



Clinton Power Station  
8401 Power Road  
Clinton, IL 61727

U-604366

10CFR50.73  
SRRS 5A.108

August 9, 2017

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555-0001

Clinton Power Station, Unit 1  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461

Subject: Licensee Event Report 2017-007-00

Enclosed is Licensee Event Report (LER) 2017-007-00: Manual Reactor SCRAM due to Loss of Feedwater Heating. This report is being submitted in accordance with the requirements of 10 CFR 50.73.

There are no regulatory commitments contained in this report.

Should you have any questions concerning this report, please contact Mr. Dale Shelton, Regulatory Assurance Manager, at (217) 937-2800.

Respectfully,

A handwritten signature in black ink, appearing to read "T. Stoner", written in a cursive style.

Theodore R. Stoner  
Site Vice President  
Clinton Power Station

KP/cac

Attachment: Licensee Event Report 2017-007-00

cc:

Regional Administrator— NRC Region III  
NRC Senior Resident Inspector - Clinton Power Station  
Office of Nuclear Facility Safety — Illinois Emergency Management Agency

IEZZ  
NRR



**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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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> Clinton Power Station, Unit 1	<b>2. DOCKET NUMBER</b> 05000461	<b>3. PAGE</b> 1 OF 4
--	-------------------------------------	--------------------------

**4. TITLE**  
Manual Reactor SCRAM due to Loss of Feedwater Heating

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	10	2017	2017	- 007	- 00	08	09	2017	FACILITY NAME	DOCKET NUMBER
										05000
										05000

<b>9. OPERATING MODE</b>	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>			
1	<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 checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
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)(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 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 Mr. Dale Shelton	TELEPHONE NUMBER (Include Area Code) (217)-937-2800
--------------------------------------	--

**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>14. SUPPLEMENTAL REPORT EXPECTED</b>	<b>15. EXPECTED SUBMISSION DATE</b>		
<input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO	MONTH	DAY	YEAR
	11	03	2017

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

On June 10, 2017, at 2256, Clinton Power Station (CPS) experienced a complete loss of the 'A' feedwater (FW) heater string. The operators received numerous FW trouble alarms on FW string 'A' and low pressure heater 1A/1B bypass opened (1CB004). The operators entered procedure 4005.01, "Loss of FW Heating," which directs the operators to restore and maintain power at or below the original power level. The operators lowered core flow and inserted all CRAM rods, monitored core flow, and then observed that feedwater temperature had dropped greater than 100°F. As directed by CPS 4005.01, at 2306 hours with the unit at 93 percent power, the reactor mode switch was placed into the shutdown position and procedure 4100.01, "Reactor Scram," was entered. All systems operated as expected following the scram. At 0100 EDT, June 11, 2017, an ENS notification was made (EN 52800). The loss of FW heating transient was caused by a loss of power to Moore trip units caused by a shorted condition on the Moore trip unit associated with the Hi-Hi level in the 4A FW heater. The root cause of the event is still under investigation and will be reported in a supplement to this licensee event report. Prior to startup, CPS modified the circuit card locations in the panel that contains the Heater Drain system Moore trip units and thereby diversified the power supplies so that the trip units have less dependency on common fuses. This event is reportable under the provisions of 10 CFR 50.73(a)(2)(iv) due to the manual actuation of the reactor protection system.



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

(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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Clinton Power Station, Unit 1	05000461	2017	- 007	- 00

**NARRATIVE**

**PLANT AND SYSTEM IDENTIFICATION**

General Electric -- Boiling Water Reactor, 3473 Megawatts Thermal Rated Core Power Energy Industry Identification System (EIS) codes are identified in text as [XX].

**EVENT IDENTIFICATION**

Manual Reactor SCRAM due to Loss of Feedwater Heating

**A. Plant Operating Conditions before the Event**

Unit: 1                      Event Date: 6/10/17                      Event Time: 2256  
Mode: 1                      Mode Name: Power Operation                      Reactor Power: 93 percent

**B. Description of Event**

On June 10, 2017, at 2256, Clinton Power Station (CPS) experienced a complete loss of the 'A' feedwater (FW) heater [HX] string. The operators received numerous FW trouble alarms on FW string 'A' and low pressure (LP) heater [HTR] 1A/1B bypass valve (1CB004) automatically opened. The operators entered procedure CPS 4005.01, "Loss of FW Heating," which directs the operators to restore and maintain reactor power at or below the original power level and within stability control and power/flow map limits by adjusting reactor recirculation flow, control rods or CRAM array. The operators lowered core flow and inserted all CRAM rods. The operators observed that FW temperature had dropped by greater than 100°F. Procedure 4005.01 directs the operators to place the reactor mode switch [JS] in shutdown and enter procedure CPS 4100.01, "Reactor Scram." With the unit at approximately 93 percent power, the operators placed the mode switch in shutdown at 2306 on June 10, 2017 and entered procedure CPS 4100.01.

