



Indian Point Energy Center  
450 Broadway, GSB  
P.O. Box 249  
Buchanan, N.Y. 10511-0249  
Tel (914) 254-6700

John A. Ventosa  
Site Vice President

NL-12-086

June 12, 2012

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Stop O-P1-17  
Washington, D.C. 20555-0001

SUBJECT: Licensee Event Report # 2011-005-00-01, "Automatic Actuation of Emergency Diesel Generators and Auxiliary Feedwater Pumps Due to Undervoltage on 480 VAC Vital Buses Due to a Loss of Offsite Power During a Severe Storm" Indian Point Unit No. 3  
Docket No. 50-286  
DPR-64

Reference: 1. LER-2011-005-00 submitted by letter NL-11-111 dated October 18, 2011

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2011-005-01. The attached LER is a revision to an LER submitted on October 18, 2011 (Reference 1), that identified an event where Emergency Diesel Generators and Auxiliary Feedwater Pumps automatically actuated, which is reportable under 10 CFR 50.73(a)(2)(iv)(A). This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP2-2011-04045. The root cause was identified as indeterminate. Vendor testing of the ground grid was a corrective action to be performed. As a result of the ground grid testing the cause was identified. This LER revision incorporates the applicable changes from the revised root cause analysis.

There are no new commitments identified in this letter. Should you have any questions regarding this submittal, please contact Mr. Robert Walpole, Manager, Licensing at (914) 254-6710.

Sincerely,

A handwritten signature in black ink, appearing to read "John A. Ventosa".

JAV/cbr

cc: Mr. William Dean, Regional Administrator, NRC Region I  
NRC Resident Inspector's Office, Indian Point 3  
Mrs. Bridget Frymire, New York State Public Service Commission  
LEREvents@inpo.org

JE22  
MM

## LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this mandatory collection request: 50 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 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to 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: INDIAN POINT 3

2. DOCKET NUMBER  
05000-2863. PAGE  
1 OF 5

4. TITLE: Automatic Actuation of Emergency Diesel Generators and Auxiliary Feedwater Pumps Due to Undervoltage on 480 VAC Vital Buses Due to a Loss of Offsite Power During a Severe Storm

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
8	19	2011	2011-	005	- 01	06	11	2012		05000
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"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(iii) <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> 50.73(a)(2)(viii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(ix)(A) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71(a)(4) <input type="checkbox"/> 73.71(a)(5) <input type="checkbox"/> OTHER				
10. POWER LEVEL  100%			Specify in Abstract below or in NRC Form 366A							

## 12. LICENSEE CONTACT FOR THIS LER

NAME  
Christopher Ingrassia, System EngineerTELEPHONE NUMBER (Include Area Code)  
(914) 254-7047

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	CC	BKR	W120	Yes	X	EA	BKR	W120	Yes

## 14. SUPPLEMENTAL REPORT EXPECTED

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

## 15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

## 16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced type written lines)

On August 19, 2011, during a severe thunderstorm, Emergency Diesel Generators (EDGs) 32 and 33 automatically actuated and loaded onto 480 volt buses 5A and 6A as a result of undervoltage due to a loss of 138 kV offsite power feeder 95331. 480 volt buses 2A and 3A remained energized from the Unit Auxiliary Transformer (UAT) which is connected to the Main Generator. As a result of the 480 volt bus undervoltage, the 32 and 33 Auxiliary Feedwater pumps (AFWP) auto started (Non-SI Blackout Logic). All EDGs and AFWPs operated as designed. A load reduction to approximately 74 % power was required due to the loss of condenser vacuum caused by the loss of three Circulating Water Pumps. The direct cause of the event was loss of power to 480 volt safeguards buses 5A and 6A due to a trip of the 138 kV Primary Pilot Wire relay (87L1/138) that isolated the 138 kV feeder 95331 to the Station Auxiliary Transformer. The root cause was the 138 kV Primary Pilot Wire System is susceptible to the maximum ground potential rise (GPR) based on the original design. The susceptibility to GPR is due to 1) the calculated worst case GPR is higher than the insulating rating of the pilot wires, 2) the wires being utilized between Unit 3 138 kV Control House and the Buchanan switchyard are not twisted pair, 3) The pilot wire system was not provided with equipment to protect against GPR, 4) The insulation system of the pilot wire is degraded. Corrective actions included restoration of feeder 138 kV 95331 to service and return of 480 volt buses 5A and 6A to normal feeds, re-alignment of EDGs for unit operation and securing of the 32 and 33 AFWPs and alignment for automatic operation. Enhancements will be implemented to the Station Grounding Plan, and the 138 kV and 345 kV pilot wire systems replaced. The event had no significant effect on public health and safety.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2011	- 005	- 01	2 OF 5

