



Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
600 Rocky Hill Road  
Plymouth, MA 02360

October 13, 2016

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

SUBJECT: Licensee Event Report 2016-006-00, "C" Inboard Main Steam Isolation Valve  
Inoperable

Pilgrim Nuclear Power Station  
Docket No. 50-293  
Renewed License No. DPR-35

LETTER NUMBER: 2,16.063

Dear Sir or Madam:

The enclosed Licensee Event Report 2016-006-00, "C" Inboard Main Steam Isolation Valve Inoperable, is submitted in accordance with 10 Code of Federal Regulations 50.73.

If you have any questions or require additional information please contact me at (508) 830-8323.

There are no regulatory commitments contained in this letter.

Sincerely,

A handwritten signature in cursive script that reads "Everett P. Perkins, Jr.".

Everett P. Perkins, Jr.  
Manager, Regulatory Assurance

EPP/sc

Attachment: Licensee Event Report 2016-006-00, "C" Inboard Main Steam Isolation Valve  
Inoperable (4 pages)

IEZZ  
NRR

cc: Mr. Daniel H. Dorman  
Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
2100 Renaissance Blvd., Suite 100  
King of Prussia, PA 19406-2713

Ms. Booma Venkataraman, Project Manager  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Mail Stop O-8C2A  
Washington, DC 20555

NRC Senior Resident Inspector  
Pilgrim Nuclear Power Station

**Attachment**

Letter Number 2.16.063

Licensee Event Report 2016-006-00

"C" Inboard Main Steam Isolation Valve Inoperable

(4 Pages)



**LICENSEE EVENT REPORT (LER)**

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](mailto: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.

<b>1. FACILITY NAME</b> Pilgrim Nuclear Power Station	<b>2. DOCKET NUMBER</b> 05000293	<b>3. PAGE</b> 1 OF 4
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**4. TITLE**  
"C" Main Steam Isolation Valve Inoperable

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
08	16	2016	2016	006	00	10	13	2016	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

9. OPERATING MODE		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
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)	
100	<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"/>	73.71(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**

<b>LICENSEE CONTACT</b> Mr. Everett P. Perkins, Jr. - Regulatory Assurance Manager	<b>TELEPHONE NUMBER (Include Area Code)</b> 508-830-8323
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**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

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

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

On 8/16/2016, during performance of Main Steam Isolation Valve (MSIV) stroke time testing, with the plant operating at approximately 60% power, "C" inboard MSIV closure time was 7.4 seconds, exceeding the maximum closure time of 5 seconds referenced in Final Safety Analysis Report (FSAR) Table 5.2-4. The MSIV was declared inoperable. In accordance with the plant Technical Specifications (TS) the "C" outboard MSIV was closed and isolated. A team was formed to perform troubleshooting and determine corrective actions. With one main steam line inoperable the plant was limited to less than 75% power. On 8/21/16 the plant was shut down and entered a forced outage to repair the "C" inboard MSIV. The air pack was replaced and post maintenance tests were satisfactorily performed to restore the valve to Operable status.

On 8/30/16 Pilgrim Nuclear Power Station conservatively concluded that, based on the historical issues with the "C" inboard MSIV, the valve had been inoperable since stroke time testing was performed on May 24, 2016.

There was no impact to public health and safety from this condition.

## BACKGROUND

The function of the MSIVs is to prevent coolant inventory loss and protect plant personnel in the event of a steam line break outside containment. Also MSIVs provide a primary containment boundary after a loss of coolant accident (LOCA). The MSIVs are 20-inch air/spring operated, balanced "Y"-type globe valves. There are four main steam lines. Each steam line has two MSIVs; one inside primary containment and one outside of primary containment. The MSIV "C" inboard valve is located inside primary containment, within the drywell.

Pneumatic power to the MSIVs located inside primary containment is supplied by nitrogen when the drywell atmosphere is inerted and by instrument air when the drywell is de-inerted. An air pack consisting of two-way, three-way and four-way valves and Alternating Current/Direct Current (AC/DC) solenoid valves are used to control MSIV position (open/closed).

The air pack employs a two-stage control scheme whereby pilot air pressure controls the position of a dual-cylinder four-way valve; repositioning spools within the cylinders to apply pneumatic power above or below the MSIV air actuator piston. The air pack has one AC and one DC solenoid operated valve for controlling pilot air pressure within the air pack.

