



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 2016-005-00, Ultimate Heat Sink and Salt Service Water System Declared Inoperable

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

LETTER NUMBER: 2.16.062

Dear Sir or Madam:

The enclosed Licensee Event Report 2016-005-00, Ultimate Heat Sink and Salt Service Water System Declared Inoperable, is submitted in accordance with 10 Code of Federal Regulations 50.73.

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

There are no regulatory commitments contained in this letter.

Sincerely,

A handwritten signature in black ink, appearing to read "Everett P. Perkins, Jr.", with a stylized flourish at the end.

Everett P. Perkins, Jr.  
Manager, Regulatory Assurance

EPP/sc

Attachment: Licensee Event Report 2016-005-00, Ultimate Heat Sink and Salt Service Water System Declared Inoperable (5 Pages)

IE22  
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 2.16.062

Licensee Event Report 2016-005-00

Ultimate Heat Sink and Salt Service Water System Declared Inoperable

(5 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 [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  
Pilgrim Nuclear Power Station

2. DOCKET NUMBER  
05000293

3. PAGE  
1 OF 5

4. TITLE  
Ultimate Heat Sink and Salt Service Water System Declared 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	15	2016	2016	005	00	10	13	2016	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)		
70			<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 checked="" 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 checked="" 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 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

## LICENSEE CONTACT

Mr. Everett P. Perkins, Jr. - Regulatory Assurance Manager

## TELEPHONE NUMBER (Include Area Code)

508-830-8323

## 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

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO

## 15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

## ABSTRACT

On August 15, 2016 at 1552 EDT, with the reactor at about 70 percent core thermal power (CTP), Pilgrim Nuclear Power Station (PNPS) declared the ultimate heat sink (UHS) and salt service water (SSW) system inoperable due to high sea water inlet temperatures greater than 75 degrees Fahrenheit (F). PNPS had already taken action, in accordance with plant procedures, to reduce power from 100 percent in an effort to keep from exceeding the Technical Specification (TS) Limit. PNPS entered a 24-hour shutdown Limiting Condition for Operation Action Statement (LCO-AS) for Salt Service Water (SSW) inlet temperature exceeding the TS limit in TS 3.5.B.4. The LCO-AS was subsequently exited at 1651 hours when the temperature of SSW trended to below the TS limit.

Under certain design conditions, the SSW system is required to provide cooling water to various heat exchangers such as the Reactor Building Closed Cooling Water (RBCCW) and Turbine Building Closed Cooling Water (TBCCW) systems. When the inlet temperature to these supplied loads exceeds the 75 degree F limit established in the TS, the SSW system is conservatively declared inoperable until the temperature trends below this value. This condition existed for 59 minutes reaching a maximum of 75.1 degrees F. The cause of the sea water inlet temperature exceeding the 75 degree F TS criterion was sustained increased sea water surface temperature in Cape Cod Bay due to summer weather conditions and recirculation of water from the plant's discharge due to wind and tidal conditions.

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

NRC FORM 366  
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION



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

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 10/31/2018

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](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	2. DOCKET NUMBER	3. LER NUMBER		
Pilgrim Nuclear Power Station	05000293	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	005	00

## **NARRATIVE**

### **BACKGROUND**

Cape Cod Bay is the Ultimate Heat Sink (UHS) for PNPS. The circulating water system and the Salt Service Water (SSW) system take sea water from Cape Cod Bay via the plant intake canal and intake structure and provide cooling water for various plant heat loads. These systems discharge the heated cooling water back into Cape Cod Bay via system discharge piping and the plant discharge canal. The safety objective of the SSW system is to provide a heat sink for the Reactor Building Closed Cooling Water (RBCCW) system under normal, transient, and accident conditions. The SSW system has five SSW pumps and is designed with sufficient redundancy so that no single active system component failure can prevent the system from achieving the safety objective. The system is designed to continuously provide a supply of cooling water to the secondary side of the RBCCW heat exchangers adequate to meet the requirements of the RBCCW system under all conditions. The RBCCW system provides the necessary cooling requirements for the Residual Heat Removal (RHR) system and ultimately the reactor and primary containment.

The SSW pumps are separated into two loops. Two pumps are connected to each loop and the fifth pump can feed either loop. Initiation of standby AC power following loss of the preferred AC power source will automatically start at least one pump in each loop during normal conditions. Following a Loss of Coolant Accident (LOCA) and loss-of-offsite power, one pump will start in each loop because of diesel load limitations. Additional pumps are started manually by the operator as additional cooling loads are established and diesel capacity is available.

Technical Specification (TS) Limiting Condition For Operation (LCO) 3.5.B.4 requires that two SSW subsystems shall be operable whenever irradiated fuel is in the reactor vessel, reactor coolant temperature is greater than 212 degrees F and prior to startup from a cold condition. A subsystem is considered OPERABLE when it has an OPERABLE UHS and two OPERABLE pumps with associated controls and instrumentation. The OPERABILITY of the UHS is based on having a minimum water level in the pump well of the intake structure of greater than 13 ft. 9 in. below mean sea level and a maximum water temperature of 75 degrees F.

One of the TS Surveillance Requirements for the SSW System is 4.5.B.4.2 which is to verify the average sea water temperature is less than or equal to 75 degrees F every 24 hours.

