

V.C. Summer Nuclear Station
Bradham Blvd & Hwy 215, Jenkinsville, SC 29065
Mailing Address:
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DominionEnergy.com



May 30, 2023

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U.S. Nuclear Regulatory Commission
Washington, DC 20555

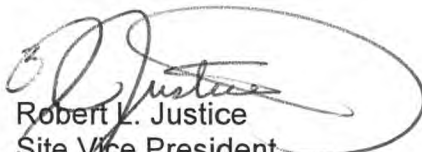
Serial No.: 23-152
VCS-LIC/JB R0
Docket No. 50-395
License No. NPF-12

DOMINION ENERGY SOUTH CAROLINA (DESC)
VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
LICENSEE EVENT REPORT 2023-001-00
MANUAL REACTOR TRIP DUE TO LOSS OF MAIN FEEDWATER PUMP

Dominion Energy South Carolina hereby submits Licensee Event Report (LER) 2023-001-00, for VCSNS. This report provides updated details concerning a manual reactor trip due to the loss of Main Feedwater Pump 'C' and is submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A).

Should you have any questions, please call Mr. Michael Moore at (803) 345-4752.

Sincerely,



Robert L. Justice
Site Vice President
V.C. Summer Nuclear Station

Enclosure

Commitments contained in this letter: None

cc:
G. J. Lindamood – Santee Cooper
L. Dudes – NRC Region II
G. Miller – NRC Project Mgr.
NRC Resident Inspector
J. N. Bassett – INPO
Marsh USA, Inc.

**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Library, and Information Collections Branch (T-6 A10M), U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by email to Infocollections.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; email: oira_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name V.C. Summer Nuclear Station, Unit 1	<input checked="" type="checkbox"/> 050 <input type="checkbox"/> 052	2. Docket Number 395	3. Page 1 OF 3
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4. Title MANUAL REACTOR TRIP DUE TO LOSS OF MAIN FEEDWATER PUMP
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5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	Docket Number
4	5	2023	2023	- 001 -	00	05	30	2023	Facility Name	<input type="checkbox"/> 050 <input type="checkbox"/> 052

9. Operating Mode 1	10. Power Level 085
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11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

<input checked="" type="checkbox"/> 10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 10 CFR Part 50	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 73.1200(a)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 73.1200(b)
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 73.1200(c)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.1200(d)
<input type="checkbox"/> 20.2203(a)(2)(i)	<input checked="" type="checkbox"/> 10 CFR Part 21	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input checked="" type="checkbox"/> 10 CFR Part 73	<input type="checkbox"/> 73.1200(e)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 21.2(c)	<input type="checkbox"/> 50.69(g)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.77(a)(1)	<input type="checkbox"/> 73.1200(f)
<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(2)(i)	<input type="checkbox"/> 73.1200(g)
<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(ii)	<input type="checkbox"/> 73.1200(h)
<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)		

<input type="checkbox"/> OTHER (Specify here, in abstract, or NRC 366A).
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12. Licensee Contact for this LER

Licensee Contact Michael Moore	Phone Number (Include area code) (803) 345-4752
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13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS	Cause	System	Component	Manufacturer	Reportable to IRIS
B	SJ	P	G533	Y					

14. Supplemental Report Expected

<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date)	15. Expected Submission Date	Month	Day	Year
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16. Abstract (Limit to 1326 spaces, i.e., approximately 13 single-spaced typewritten lines)**MANUAL REACTOR TRIP**

On April 5, 2023, at approximately 0651 EDT with Unit 1 in Mode 1 at 85 percent power, the reactor was manually tripped due to the loss of Main Feedwater Pump 'C' (FWP 'C') with FWP 'B' removed from service as a part of normal plant shutdown procedures. The turbine tripped automatically based on the reactor trip signal. Emergency Feedwater (EFW) actuation occurred as expected due to the low-low steam generator water levels which occurred as a result of the reactor trip. The reactor trip was not complex with safety systems responding normally post trip. Operations stabilized the plant in Mode 3. Decay heat was removed by the steam generators, utilizing the steam dump system.

Due to the manual Reactor Protection System (RPS) actuation and the automatic actuation of the EFW system, this event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A).

