



Exelon Generation®

Oyster Creek  
Route 9 South  
P.O. Box 388  
Forked River, NJ 08731

10 CFR 50.73

RA-17-051

September 22, 2017

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk or O-8B1  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852

Oyster Creek Nuclear Generating Station  
Renewed Facility Operating License No. DPR-16  
NRC Docket No. 50-219

Subject: Supplemental Licensee Event Report (LER) 2016-005-01, "Technical Specification Prohibited Condition Caused by One Electromatic Relief Valve Inoperable for Greater than Allowed Outage Time."

Enclosed is LER 2016-005-01 reporting the Technical Specification prohibited condition due to an Electromatic Relief Valve inoperable for greater than the allowed outage time discovered during as-found testing, which occurred on September 19, 2016. The LER was revised to add supplemental information as required by Revision 00 of the document.

This event did not affect the health and safety of the public or plant personnel. This event did not result in a safety system functional failure. There are no regulatory commitments made in this LER submittal.

Should you have any questions concerning this report, please contact Gary Flesher, Regulatory Assurance Manager, at (609) 971-4232.

Respectfully,

Michael Gillin  
Plant Manager  
Oyster Creek Nuclear Generating Station

Enclosure: NRC Form 366, LER 2016-005-01

cc: Administrator, NRC Region I  
NRC Senior Resident Inspector - Oyster Creek Nuclear Generating Station  
NRC Project Manager - Oyster Creek Nuclear Generating Station

**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  
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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 e-mail to [Infocollections.Resource@nrc.gov](mailto: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.

**1. FACILITY NAME**

Oyster Creek, Unit 1

**2. DOCKET NUMBER**

05000 - 0219

**3. PAGE**

1 OF 4

**4. TITLE**

Technical Specification Prohibited Condition Caused by One Electromatic Relief Valve Inoperable for Greater than Allowed Outage Time

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
09	19	2016	2016	005	01	09	22	2017	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A
<b>9. OPERATING MODE</b>			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>							
N			<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
			<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
			<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
			<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
000			<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
			<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
			<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(II)			<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
			<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(I)
			<input type="checkbox"/> 20.2203(a)(2)(vi)			<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(II)
						<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER****LICENSEE CONTACT**

Gary Flesher, Regulatory Assurance Manager

**TELEPHONE NUMBER (Include Area Code)**

(609) 971-4232

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SB	RV	D245	Y	N/A	N/A	N/A	N/A	N/A

**14. SUPPLEMENTAL REPORT EXPECTED**☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On September 19, 2016, after achieving Cold Shutdown for the 1R26 Refuel Outage, as found testing was performed on all five (5) Electromatic Relief Valves (EMRVs). The "E" EMRV did not open from the Main Control Room (MCR), and no change in indication was observed. Per the work activity, technicians were dispatched to the Drywell to verify that the valve did not move upon receiving an open signal from the MCR.

A cutout switch in the valve actuator was stuck in the open position, thereby preventing a solenoid from actuating to open the valve. The cutout switch did not operate as required because the hinge pin lock star washers were not installed in the cutout switch assembly. Without the lock star washers installed, the hinge pins interfered with the solenoid frame holes creating mechanical binding. Based on this information it is suspected that the "E" EMRV would have been inoperable for longer than the Technical Specification Allowed Out of Service Time (AOT) of 24 hours. Therefore, this issue is reportable under 10 CFR 50.73(a)(2)(i)(B) as an Operation or Condition which was Prohibited by the plant's Technical Specifications.

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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Oyster Creek, Unit 1	05000- 0219	2016	- 005	- 01

**NARRATIVE****Plant Conditions Prior To Event**

Event Date: September 19, 2016  
Unit 1 Mode: Cold Shutdown

Event Time: 1500 EDT  
Power Level: 0%

**Description of Event**

On September 19, 2016 after achieving Cold Shutdown for the 1R26 Refuel Outage, as found testing was performed on all five (5) Electromatic Relief Valves (EMRVs). The "E" EMRV did not open from the Main Control Room (MCR), and no change in indication was observed. Per the work activity, technicians were dispatched to the Drywell to validate that the valve did not move upon receiving an open signal from the MCR. Troubleshooting was developed and determined that the cutout switch in the valve actuator was stuck in the open position, thereby preventing the actuator pickup solenoid from energizing to open the valve. The cutout switch did not operate as required because the hinge pin lock star washers were not installed in the cutout switch assembly. Without the lock star washers installed, the hinge pins interfered with the solenoid frame holes creating mechanical binding.

During each refueling outage, all five (5) EMRV actuators are removed from the plant, refurbished, and reinstalled during the following refueling outage. By Oyster Creek Nuclear Generating Station (OCNGS) process, the EMRV actuators are refurbished with new springs, posts, guides, and microswitches every 24 months during refueling outages. The actuator inspection/refurbishment frequency of 24 months is more frequent than the manufacturer's (Dresser Industries) recommended frequency of 36 months (per Vendor Manual VM-OC-0030, Installation and Maintenance Manual for Electromatic Relief Valves, Revision 1, Section VII, Ref. 4.5).

