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FEB 14 2013



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

**SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 50-388/2012-003-00  
UNIT 2 LICENSE NO. NPF-22  
PLA-6974**

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**Docket No 50-388**

Attached is Licensee Event Report (LER) 50-388/2012-003-00. On December 16, 2012, at approximately 0156 hours, the Susquehanna Steam Electric Station (SSES) Unit 2 reactor automatically scrammed during the performance of quarterly Unit 2 main turbine control valve testing. This event was determined to be reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) for an event that resulted in the automatic actuation of the Reactor Protection System, Reactor Core Isolation Cooling and the High Pressure Coolant Injection system.

There were no actual consequences to the health and safety of the public as a result of these events.

No commitments were identified in this submittal.

A handwritten signature in dark ink, appearing to read "Jeff M. Helsel", is written over a faint, circular, embossed or stamped seal. The signature is fluid and cursive.

J. M. Helsel

Attachment: LER 50-388/2012-003-00

Copy: NRC Region I  
Mr. P. W. Finney, NRC Sr. Resident Inspector  
Mr. J. Whited, NRC Project Manager  
Mr. L. Winker, PA DEP/BRP

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

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 Records and FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@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

Susquehanna Steam Electric Station Unit 2

## 2. DOCKET NUMBER

05000388

## 3. PAGE

1 OF 4

## 4. TITLE

Unit 2 Automatic Reactor Scram While Performing Turbine Control Valve Surveillance Testing

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
12	16	2012	2012	- 003 -	00	02	14	2013	FACILITY NAME	DOCKET NUMBER <b>05000</b>
									FACILITY NAME	DOCKET NUMBER <b>05000</b>

## 9. OPERATING MODE

1

## 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)

- |   |   |  |  |
|---|---|--|--|
| <input type="checkbox"/> 20.2201(b)         | <input type="checkbox"/> 20.2203(a)(3)(i)   | <input type="checkbox"/> 50.73(a)(2)(i)(C)             | <input type="checkbox"/> 50.73(a)(2)(vii)        |
| <input type="checkbox"/> 20.2201(d)         | <input type="checkbox"/> 20.2203(a)(3)(ii)  | <input type="checkbox"/> 50.73(a)(2)(ii)(A)            | <input type="checkbox"/> 50.73(a)(2)(viii)(A)    |
| <input type="checkbox"/> 20.2203(a)(1)      | <input type="checkbox"/> 20.2203(a)(4)      | <input type="checkbox"/> 50.73(a)(2)(ii)(B)            | <input type="checkbox"/> 50.73(a)(2)(viii)(B)    |
| <input type="checkbox"/> 20.2203(a)(2)(i)   | <input type="checkbox"/> 50.36(c)(1)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(iii)              | <input type="checkbox"/> 50.73(a)(2)(ix)(A)      |
| <input type="checkbox"/> 20.2203(a)(2)(ii)  | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x)          |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2)        | <input type="checkbox"/> 50.73(a)(2)(v)(A)             | <input type="checkbox"/> 73.71(a)(4)             |
| <input type="checkbox"/> 20.2203(a)(2)(iv)  | <input type="checkbox"/> 50.46(a)(3)(ii)    | <input type="checkbox"/> 50.73(a)(2)(v)(B)             | <input type="checkbox"/> 73.71(a)(5)             |
| <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)(C)             | <input type="checkbox"/> OTHER                   |
| <input type="checkbox"/> 20.2203(a)(2)(vi)  | <input type="checkbox"/> 50.73(a)(2)(i)(B)  | <input type="checkbox"/> 50.73(a)(2)(v)(D)             | Specify in Abstract below<br>or in NRC Form 366A |

## 10. POWER LEVEL

98%

## 12. LICENSEE CONTACT FOR THIS LER

Facility Name

Brenda W. O'Rourke, Senior Engineer - Nuclear Regulatory Affairs

Telephone Number (Include Area Code)

