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DEC 11 2015

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


Serial No. 15-403A
MPS Lic/LES R0
Docket No. 50-336
License No. DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
LICENSEE EVENT REPORT 2015-002-01
DEGRADED EMERGENCY CORE COOLING SYSTEM CHECK VALVE

This letter forwards Licensee Event Report (LER) 2015-002-01 documenting the supplemental LER for an event at Millstone Power Station Unit 2 that occurred on June 11, 2015. This LER is being submitted pursuant to 10 CFR 50.73(a)(2)(v)(C).

If you have any questions or require additional information, please contact Mr. Thomas G. Cleary at (860) 447-4377.

Sincerely,


John R. Daugherty
Site Vice President – Millstone

Attachments: 1

Commitments made in this letter: None

JE22
MLL

cc: U.S. Nuclear Regulatory Commission
Region I
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713

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Millstone Power Station

ATTACHMENT

LICENSEE EVENT REPORT 2015-002-01
DEGRADED EMERGENCY CORE COOLING SYSTEM
CHECK VALVE

MILLSTONE POWER STATION UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.



LICENSEE EVENT REPORT (LER)
(See Page 2 for required number of digits/characters for each block)

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, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Millstone Power Station Unit 2	2. DOCKET NUMBER 05000336	3. PAGE 1 OF 5
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4. TITLE
Degraded Emergency Core Cooling System Check Valve

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	11	2015	2015	002	01	12	11	2015		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
100	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT Thomas G. Cleary, Manager Nuclear Station Licensing	TELEPHONE NUMBER (Include Area Code) (860) 444-4377
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On June 11, 2015, while Millstone Power Station Unit 2 (MPS2) was in MODE 1 operating at 100 percent power, Engineering identified that due to a degraded check valve, the post-accident radioactivity release rates assumed in the FSAR could be affected. While performing 'B' High Pressure Safety Injection (HPSI) pump in-service testing, the measured flow was lower than expected. Because both trains of HPSI, Low Pressure Safety Injection (LPSI) pumps, and Containment Spray (CS) pumps share a common minimum flow recirculation line back to the Refueling Water Storage Tank, back-leakage through one of the idle pump's recirculation check valves was postulated as the cause of the observed drop in recirculation flow. Troubleshooting was performed, and it was determined that the minimum flow check valve associated with the 'A' CS pump, 2-CS-6A, was back-leaking. The associated minimum flow isolation valve was closed to eliminate the flow path. Back-leakage of the minimum flow recirculation check valves on the HPSI, LPSI, and CS pumps was not previously considered in radiological release analysis. This leakage had the potential to adversely affect calculated post-Loss of Coolant Accident recirculation phase radioactivity release rates under some postulated scenarios.

This event is being reported as an event or condition that could have prevented fulfillment of a safety function to control the release of radioactive material under 10 CFR 50.73(a)(2)(v)(C). The cause of the event was a failed open check valve. As a corrective action, the failed check valve 2-CS-6A has been repaired.



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

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, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollections.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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NARRATIVE

1. EVENT DESCRIPTION:

On June 11, 2015, while Millstone Power Station Unit 2 (MPS2) was in MODE 1 operating at 100 percent power, Engineering identified that due to a degraded check valve, the post-accident radioactivity release rates assumed in the FSAR could be affected. While performing 'B' High Pressure Safety Injection (HPSI) pump in-service testing, the measured flow was lower than expected. Because both trains of HPSI, Low Pressure Safety Injection (LPSI) pumps, and Containment Spray (CS) pumps share a common minimum flow recirculation line back to the Refueling Water Storage Tank (RWST), back-leakage through one of the idle pumps recirculation check valves was postulated as the cause of the observed drop in flow. Troubleshooting was performed, and it was determined that a degraded minimum flow check valve associated with the 'A' CS pump (2-CS-6A) was back-leaking into the "A" train suction line and flowing to the RWST through 2-CS-14A (RWST suction check valve) and normally open 2-CS-13.1A (RWST suction line isolation). The associated minimum flow isolation valve for 2-CS-6A was closed to eliminate the path and the valve was repaired.

Subsequently, engineering evaluation determined that during a loss of power to one facility or train of the Emergency Core Cooling System (ECCS), this back-leakage flow path could result in more leakage to the RWST than had been previously considered in the accident analysis. This leakage was evaluated for the potential to adversely affect calculated post-Loss of Coolant Accident recirculation phase radioactivity release rates under some postulated scenarios. Specifically, without power on the affected (i.e.: back-leaking) train, the CS discharge flowpath would not automatically open resulting in leakage to the RWST.

Prior to this discovery, the last time that the 'A' containment spray pump was run was on April 15, 2015, which would have opened 2-CS-6A. On this basis, it was concluded that this condition existed from April 15, 2015 to June 11, 2015. During this period, the 'A' Emergency Diesel Generator (EDG) was inoperable 4 times for a total of approximately 25 hours. However, all 4 times were for surveillances. At no time during this period was any maintenance done on the 'A' EDG. It is judged that, between accident initiation and commencement of sump recirculation (approximately 2 hours with only one train available), the EDG could have been made available.

