1, & 2
		DC01520-059	Minimum Required Thrust for Rising Stem MOVs in the Safety Injection System	Rev. 12
		DC01520-062	Minimum Required Thrust for Rising Stem MOVs - RC System,	Rev. 10
		DC01520-065	Design, Review and Capability of Rising Stem MOVs	Rev. 14
		DC01520-065	Design, Review and Capability of Rising Stem MOVs	Rev. 14
		DC01520-066	Minimum Required Thrust for Rising Stem MOVs	Rev. 11
		DC01520-067	Design, Review and Capability of Rising Stem MOVs	Rev.16
		DC01520-067	Design, Review and Capability of Rising Stem MOVs in the CS, RH and SI System	Rev. 16
		DC01520-069	MOV Thermal Overload Calculation	Rev. 3
		DC01520-089	GL-89-10 MOV Scope, Grouping and Engineering Justification	Revs. 6 & 11
		DC01520-090	Design, Review and Capability of Henry Pratt Generic Letter 89-10 Motor Operated Butterfly Valves	Rev. 5
		DC01520-093	Measurement Conversions and Error Determination for MOV Parameters	Rev.3
		DC01520-093	Measurement Conversions and Error Determination for MOV Parameters Obtained Per ES-513	Rev. 3
		DC01520-094	Max Operating Torque for Henry Pratt GL89-10 Motor Operated Butterfly Valves	Rev. 3
DC01520-102	Force Required to Overcome Pressure Locking XVG08000A	Rev. 1		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		DC01521-011	Determination of the Limiting Line Pressure and Maximum Expected Differential Pressure for Category 1 Air Operated Valves In The MS System	Rev. 1
		DC0152A-007	Determination of Limiting Line Pressure and Maximum Expected Differential Pressure for Air- Operated Valves, HR Purge CIV's	Rev. 1
		DC0152A-008	KVAP Analysis for Air Operated Valves XVG06056/6057/6066/6067-HR	Rev. 1
		DC0152A-012	KVAP Analysis for Air-Operated Valves IFV02030-MS, IPV/02000/0210/2020-MS & XVM02801A/B/C-MS	Rev. 1
		DC08200-003	Class 1E 460V MOV Starting Voltages	Rev. 8
		DC08760-007	MCC Control Circuit Analysis	Rev. 2
	Corrective Action Documents	CR-11-01045, CR-11-00991, CR-11-01027, CR-11-00631, CR-11-00750, CR-11-00782, CR-11-00956, CR-20-03556, CR-20-03557, CR-20-03560, CR-21-00678, CR-05-03241, CR-06-02041, CR-20-02322, CR-20-02274		
	Corrective Action Documents Resulting from Inspection	21-011679	Review appropriateness of Commonwealth Edison White Paper 125 Revision 3 in the VCS actuator capability calculations.	06/21/2021
		21-01559	TR01520-001 stated in the notes for XVG08811A&B-SI that this valve did not have a closed safety function.	06/08/2021
		21-01574	MOV program needs to update it engineering review of static test data to include the refined gate unwedging	6/10/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			equation.	
		21-01586	Evaluate the need to revise SAP-143 to resolve the potentially contradictory guidance and revise SAP-143 as required	06/10/2021
		21-01620	ECR 72009 not completed and the calculations updated in a timely manner.	6/14/2021
		21-01629	Procedure Enhancement of EMP0445.007 to include QSS check prior to MOVATs	06/15/2021
		21-01657	Magnesium rotor degradation	06/17/2021
		21-01678	Track review and revision of MOV calculations and program documents as needed regarding degraded voltage MOV calculation and MOV diagnostic test data.	6/21/2021
		21-01680	Calculation DC0152A-008 needs to be updated	06/21/2021
		21-01685	review the application of IEEE 741-2017 in DC08200-001 and determine if it applies to DC08200-003 Section 7.1	06/21/2021
		21-01698	Difference in COF numbers between DC01520-090 and DC01520-094	06/23/2021
		21-01699	Two maximum differential pressure values (30 psid and 75 psid) are reflected in various 152 series MOV calculations (DC01520-050,-090) and program documents for XVB09503A-CC.	06/23/2021
		21-01700	Issues with design calculation DC01520-102	06/23/2021
		21-01701	Drawing or maintenance procedure doesn't provide installation orientation regarding flow and flow direction not physically marked on valve.	06/23/2021
		Drawings	1MS-025-067	ASME Assembly Drawing MOV LCV00115C-CS
	1MS-025-115		ASME Assembly Drawing MOV XVG08000A	Rev. 5
	1MS-25-118		Motor Operated Gate Valve Model 14000GM84FEH00	Rev. 5
	1MS-25-290-2		12 inch 150 Gate Valve- R.S. Bolted Bonnet- Butt Welds Ends Motor Oper-Sgl Pack	Rev. B
	1MS-25-572		16" thru 24" 1100 Nuclear Valve Cross-section and Materials List ASME Section III Class Flange X Flange	Rev. 2
