



August 15, 2017

L-2017-144
10 CFR 50.73

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

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 2016-003-01
Date of Event: August 21, 2016
Generator Lockout Relay Actuation During Power Ascension Results in Reactor Trip

The attached supplement to Licensee Event Report 2016-003 is being submitted pursuant to the requirements of 10 CFR 50.73 to provide additional information related to the subject event.

Sincerely,

A handwritten signature in cursive script that reads "Daniel DeBoer".

Daniel DeBoer
Site Director
St. Lucie Plant

DD/rcs

Attachment

cc: NRC Region II Administrator
St. Lucie Plant NRC Senior Resident Inspector

| | | | |
|----------------------------------|---|---|----------------------------|
| NRC FORM 366 (06-2016) | U.S. NUCLEAR REGULATORY COMMISSION LICENSEE EVENT REPORT (LER) | APPROVED BY OMB: NO. 3150-0104 <small>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 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.</small> | EXPIRES: 10/31/2018 |
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|---|-------------------------------------|--------------------------|
| 1. FACILITY NAME St. Lucie Unit 1 | 2. DOCKET NUMBER 05000335 | 3. PAGE 1 OF 3 |
|---|-------------------------------------|--------------------------|

4. TITLE
Generator Lockout Relay Actuation During Power Ascension Results in Reactor 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 |
| 08 21 2016 | 2016 - 003 - 01 | 08 15 2017 | NA NA |

| | | | | |
|--------------------------|---|---|--|---|
| 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) |
| | <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) |
| 10. POWER LEVEL | <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) |
| 38% | <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

| | |
|---|--|
| NAME Richard Sciscente – Principal Engineer, Licensing | TELEPHONE NUMBER (Include Area Code) 772-467-7156 |
|---|--|

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURE | REPORTABLE TO EPIX |
|-------|--------|-----------|---------------|--------------------|-------|--------|-----------|--------------|--------------------|
| B | EL | 86 | G080 | YES | | | | | |

| | | | | |
|--|-------------------------------------|-------|-----|------|
| 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 |
| | | | | |

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

On August 21, 2016, during Unit 1 restart following a maintenance outage, an unexpected actuation of the Main Generator Inadvertent Energization Lockout Relay caused the main generator to trip, resulting in an automatic reactor trip. The generator lockout prevented the automatic transfer of station auxiliaries to the available startup transformer power, requiring the emergency diesel generators to start and power the safety related buses. Reactor coolant pumps normally powered through the non-safety buses were deenergized, and decay heat removal was via natural circulation and Auxiliary Feedwater. The lockout relay actuation was caused by a latent error introduced during a 2013 design modification where a wire was inadvertently removed from the circuit.

Corrective actions included restoration of the affected circuit and implementation of procedure guidance to verify the inadvertent energization relay state and to reset as required following Main Generator manual synchronization.

This licensee event report is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) for system actuations of the reactor protection system, the emergency diesel generators and the auxiliary feedwater system.

This event had no effect on the health and safety of the public.



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

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 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.

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|-------------------------|------------------|----------------------|-------------------|-----------------|
| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | |
| St. Lucie Unit 1 | 05000335 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER |
| | | 2016 | - 003 | - 01 |

NARRATIVE

Description of the Event

On August 21, 2016 St. Lucie Unit 1 was in in Mode 1 performing normal power ascension evolutions following a maintenance outage. At 1926 EDT when the main generator [EL] reached approximately 8000 amps and at 38% reactor power, unexpected actuation of the Main Generator Inadvertent Energization Lockout Relay [86:EL] caused the main generator to trip, resulting in an automatic reactor trip.

The reactor trip was complicated by the generator lockout preventing the automatic transfer of station auxiliaries to the available startup transformer power, requiring the emergency diesel generators to automatically start and power the safety related buses. Reactor coolant pumps normally powered through the non-safety buses were deenergized, and decay heat removal was via natural circulation and manual control of Auxiliary Feedwater. Due to the blocked automatic transfer to the available startup transformer power, the electric driven main feedwater pumps were not available until power to the non-safety related buses was restored.

Other than the generator lockout, all systems functioned as designed, and the plant stabilized in Mode 3.

Operators declared a Notice of Unusual Event (NUE). The declaration of the NUE was based on the lockout relay preventing the automatic transfer to available startup transformer power. The transfer of power was required to be performed manually by operators following verification of availability. Offsite power remained available at the switchyard throughout the event, and operators restored power to the safety and non-safety related buses from the startup transformers at 2036 and restarted reactor coolant pumps. The unusual event was terminated at 2125 hours following restoration of forced cooling within the reactor coolant system.

Unit 2 was unaffected and remained at 100% power.

Cause

The root cause of this event was a latent error introduced during a 2013 design modification when a wire for the inadvertent energization lockout relay reset circuit was incorrectly removed as part of a modification to the synchronization circuit. This modification allowed the relay to remain energized and undetected following manual synchronization to the grid.

Analysis of the Event

The generator lockout relay was energized due to a missing wire in the non-safety related protection relay circuit. The missing wire had been inadvertently removed during a modification of the automatic synchronization system components implemented in 2013 to restore the automatic synchronization capabilities of the main generator breakers. The wire that had been incorrectly removed was in a section of the circuit that was not intended to be modified, and this wire was not within the scope of the 2013 design modification. The missing wire caused the lockout relay circuit to remain armed after manual synchronization to the grid. The discrepant condition was not immediately detectable to control room operators.



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NARRATIVE

Prior to this event, Operators were performing normal power ascension evolutions following a maintenance outage. The Unit 1 main generator was manually synchronized to the electrical grid. Previous synchronizations since the 2013 modification had been performed using the automatic synchronization feature, which was not affected by the missing wire. Following the manual synchronization on August 21, 2016, the lockout relay circuit did not reset as designed but remained armed with a trip setpoint of 8000 amps through the main generator.

This licensee event report is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)." This event included automatic actuations of the reactor protection system and the 1A and 1B emergency diesel generators, and manual actuation of the auxiliary feedwater system.

Safety Significance

The loss of offsite power to onsite AC systems is a design basis analyzed condition; with back-up systems, off normal procedures and operator training used for mitigation.

UFSAR section 8.3, Onsite Power System, states that in the event of a complete loss of the normal offsite ac power sources, the station on-site emergency AC power system will be supplied by the on-site emergency diesel generators and station batteries. The loss of offsite power to the station auxiliaries is classified as an anticipated operational occurrence in UFSAR section 15.2.9. The plant response to this event was similar to the design response described in 15.2.9.

Additionally, UFSAR Table 10.5-3 indicates station compliance to General Design Criterion 44, to assure redundancy of components so that under more severe conditions safety functions can be performed assuming a single active component failure coincident with the loss of offsite power for certain events.

Corrective Actions to Prevent Recurrence

1. The removed wire for the lock out relay circuit was reinstalled.
2. Implemented procedure guidance to verify the inadvertent energization relay is reset prior to exceeding 8000 amps when synchronizing to the grid manually.

Failed Component

86/INAD/1790
Main Generator Inadvertent Energization Lockout Relay

Manufacturer

General Electric
Model: 12HEAG1B237X16

Previous Occurrence

No previous similar LERs.