This event is being reported as an event or condition that could have prevented fulfillment of a safety function to control the release of radioactive material under 10 CFR 50.73(a)(2)(v)(C). Note: The initial non-emergency report (#51149) of this issue on June 11, 2015 was subsequently updated on July 10, 2015. An additional unidentified release path from the original design of the plant was reported to the NRC as a follow-up notification on July 10, 2015.

BACKGROUND

The MPS2 Containment Spray (CS) system functions as an engineered safety feature to limit containment pressure and temperature after a loss-of-coolant accident (LOCA) and Main Steam Line Break (MSLB) accident, and thereby reduce the potential for leakage of airborne radioactivity to the outside environment. A minimum flow recirculation line is included in the design for recirculating water from the outlet of the pump to the RWST.

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With the CS system operating during a design basis accident, a small portion of the CS pump discharge flow recirculates to the RWST during the injection phase; however, the recirculation line is isolated from the RWST when transferring to sump recirculation. All seven ECCS/CS pumps (2 LPSI, 2 CS, and 3 HPSI) have minimum flow recirculation lines that tie into one common header to the RWST. Exhibit A attached to this LER is a sketch depicting the configuration.

Evaluation of this failure identified that during a SBLOCA (Small Break Loss of Coolant Accident) concurrent with a loss of power to the "A" train associated with the leaking 2-CS-6A, the operating (opposite) train HPSI pump would pressurize the common recirculation header during the injection phase of the accident as was described above. In the operator response to this postulated event when the 2-CS-6A leaks to the RWST, suction 2-CS-13.1B is manually isolated terminating the release to the RWST. However, it was additionally identified that the "A" train suction header would pressurize because of the continued back leakage with none of the "A" train pumps flowing due to loss of power and no open flowpath (to containment spray or RWST). This pressurization would continue, exceeding the design pressure of the suction header (60 psig) ultimately reaching 500 psig, the lift setpoint for the two "A" train shutdown cooling heat exchanger relief valves downstream of the "A" LPSI and CS pumps. These relief valves discharge to the EDST (Equipment Drains Sump Tank) which is located outside the filtered ventilation boundary. Upon emptying of the RWST and initiation of sump recirculation, the described back-leakage flowpath would contain sump fluid. This additional unidentified release path from the original design of the plant was reported to the NRC as a follow-up notification on July 10, 2015.

For this accident and radiological release sequence to occur the following are required:

- 2-CS-6A back-leakage
- SBLOCA
- Loss of Offsite Power (LOOP)
- Loss of the "A" train of onsite electric power
- SBLOCA break size that results in RCS re-pressurization and sustained RCS pressures above 500 psig, such that HPSI would continue to pressurize the recirculation header
- Fuel damage

While the discussion above relates to 2-CS-6A and the "A" train, back leakage from any of the minimum flow check valves and a concurrent loss of power to that train will have a similar outcome.

2. CAUSE:

The cause of the event was a failed-open check valve. Leakage of these check valves was not considered as a failure mode in the Millstone Unit 2 FSAR or original design basis.

3. ASSESSMENT OF SAFETY CONSEQUENCES:

An Operability Determination has been prepared and approved to document the radiological consequences of the condition. The radiological consequences of ECCS/CS min-flow check valve(s) leakage were evaluated for 5 gallons per minute of post LOCA containment sump liquid relieving to the Equipment Drains Sump Tank. This evaluation considered a 30 day unfiltered ground release and used a best estimate source term (gap release, 1% partitioning, etc.). This leakage was added to the consequences of previously identified leak paths, which had been analyzed using design basis LOCA analysis assumptions. The maximum train as found leakage was .089 gpm, well below the 5 gpm limit using best estimate source term.

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Even with the addition of the minimum-flow leakage, the control room and offsite dose consequences are within the regulatory limits of 10CFR50.67.

4. CORRECTIVE ACTION:

During the recently completed 2R23 refueling outage, leak testing of all MPS2 ECCS/CS min-flow check valves was completed. The testing was performed at 500 psig. The results were scaled to 1200 psid to reflect the highest HPSI discharge pressure. The resultant maximum as-found leak rate was 0.089 gpm through the 'A' ECCS/CS train. The failed check valve 2-CS-6A has been repaired. The 'B' HPSI check valve 2-SI-422, the check valve with the highest as-found leakage rate of 0.085 gpm, was repaired and retested. The maximum ECCS/CS pump min-flow as-left check valve leak rate in a train is 0.004 gpm.

Additional corrective actions are being taken in accordance with the station's corrective action program.

5. PREVIOUS OCCURRENCES:

- None

6. Energy Industry Identification System (EIS) codes:

- Pump – P
- Valve – V
- Tank – T
- Containment Spray – CS
- Safety Injection – SI

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