	1MS-25-935		ASME Assembly Drawing AOV PCV00444B-RC	Rev. 3
		1MS-50-105	Emergency Feedwater Pump Turbine Control Valve	Rev. 10

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		B-201-359	Electrical MCC Listing XMC1DA2Y, Sht 1	Rev. 12
		B-201-362	Electrical MCC Listing XMC1DB2Y, Sht 1	Rev. 10
		B-208-011	Electrical- Elementary Diagram RHR Heat Exchanger Inlet Valve (XVB9503A)	Rev. 5
		B-208-021	Electrical Elementary Diagram LCV-115C, Sheet 34	Rev. 10
		B-208-054	6 inch Continuous Purge Line to HR System Isolation Valve XVG-6067 & 6057, Sht 23	Rev.8
		B-208-067	Main Steam to EFW Pump Turbine Isolation Valve IFV-2030, Sht 46	Rev. 11
		B-208-082	Electrical Elementary Diagram XVG08000A,Sht 10	Rev. 8
		B-208-095	Electrical- Elementary Diagram Recirc Sump to RHR Pump B Isol VV 8811B (XVG8811B)	Rev. 12
		B-208-101	Electrical- Elementary Diagram Service Water Pump A Discharge Valve (XVB3116A)	Rev. 9
		B-208-101	Isolation Valve XVG3111B, Sht 40	Rev. 7
		B-816-083	Instrument Air Supply Diagram	Rev. 9
		B-817-130	PORV Control Air Signal Diagram	Rev. 5
		C-4454	Pratt 1100 Nuclear Water Valve HB Operator SMB000 Motor Replaceable Packing Bonnet Flange X Flange	Rev. 2
		D-302-011	Main Steam	Rev. 41
		D-302-611	System Flow Diagram Component Cooling	Rev. 24
		E-302-69	System Flow Diagram Safety Injection	Rev. 23
		IMS-25-756-1-0	6 inch 150 Weld End Gate Valve , Sht 1	Rev. 0
		Engineering Evaluations	0310-0028-CALC-001	Calculation of EDG Voltage and Frequency Variations on Safety-Related MOVs
	2865C		V. C. Summer Nuclear Station JOG MOV Periodic Verification Classification	Rev. 0
	R015239		Comanche Peak MOVs VS VCSNS MOVs	07/23/1997
	Miscellaneous		Power Operated Valves Self-Assessment	Rev. 0
		DBD-MV2	Motor Operated Valve Design Review, Capability and Setup Volume 2 (MV2)	Rev. 6
		ECR 50316	Automatic Transfer to the RB Sump	Rev. A
		ECR 70460	Limitorque SMB-000 Motor Replacement	Rev. 0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date	
		EI-3-009	Teledyne Check-out Procedure for Quick Stem Sensors	Rev.0	
		ER-AA-IST-10	ASME Inservice Testing Program	Rev. 7	
		MRF 22765B	Pressure Locking of SI Sump Recirc Valves	11/13/1995	
		TEP-3-023	Teledyne In-Situ Calibration of Thrust/Torque Strain Gages	Rev. 3	
		TR-01520-004	AOV Setup, Test and Performance Validation Summary Report	Rev. 9	
		TR-01520-007	PORV Qualification for Inadvertent Safety Injection	Rev. 0	
		TR01520-001	GL 89-10 MOV Setup, Test and Performance Validation Summary Report	Rev. 9	
		TR01520-004	SAP-0159 Air Operated Valve (Category 1) Setup, Test, and Performance Validation Summary Report	02/10/2021	
		TWR RO15239	Comanche Peak MOVs vs. VCSNS MOVs	07/23/1997	
		VCSNS - DBD - SI	SAFETY INJECTION SYSTEM (SI)	Rev. 16	
		VCSNS - EDBD - CC	Component Cooling Water System CC	Rev. 13	
		VCSNS-DBD-ES	Electric Power System	Rev. 6	
		VCSNS-DBD-HS	Post-Accident Sampling, Nuclear Sampling, and Hydrogen Removal Systems	04/08/21	
		VCSNS-DBD-MS	Main Steam	05/03/2021	
		VCSNS-DBD-RC	Reactor Cooling System	Rev. 13	
		VCSNS-DBD-SW	Service Water System	07/25/19	
		WCAP-13097	System Operating Basis for Motor Operated Valves	Rev. 0	
		Procedures	EMP-445.007	Testing of Motor Operated Valves	Rev. 15
			EMP-445.019	MOV Magnesium Rotor Inspection	Rev. 1
			ER-AA-IST-102	ASME IST Program – Inservice Testing of Valves	Rev. 8
	ER-AA-IST-107		ASME IST Program – Inservice Testing of Active Motor Operated Valves	Rev. 0	
	ES-510		Sizing of Thermal Overloads	Rev. 2	
	ES-513		MOV Program Implementation	Rev. 2	
	ES-527		Control and Maintenance of the Plant Lubrication Manual Database	Rev. 1	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		GTP-302	Inservice Testing of Valves Fourth Ten Year Interval	Rev. 17
		ICP-240.169	Valve Diagnostic Procedure	Rev. 4
		MMP-445.057	Maintenance of IFV02030-MS and IFV02030-O-MS	Rev. 3
		SAP-0143	Preventive Maintenance Program	Rev. 16C
		SAP-0999	Corrective Action Program	Rev. 19C
		SAP-160	Motor Operated Valve Program	Rev. 1
	Work Orders	1602584-001, 1711121-001, 217450041, 1716500-001, 1716501-001, 2017872-001, 2100008-001, 1902265-001, 1902451-001, 1902989, 2100011-001, 1902989-001, 1711218-001, 1711217-002, 1712429-001, 1712429-003, 1712429-004, 1711219-001, 2017465-001, 2008733-002, 2101920-001, 1109922-001		