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form
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1. FACILITY NAME

V.C. Summer Nuclear Station, Unit 1

☒ 050☐ 052**2. DOCKET NUMBER**

395

3. LER NUMBER

YEAR

2023

SEQUENTIAL
NUMBER

001

REV
NO.

00

NARRATIVE**1.0 DESCRIPTION OF THE EVENT**

On April 5, 2023, at approximately 0651 EDT with Unit 1 in Mode 1 at 85 percent power, the reactor was manually tripped due to the loss of Main Feedwater Pump 'C' (FWP 'C').

FWP 'B' was removed from service at 0551 per the plant operating procedures. V.C. Summer Nuclear Station (VCSNS) operations had completed a power reduction to 85% per procedure at 0537 hours and generator output was 865 Mwe. The plant was stable at 85% power to meet the required conditions to support pre-outage scheduled Main Steam Safety Valve testing. These were pre-planned plant operations prior to entering Refueling Outage 27 (RF27).

The turbine tripped automatically based on the reactor trip signal. Emergency Feedwater (EFW) actuation occurred as expected due to the low-low steam generator water levels which occurred as a result of the reactor trip. The reactor trip was not complex with safety systems responding normally post trip. Operations stabilized the plant in Mode 3. Decay heat was removed by the steam generators, utilizing the steam dump system. Subsequently on April 5, 2023, the decision to enter RF27 ahead of schedule was made.

With FWP 'B' removed from service in preparation for a planned shutdown for RF27, the station was aware of the conditional risk of two feedwater pump operation, which was necessary prior to the outage. Aware of the risk, the operating crew was trained and briefed to trip the unit upon loss of one of two operating feedwater pumps in that plant condition. The crew responded accordingly and placed the plant in a safe condition, as previously had been briefed for the condition.

Due to the manual Reactor Protection System (RPS) actuation and the automatic actuation of the EFW system, this event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A).

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

The operating crew responded correctly to the event. The applicable emergency operating procedures were properly entered, and documentation met expectations.

3.0 CAUSE OF THE EVENT

The apparent cause of the FWP 'C' trip was a combination of the following factors: improper instrumentation thresholds during the last vendor preventative maintenance evolution in 2014, normal thrust bearing wear, and change in pump performance characteristics when the 'B' Main Feedwater Pump was secured. Engineering analysis determined that the thrust bearing wear detector 'Y' clearance was set low at some time in the past, most likely during major inspection as a part of RF21 in the Spring of 2014. The FWP 'C' thrust bearing wear detector configuration on April 5, 2023, did not allow online monitoring of thrust bearing wear oil sensing lines.

4.0 IMMEDIATE CORRECTIVE ACTIONS

VCSNS entered its planned RF27 and performed a failure modes analysis to determine the FWP 'C' trip cause.



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1. FACILITY NAME		<input checked="" type="checkbox"/> 050	2. DOCKET NUMBER	3. LER NUMBER		
V.C. Summer Nuclear Station, Unit 1		<input type="checkbox"/> 052	395	YEAR	SEQUENTIAL NUMBER	REV NO.
				2023	001	00

NARRATIVE

5.0 ADDITIONAL CORRECTIVE ACTIONS

An extent of condition was performed for FWP's 'A' and 'B' thrust bearings and thrust bearing wear detectors. This extent of condition found that neither FWP 'A' nor 'B' were similarly affected by the error on the thrust bearing wear detectors.

6.0 ACTIONS TO PREVENT RECURRENCE

As a final measure to mitigate the risk of a similar trip in the future, an engineering design change was implemented to install pressure gauges on both the active and the inactive thrust bearing wear detector oil sensing lines for all three Main Feedwater Pumps. This modification will allow for online monitoring of the margin to the thrust bearing wear trip setpoint. Field measurements were also taken by Design Engineering and a vendor to consider future enhancements.

7.0 SIMILAR EVENTS

No similar events were identified within the last three years, where a reactor trip was required due to a feedwater malfunction.

8.0 MANUFACTURER & MODEL (OR OTHER IDENTIFICATION)

General Electric DRV-631, 6 Stage, Dual Inlet, Feedwater Pump Turbine

9.0 ADDITIONAL INFORMATION

None