(570) 542-1791

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
05	31	2013

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

On December 16, 2012, at approximately 0156 hours, the Susquehanna Steam Electric Station (SSES) Unit 2 reactor automatically scrambled during the performance of quarterly channel functional test of the turbine control valve (CV) fast closure channels of the Reactor Protection System (RPS). Both the High Pressure Cooling Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems automatically initiated and injected water into the reactor vessel. At approximately 0210 hours on December 16, 2012, a second reactor scram signal was received due to reactor water level lowering to +13 inches. This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A) for an event or condition that resulted in the automatic actuation of the RPS, and the HPCI and RCIC systems.

0156 Hours Scram: The probable direct cause of the unexpected Division 1 scram signal was due to a faulty subcomponent on the #1 Turbine CV. The as-found condition of one of the two 120VAC electrical connections to the #1 CV Fast Acting Solenoid Valve was not crimped properly. The root cause of the scram was SSES failed to incorporate industry best practices with other impacted work groups for half scram reduction. 0210 hours Scram: The cause of the second scram event is currently under investigation and will be reported in a supplement to this LER.

Completed corrective actions include: replacement of the Unit 1 CV #1 Fast Acting Solenoid Valve and Shutoff Valve and revision of Unit 1 and 2 quarterly turbine valve cycling surveillance procedures to require the use of an RPS test box. Planned corrective actions include: revise OE procedures to ensure condition reports are initiated when there is risk identified in OE that may impact SSES, and inspect all four Unit 1 Fast Acting Solenoid Valves for secure butt splice connections. There were no actual consequences to the health and safety of the public as a result of this event.

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

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Susquehanna Steam Electric Station Unit 2	05000388	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2012	--003--	00	

**NARRATIVE**

**CONDITIONS PRIOR TO THE EVENT**

Unit 1 - Mode 1, 100 percent Rated Thermal Power  
Unit 2 - Mode 1, 98 percent Rated Thermal Power

**EVENT DESCRIPTION**

On December 16, 2012, at approximately 0156 hours, the Susquehanna Steam Electric Station (SSES) Unit 2 reactor automatically scrammed during the performance of Technical Specification (TS) surveillance testing of the #2 turbine control valve (CV). The test being performed was the quarterly channel functional test of the turbine CV fast closure channels of the Reactor Protection System (RPS). At 0151 hours, the #4 CV was tested and a Division 2 half-scam signal was received and cleared as expected. At 0153, CV #1 was tested, but the test was aborted due to nail meter glare. At 0153 hours, the CV #1 tested was successfully completed. At 0155 hours, during testing of the #2 CV, a RPS half-scam was received as expected (specifically, the 'B' channel, Division 2 of RPS). Prior to the Division 2 scram signal clearing, an unexpected momentary Division 1 ('A' channel of RPS) scram signal was also received from the CV #1 fast closure signal, resulting in a full RPS reactor scram.

All control rods fully inserted, with two control rods inserting beyond position "00" following reset of the reactor scram. Both reactor recirculation pumps tripped at -38 inches. All containment isolations occurred as expected. Both the High Pressure Cooling Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems automatically initiated and injected water into the reactor vessel but were overridden by the control room operators once reactor water level was restored above the HPCI and RCIC initiation setpoints. The scram was reset to aid in preventing reactor vessel thermal stratification.

At approximately 0210 hours on December 16, 2012, a secondary scram occurred on low reactor water level (+13 inches). No control rod motion occurred, as all rods were inserted.

There were no safety relief valve actuations or emergency diesel generator starts during the event. Reactor pressure was controlled via turbine bypass valve operation. There were no structures, systems, or components that were inoperable at the start of the event that contributed to this event.