Energizing either the AC or the DC solenoid valve individually will cause the MSIV to open. Pilot air (nitrogen) passes through the energized solenoid valves to the four-way valve, repositioning its spools to port air (nitrogen) beneath the MSIV air actuator piston which drives the valve stem and main poppet open.

To close the MSIV, the AC and DC solenoids must both be de-energized to vent pilot air from the four-way valve, repositioning its spools to vent nitrogen pressure below the actuator piston and to port air (nitrogen) above the MSIV air actuator piston which drives the MSIV closed (fast closure mode). De-energizing either the AC or the DC solenoid valve individually will not close the MSIV.

The MSIV is opened and held in the open position by compressed gas (air or nitrogen). Pneumatic pressure is required to compress the springs and open the MSIV. The air actuator assists the springs during fast closure of the MSIV. The springs extend when the valve closes. If loss of air or nitrogen gas pressure to the MSIV actuator occurs then spring force exerted upon the bottom spring seat will close the MSIV (fail-safe closure). The actuator provides no air-assist during fail-safe valve closure. The valve's fail-safe closure time is slower than its air-assisted fast closure time.

During fast closure mode, the MSIV must close in the required three to five seconds elapsed time using closure force provided by both its actuator and stored energy in the compressed springs. The MSIV utilizes a dashpot to control the valve closing speed. The actuator stem passes through the dashpot. A piston threaded onto the actuator stem strokes within the dashpot cylinder, displacing dashpot hydraulic fluid through a needle valve (speed control valve). MSIV closing time can be controlled between three and five seconds by adjusting the speed control valve opening (orifice).

## EVENT DESCRIPTION

On 8/16/2016, with Pilgrim Nuclear Power Station operating at approximately 60% Power during performance of MSIV Operability testing, closure time for the "C" inboard MSIV was 7.4 seconds which exceeded the maximum closure time of five seconds referenced in FSAR Table 5.2-4. The "C" inboard MSIV was declared inoperable. In accordance with plant TS the "C" outboard MSIV was closed and deactivated. The plant was restricted to less than 75% power due to only having three operating main steam lines. A decision was made to shut down and replace the air pack four-way valve and solenoid valves. The drywell was entered and an as-found inspection of the MSIV air pack was completed while the

MSIV was open. The air pack four-way valve and solenoid valves were replaced. The pilot air pneumatic line was cleaned and sampled for debris. The "C" inboard MSIV was tested satisfactorily and declared operable.

#### CAUSE OF THE EVENT

The Root Cause of this event is system debris (accumulated dust/wear and corrosion products) in the "C" inboard MSIV pilot air tubing which were disturbed during the August 2015 pipe failure and subsequently collected in the solenoid valve soft disc. The vibration and high flow through the airline resulted in accumulated system debris being agitated and released into the airline. Subsequent MSIV stroke time testing moved the debris through the air line into the newly overhauled air pack and deposited it in the solenoid valve seats, resulting in slow stroke time of the "C" inboard MSIV. The solenoid valves had been replaced in 2015 during RFO 20. At the same time, a new four-way valve had also been installed during preventive maintenance.

#### CORRECTIVE ACTIONS

The "C" Inboard MSIV failed its TS required stroke time test. Therefore, the plant was shut down and the air pack four-way valve and solenoid valves were replaced.

The corrective action to prevent recurrence is to replace the Instrument Air header in the drywell along with all of the pilot air lines to the inboard MSIVs. This is currently scheduled to be accomplished during RFO21.

#### SAFETY CONSEQUENCES

There were no consequences to the safety of the public, nuclear safety, industrial safety or radiological safety due to this event.

There were no potential consequences because the "C" inboard MSIV closed as required. The delay in the timing of closure is not significant. The "C" inboard MSIV is a fail-safe design and will fail closed. In addition, if the "C" inboard MSIV failed to close, reactor isolation is available by the "C" outboard MSIV. That valve remained operable and could have performed its design function if isolation had been necessary.

Based on the defense in depth fail-safe design of inboard and outboard MSIVs, risk is considered to be Low.

No actions to reduce the frequency or consequence are necessary.

#### REPORTABILITY

This event is reportable under 10 CFR 50.73(a)(2)(i)(B), Condition Prohibited By Technical Specifications.

#### PREVIOUS EVENTS

A review of Pilgrim Nuclear Power Station Licensee Event Reports for the past three years did not identify any similar occurrences.

REFERENCES:

Condition Report CR-PNP-2016-05987

Condition Report CR-PNP-2016-02163