**Equipment Description**

The EMRVs are Type 6" 1525-VX relief valves manufactured by Dresser Industries. They are installed on the two (2) main steam lines that carry steam from the reactor vessel to the main turbine. Actuation signals from either the Automatic Depressurization System or the individual EMRV pressure switches, as well as from the manual control switches will open the valves to lower reactor pressure, thereby allowing the low pressure Core Spray System to provide makeup water to the reactor core during accident / transient conditions.

The main valve is operated by a pilot valve that is controlled by energizing a DC operated solenoid actuator. When energized, the solenoid develops an electromagnetic field that enables the downward travel of a plunger, which strikes the pilot valve lever pushing it down. In that position, the lever opens the exhaust/venting path of the main valve, which subsequently opens the EMRV. The solenoid actuator is equipped with two solenoid coils (a pickup, low resistance ~ 5Ω coil, and a hold, high resistance ~ 300Ω coil) in series. The hold coil has a parallel cutout switch, which is normally closed, thus bypassing the hold coil during the initial solenoid actuation. The initial pickup current in that configuration (~20 amps) is capable of developing the force required by the plunger for striking down the pilot valve lever and opening the EMRV. During its downward travel, the plunger tail will also strike down the cutout switch lever, which opens the cutout switch and connects the hold coil into the circuit. The low current developed (~ 0.5 Amps) in that configuration is required to allow the EMRV to remain open, as needed, without the risk of burning out the pickup coil.

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**NARRATIVE****Analysis of Event**

When the EMRV is no longer required to be open, the solenoid coils are de-energized, and the plunger travels upward pulled by the actuator springs. As it travels upward, the plunger releases the cutout switch lever, which retracts to its initial (closed) position helped by the combination of a tension and torsional springs. The failure of the cutout switch to retract to its normal (closed) position would result in the pickup and hold coil simultaneously energized during an EMRV actuation, which would subsequently prevent the solenoid from developing the required force to overcome the actuator spring force, inhibiting the EMRV from opening.

Based on the failure mechanism, it has been determined that the "E" EMRV was inoperable for longer than the Technical Specification Allowed Out of Service time of 24 hours.

There was no actual safety consequence associated with this event. The results of the analysis performed substantiate that the cause of the event was isolated to the "E" EMRV only.

**Cause of Event**

The "E" EMRV failure was caused due to the failure to install the hinge pin lock star washers in the cutout switch assembly. Without the lock star washers installed, the hinge pins interfered with the solenoid frame holes creating binding and rotational forces that resulted in a deformation of the cutout switch lever arm. The lever arm deformation allowed the lever arm to bind on the solenoid frame and could not be overcome by the spring force. This condition resulted in the cutout switch being held open and the "E" EMRV unable to actuate.

**Immediate Actions**

Extent of Condition Inspections were performed on the other four (4) EMRV actuators that were removed during 1R26 Refuel Outage. Discrepancies were identified with the "E" EMRV only.

**Corrective Actions**

1. Inspected all five (5) EMRV solenoid actuators prior to installation in the plant to verify critical parameters as well as installation of the hinge pin lock star washers.
2. Implemented a policy improving field observations and increasing the criticality requirements.
3. Revised procedure to rebuild EMRVs to include verification signatures for critical steps.

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**NARRATIVE****Assessment of Safety Consequences**

There was no actual safety consequences associated with this event. All EMRVs were operable at the time of installation during 1R25 Refuel Outage (2014) as proven by operability surveillance testing during start-up from the outage. During Cycle 25, the OCNGS did not have any transients or events which required the "E" EMRV to operate. Additionally, OCNGS UFSAR Chapter 15, assumes four out of the five EMRVs are available for any of the accident analyses requiring EMRV operation/actuation.

The Electromatic Relief Valves (EMRVs) have three modes of operation that were evaluated for Design Basis. These three modes are:

- 1) Automatic operation under Small Break Loss of Coolant Accident (SBLOCA) conditions
- 2) Automatic operation under high Reactor Pressure Vessel (RPV) Pressure condition
- 3) Manual operation under conditions dictated by the Emergency Operating Procedures (EOPs)

The 'B', 'C', and 'E' EMRV have a setpoint to open at 1085 psig, which is higher than the setpoints for the 'A' and 'D' EMRV of 1065 psig. Time delay relays prevent the simultaneous opening of the EMRVs. The failure of the EMRV cutout switch lever arm would have precluded the "E" EMRV assembly from being able to cycle open in the event of an automatic or manual actuation. The remaining four (4) of the five (5) EMRVs would have continued to operate and would have cycled as required to ensure operations under a SBLOCA or RPV high pressure condition. The 'A' through 'D' EMRVs were evaluated to not be susceptible to a common cause failure and were maintained in an operable condition in accordance with station procedures.

**Previous Occurrences**

In 2014 the station experienced an event in which two (2) actuators were found to be inoperable during the refurbishment process, after removal from the plant in September 2012 during the 1R24 Refuel Outage. The station performed the corrective actions to change the design of the EMRV solenoid actuators to prevent recurrence. The newly designed actuators were installed in September 2014 during OCNGS 1R25 Refuel Outage. Additionally, a corrective action was implemented to perform as found testing during subsequent refuel outages prior to replacing the actuators. The performance of these modifications was not a contributing cause to the failure experienced in the "E" EMRV on September 19, 2016.

**Component Data**

Component	IEEE 805 System ID	IEEE 803A Component
Relief Valve	SB	RV