If the UHS is inoperable, the unit must be placed in a MODE in which the Specification does not apply. To achieve this status, the unit must be in Cold Shutdown within 24 hours. The allowed completion times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

### **EVENT DESCRIPTION**

On August 15, 2016 at 1552 EDT, with the reactor at about 70 percent core thermal power (CTP), Pilgrim Nuclear Power Station (PNPS) declared the ultimate heat sink (UHS) and salt service water (SSW) system inoperable due to high sea water inlet temperatures greater than 75 degrees F. PNPS had already taken action, in accordance with plant procedures, to reduce power from 100 percent in an effort to keep from exceeding the Technical Specification (TS) Limit. PNPS entered a 24-hour shutdown Limiting Condition for

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Pilgrim Nuclear Power Station	05000293	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	005	00

## **NARRATIVE**

Operation Action Statement (LCO-AS) for Salt Service Water (SSW) inlet temperature exceeding the TS limit in TS 3.5.B.4. The LCO-AS was subsequently exited at 1651 hours when the temperature of SSW trended to below the TS limit.

Under certain design conditions, the SSW system is required to provide cooling water to various heat exchangers such as the Reactor Building Closed Cooling Water (RBCCW) and Turbine Building Closed Cooling Water (TBCCW) systems. When the inlet temperature to these supplied loads exceeds the 75 degree F limit established in the TS, the SSW system is conservatively declared inoperable until the temperature trends below this value. On August 16, 2016 this condition existed for 59 minutes with the maximum temperature documented at 75.1 degrees F.

## **CAUSE OF THE EVENT**

The cause of the sea water inlet temperature exceeding the 75 degree F TS criterion was sustained increased sea water surface temperature in Cape Cod Bay due to summer weather conditions and recirculation of water from the plant's discharge due to wind and tidal conditions.

The lack of margin available between the possible maximum sea water temperature and the design analytical limit influenced the plant's response. The possibility that both loops of containment cooling might be declared inoperable because of high UHS temperature was recognized when the 75 degree F Technical Specification limit was established in 1997. However, at that time based on historical temperature data and knowledge of the behavioral characteristics of the bay and local meteorology, it was considered highly improbable that the plant would ever be shut down because of high UHS temperature with the limit set at 75 degrees F. On these bases, the UHS temperature limit of 75 degrees F was considered acceptable.


## **CORRECTIVE ACTIONS**

To increase the margin between the Salt Service Water (SSW) design basis inlet temperature and expected environmental operating conditions an engineering evaluation that supports increasing the margin between the Salt Service Water (SSW) design basis inlet temperature and expected environmental operating conditions is being performed. Appropriate regulatory actions will be taken based on the results of that evaluation.

As an interim action, procedural enhancements to deal with elevated salt service water temperature will be implemented.

Additional corrective actions will be implemented as necessary within the corrective action program.

## **SAFETY CONSEQUENCES**

<b>NRC FORM 366</b> (11-2015)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		<b>APPROVED BY OMB: NO. 3150-0104</b>		<b>EXPIRES: 10/31/2018</b>	
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Pilgrim Nuclear Power Station		05000293		<b>YEAR</b>	<b>SEQUENTIAL NUMBER</b>	<b>REV NO.</b>	
				2016	005	00	

**NARRATIVE**

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

The safety function of the SSW System is to transfer heat from all systems and components cooled by the Reactor Building Closed Cooling Water (RBCCW) System to Cape Cod Bay. The SSW System provides a continuous supply of cooling water to the secondary side of the RBCCW heat exchangers under normal, shutdown, transient, and accident conditions. Design and accident analyses for the station have been performed with the assumption that the SSW inlet temperature would average 75 degrees F maximum. Increased SSW inlet temperatures reduce the ability of the SSW System to remove heat from the RBCCW System.

Following an event in 2013 where SSW inlet temperature exceeded 75 degrees F, an engineering evaluation was performed to address the consequences of the temperature excursion and to determine whether the safety function would still have been fulfilled. This evaluation assumed an event where the SSW inlet temperature exceeded 75 degrees F and remained less than 78 degrees F for short durations, with the 12-hour rolling average less than 75 degrees F. This evaluation concluded that all systems, structures, and components would be capable of performing their safety functions under the assumed conditions. The temperature excursion that occurred on August 15, 2016 is bounded by that evaluation. Accordingly, the safety function of the Salt Service Water System would have been satisfied based on the maximum temperature recorded and the short duration of the excursion.

There was no adverse impact on the public health or safety.

**REPORTABILITY**

This event is reportable under 10 CFR 50.73(a)(2)(v)(B) and 10 CFR 50.73(a)(2)(v)(D), Event or Condition that Could Have Prevented Fulfillment of a Safety Function.

**PREVIOUS EVENTS**

LERs for the previous ten years were reviewed for UHS and SSW Pumps being inoperable. These LERs are summarized as follows:

LER 2015-006 - Ultimate Heat Sink and Salt Service Water System Declared Inoperable

LER 2013-007 - Ultimate Heat Sink and Salt Service Water System Declared Inoperable

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(11-2015)

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		2016	005	00

## **NARRATIVE**

### **ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES**

The EIIS codes for Components and Systems referenced in this report are as follows:

#### **SYSTEMS**

#### **CODES**

Ultimate Heat Sink (UHS) System (Cape Cod Bay)

BS

#### **REFERENCES:**

- 1) Pilgrim Nuclear Power Station LER 2013-007, Ultimate Heat Sink and Salt Service Water System Declared Inoperable, dated 9/13/2013 (NRC Accession No. ML13266A242).
- 2) Pilgrim Nuclear Power Station LER 2015-006, Ultimate Heat Sink and Salt Service Water System Declared Inoperable, dated 10/7/2015 (NRC Accession No. ML15289A231).