The components of the CPS power conversion system are designed to produce electrical power utilizing the steam generated by the reactor [RCT], condense that steam into water, and return the water to the reactor as heated feedwater. A portion of the main turbine [TRB] steam is extracted for FW heating. CPS has two trains of cascading FW heaters. Under normal, full power conditions, the extraction steam valves [V] to each of the FW heaters are open such that steam is condensed in the body of the heater. In addition, the normal heater drain valves are normally open and the emergency FW heater drain valves to the main condenser [COND] are closed. A high-high level in a FW heater will isolate the input sources to the heater (i.e., extraction steam valve(s) and the upstream normal FW heater drain valve(s)), reducing the reactor FW temperature.

A walkdown of panel [PL] 1PA08J (Miscellaneous Sensors & Transducers Power Supply Cabinet), which houses Moore trip units for both the 'A' and 'B' FW heating strings, identified that there were no lights on rack CA-1 and the indicator for fuse [FU] FU-89 was open.



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

(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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Clinton Power Station, Unit 1	05000461	2017	- 007	- 00

**NARRATIVE**

Troubleshooting using an ohmmeter found that high resistance in the circuit was eliminated after pulling Moore trip unit 1LYHD103A, which is the trip unit that provides automatic actions on a Hi-Hi level for FW heater 4A. This indicated that the loss of power to rack CA-1 was caused by fuse FU-89 opening in response to a shorted condition on the Moore trip unit 1LYHD103A. When fuse FU-89 opened, power was also lost to the Moore trip units for low pressure FW heaters 2A, 3A, 5A, and 6A resulting in a loss of extraction steam to the 'A' FW heater train.

**C. Cause of the Event**

The root cause of this event is currently under investigation. The causal factors that created this condition and the associated corrective actions will be provided in a revision to this Licensee Event Report (LER).

**D. Safety Consequences**

This event is reportable under the provisions of 10 CFR 50.73(a)(2)(iv) due to the manual actuation of the reactor protection system.

An assessment of the safety consequences and implication of this event determined that the manual reactor scram ensured the plant remained in a safe and stable condition and no operating limits were exceeded.

The design basis loss of feedwater heating transient for CPS is based on a maximum temperature transient of 100°F. Should this event to occur at a lower reactor power level, the severity of the transient would be reduced commensurate with the reduction in feedwater heating.

**E. Corrective Actions**

Prior to startup, CPS modified the circuit card locations in the panel that contains the Heater Drain system Moore trip units and thereby diversified the power supplied so that the trip units have less dependency on common fuses. In addition, the blown fuse FU-89 was replaced. Additional corrective actions included installation of temporary cooling and temperature loggers in the Panel 1PA08J to monitor for elevated temperature condition.

Further corrective actions for this event will be provided in the follow-up LER.



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

(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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Clinton Power Station, Unit 1	05000461	2017	- 007	- 00

**NARRATIVE**

**F. Previous Similar Occurrences**

LER 88-025 - Loss of Feedwater Heating System Transient Outside Design Basis Due to Inadequate Communication Between the Architect Engineer and the Nuclear Steam Supply System Supplier.

On July 28, 1988, CPS experienced a partial loss of FW heating. The FW temperature drop, excluding the change caused by a reduction in power, was greater than 102, but less than 112, degrees Fahrenheit (F). The design basis loss of FW heating transient for CPS is based on a maximum temperature transient of 100 degrees F. The cause of the loss of FW heating was the inappropriate setting of the FW heater level controllers. The cause of exceeding the design basis is attributed to the failure of the FW heating system design to meet design requirements. This was caused by a lack of adequate communication between the Nuclear Steam Supply System (NSSS) supplier and the architect engineer regarding the NSSS design requirements for the FW heating system. Feedwater heating system design changes, including changes to the level trip setpoint for closing the extraction steam valves and replacing power supply fuses, were made to ensure that the design basis is met.

**G. Component Failure Data**

Failed card was determined to be a Moore Industries DCA alarm card.

Model Number: DCA/4-20ma/DH1L2/45dC/-AD-100HB1 (PC)  
Serial Number: 2412651