In accordance with 10 CFR 50.72(b)(2)(iv)(A) and 10 CFR 50.72(b)(2)(iv)(B), on December 16, 2012, a 4-hour ENS notification (# 48598) was made to the NRC for an event or condition that results in Emergency Core Cooling Systems (ECCS) discharge into the reactor coolant system as a result of a valid signal, and any event or condition that results in the actuation of the RPS when the reactor is critical, respectively. This event was also reportable as an 8-hour notification in accordance with 10 CFR 50.72(b)(3)(iv)(A) for any event or condition that resulted in a valid actuation of the RPS, and the HPCI and RCIC systems.

This LER is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A) for an event or condition that resulted in the automatic actuation of the RPS, and the HPCI and RCIC systems.

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**CAUSE OF THE EVENT**

**Scram #1:**

The probable direct cause of the unexpected Division 1 scram signal was due to a faulty subcomponent of the #1 Turbine CV. The as-found condition of one of the two 120VAC electrical connections to the #1 CV Fast Acting Solenoid Valve was not crimped properly. This would have resulted in a higher than normal connection resistance and subsequent less than designed power applied to the solenoid coil. Laboratory tests are expected to confirm this conclusion. PPL expects to have the results of the failure analysis by the end of February 2013.

The root cause of the event was that SSES failed to incorporate industry best practices with other impacted work groups (Operations) for half scram reduction. Specifically, Dresden OE (from 2000) regarding the station's success in reducing the number of half scram by using an RPS test box, and the 2005 Boiling Water Reactor Owners Group (BWROG) scram reduction effort, Recommendation #30 regarding the use of a test box to reduce RPS half-scram signals. An RPS test box allows testing of a scram contactor without actualizing the contactor and creating a half scram. SSES's evaluation of the above OE recommendations did not recognize the OE's applicability to operations surveillance test procedures.

The following two causal factor also contributed to the event:

Causal Factor 1 – Poor maintenance practices related to insulation stripping and connection crimping created resistance leading to less than designed power applied to the solenoid coil.

Causal Factor 2 – Failure to incorporate GE SIL 226 (from 1977) recommendations for adequate wait time between testing into the SSES Quarterly Turbine Valve Cycling surveillance procedures.

**Scram #2:**

The cause of the second scram event is currently under investigation and will be reported in a supplement to this LER.

**ANALYSIS / SAFETY SIGNIFICANCE**

**Actual Consequences**

All control rods inserted and both reactor recirculation pumps tripped at -38 inches. HPCI and RCIC both automatically initiated as expected. No steam relief valves opened.



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Potential Consequences

The Unit 2 risk significance and potential consequences for the initiating event experienced on December 16, 2012 due to an RPS automatic scram non-isolation event was less than 1E-06 for Core Damage Probability (CDP) and 1E-07 for Large Early Release Probability (LERP) significance thresholds as defined in NRC Inspection Manual Chapter (IMC) 609. These thresholds represent a Green significance level which is of "Very Low Safety Significance."

In summary, there were no actual consequences to the health and safety of the public as a result of the event.

**CORRECTIVE ACTIONS**

Key Completed Actions

- Revised the Unit 1 and 2 Quarterly Turbine Valve Cycling surveillance procedures to require the use of an RPS test box when performing Main Turbine Control Valve Testing.
- Replaced the Unit 1 CV #1 Fast Acting Solenoid Valve and Shutoff Valve.

Key Planned Corrective Actions

- Revise OE procedures to ensure condition reports are initiated when there is risk identified in OE that may impact SSES.
- During the next Unit 1 outage, inspect all four Fast Acting Solenoid Valves (FASV) for secure butt splice connections.
- Revise the Unit 1 and 2 Quarterly Turbine Valve Cycling surveillance procedures to require a 3-minute wait time between tests.
- Revise MT-GE-010 sections 5.20 and 5.21 to incorporate industry accepted tug test to ensure connection is mechanically secure.
- Evaluate additional Surveillance or Preventive Maintenance activities that do or could result in a half scram for use of a RPS Test Box.

Previous Similar Events:

None