



Clinton Power Station
8401 Power Road
Clinton, IL 61727

U-604374
September 28, 2017

10CFR 50.73
SRRS 5A.108

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
Licensee Event Report 2017-005-00

Subject: LER 2017-005-01

Enclosed is Licensee Event Report (LER) 2017-005-01: Automatic Reactor Scram During the Performance of Scram Time Testing As a Result of an Invalid Oscillation Power Range Monitor Growth Rate Trip. This is the supplemental report to LER 2017-005-00 which was submitted to the NRC on July 28, 2017. The updated information in the LER is denoted by revision bars located in the right-hand margin. 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".

Theodore R. Stoner

Site Vice President
Clinton Power Station

KP/cac

Attachment: Licensee Event Report 2017-005-01

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)

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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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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 Clinton Power Station, Unit 1	2. DOCKET NUMBER 05000461	3. PAGE 1 OF 4
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4. TITLE
Automatic Reactor Scram During the Performance of Scram Time Testing As a Result of an Invalid Oscillation Power Range Monitor Growth Rate Trip

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
05	30	2017	2017	- 005	- 01	09	28	2017	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)(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 028	<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 Dale A. Shelton, Regulatory Assurance Manager	TELEPHONE NUMBER (Include Area Code) (217) 937-2800
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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 TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 30, 2017 at 2038 CDT, with the reactor at approximately 28% thermal power Clinton Power Station (CPS) experienced an automatic reactor scram while conducting scram time testing (STT). Plant systems responded as expected and functioned properly following the automatic scram. The automatic scram signal was generated by the Oscillation Power Range Monitor (OPRM) Growth Rate Algorithm (GRA). An evaluation confirmed that the reactor was operating in a very stable core condition and that the event did not occur due to an actual core thermal hydraulic instability. The cause of the event was that the OPRM GRA trip function design is unable to distinguish between plant response to system perturbations and onset of thermal-hydraulic instabilities. Interim actions were implemented to increase operating margin to trip setpoints to support reactor startup and completion of STT. They included a revision to a plant procedure to establish an operating strategy when performing STT in the OPRM enabled region, implementing a monitoring strategy to assess the effectiveness of the operating strategy and monitoring for expected plant response, and raising OPRM Amplitude and GRA set points. Planned corrective actions include working with the industry, as needed, to develop and implement an industry solution for the design of the OPRM GRA to prevent false, spurious trip signals. The automatic scram is reportable under 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in a manual or automatic 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
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		YEAR	SEQUENTIAL NUMBER	REV NO.
Clinton Power Station, Unit 1	05000461	2017	- 005	- 01

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 the text as [XX]

EVENT IDENTIFICATION

Automatic Reactor Scram During the Performance of Scram Time Testing As a Result of an Invalid Oscillation Power Range Monitor Growth Rate Trip

A. Plant Operating Conditions before the Event

Unit: 1 Event Date: May 30, 2017 Event Time: 2038
 Mode: 1 Mode Name: Power Operation Reactor Power: 028 percent

B. DESCRIPTION OF EVENT

On May 30, 2017 at 2038 hours CDT, Clinton Power Station (CPS) experienced an automatic reactor scram from 28 percent thermal power while performing control rod scram time testing (STT) per CPS procedure, CPS 9813.01, Control Rod Scram Time Testing, during startup from refueling outage C1R17. The automatic scram signal was generated by the Oscillation Power Range Monitor (OPRM) Growth Rate Algorithm.

Following the event, General Electric Hitachi (GEH) performed an evaluation of CPS reactor conditions and determined that the core decay ratio, a measure of reactor core stability, was very low (<0.3) which is indicative of a very stable core condition and consistent with the observed data. A review of OPRM data concluded that the event did not occur due to actual core thermal hydraulic instability. It is also concluded that core thermal limits were not challenged by this event.

CPS is licensed with the Detect and Suppress Option III reactor core stability solution which utilizes the Period Based Detection Algorithm. This provides detection of a power instability based on occurrence of a fixed number of consecutive neutron flux period confirmations and a relative power signal exceeding a specific set point. For CPS, the number of period confirmation counts is 14 and relative power set point is 1.12. Furthermore, the Option III stability solution includes a Growth Rate Algorithm (GRA) and an Amplitude Based Algorithm (ABA) that offer defense in depth by providing protection against unexpected power oscillation characteristics.



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Clinton Power Station, Unit 1	05000461	2017	- 005	- 01

NARRATIVE

Following the automatic trip, plant systems, structures, and components responded as designed and functioned properly. There were no complications from the event.

Interim actions were implemented to increase operating margin to trip setpoints to support reactor startup and completion of STT. They consisted of developing and implementing an operating and monitoring strategy when performing STT in the OPRM enabled region. This included wait times after scram time testing a control rod, utilizing single notch rod withdrawal, pausing after rod withdrawal past a Local Power Range Monitor (LRPM), additional identification of high worth control rods, and review of Average Power Range Monitor (APRM) and LPRM response. In addition, setpoints were raised for the GRA and ABA portion of the OPRMs.

The reactor was restarted on June 2, 2017 and control rod STT was completed without issue on June 4, 2017.

C. CAUSE OF EVENT

The cause of the event is that the OPRM GRA trip function design is unable to distinguish between plant response to system perturbations and onset of thermal-hydraulic instabilities.

D. SAFETY ANALYSIS

There were no safety consequences associated with the automatic scram. This event is reportable under the provisions of 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in a manual or automatic actuation of the reactor protection system. The condition of the reactor core at the time of the event was stable. Operator actions taken during STT and following the event were in accordance with plant procedures. Systems necessary to maintain the plant per Technical Specification requirements following the automatic plant trip performed as expected and remained available to perform their safety function.

This event report does not identify any safety system functional failures.



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Clinton Power Station, Unit 1	05000461	2017	- 005	- 01

NARRATIVE

E. CORRECTIVE ACTIONS

Interim actions were implemented to increase operating margin to trip setpoints to support reactor startup and completion of STT. These actions included:

- Completed a revision to a plant procedure to establish an operating strategy when performing scram time testing in the OPRM enabled region.
- Implemented a monitoring strategy to assess the effectiveness of the operating strategy and monitor for expected plant response.
- Raised the OPRM ABA and GRA set points.

In addition, CPS will work with the industry, as needed, to develop and implement an industry solution for the design of the OPRM GRA to prevent false, spurious trip signals.

F. PREVIOUS SIMILAR OCCURENCES

There are no previous similar occurrences associated with this event. CPS has not experienced a scram in the past related to the OPRM instrumentation.

G. COMPONENT FAILURE DATA

There was no component failure data associated with this event.