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

Note: The Energy Industry Identification System Codes are identified within the brackets {}.

DESCRIPTION OF EVENT

On August 19, 2011, during a severe thunderstorm, at approximately 18:05 hours, while at 100% steady state reactor power, Emergency Diesel Generators (EDGs) {EK} 32 and 33 automatically actuated and loaded as a result of an undervoltage on 480 Volt safeguards buses {ED} 5A and 6A due to a loss of 138 kV offsite power to 6.9 kV buses 5 and 6. The loss of power to the 480 volt buses also resulted in an automatic start of the 32 and 33 Auxiliary Feedwater Pumps (AFWP) (Non-SI Blackout Logic). The 480 volt safeguard buses 2A and 3A remained energized as 6.9 kV buses 2, and 3 as well as 1 and 4 were energized from the Unit Auxiliary Transformer (UAT) {XFMR} which is connected to the Main Generator {TB}. The event was recorded in the Indian Point Energy Center Corrective Action Program (CAP) as CR-IP3-2011-04045.

The loss of normal offsite power was a result of the trip of the 138 kV Primary Pilot Wire relay (87L1/138) {87}. A trip of relay 87L1/138 trips the Station Auxiliary Transformer (SAT) primary lockout relay (LOR) 86/STP {86}. LOR 86/STP trips 6.9 kV circuit breakers ST5 and ST6 along with 138 kV circuit breaker BT5-6. The opening of these breakers de-energized 6.9 kV buses 5 and 6 and their respective 480 volt safeguards buses 5A and 6A. The automatic actuations were per design for a loss of power to 480 volt buses 5A and 6A (Non-SI Blackout logic). The plant responded normally and all parameters remained within operating limits except two battery chargers (BCs) {EJ} were declared inoperable, three of six circulating water (CW) {KE} pumps tripped and their associated condenser {SG} vacuum was partially lost, and the 32 Component Cooling Water Pump (CCWP) {CC} failed to auto start on low pressure following the bus stripping of the 31 and 33 Component Cooling Water Pumps. The loss of the BCs is an expected condition for a loss of offsite power (LOOP). Three CW pumps tripped verses two due to the pre existing condition of the 32 CW pump being in standby Load Commutated Inverter (LCI) drive. In addition, 480 volt circuit breaker 52/5A failed to close while restoring 138 kV power. On August 19, 2011, at approximately 18:05 hours, TS 3.8.1 (AC Sources-Operating) was entered for one offsite circuit inoperable, and TS 3.8.4 was entered for 31 and 32 battery charges inoperable due to loss of buses 5A and 6A. As TS 3.8.4 does not allow for separate entries and does not have a condition for two inoperable BCs, TS 3.0.3 was entered. At approximately 18:09 hours, commenced load reduction for loss of condenser vacuum. At approximately 18:47 hours, re-energized the 6.9 kv buses 5 and 6 from 13.8 kV offsite power. At 19:02 hours, TS 3.0.3 was exited when the 31 and 32 BCs and static Inverters were returned to service. At 19:05 hours, secured the 32 and 33 AFWPs and aligned them for auto operation. At 19:38 hours the 32 and 33 EDGs were re-aligned for unit operation and placed in Auto. On August 20, 2011, at 3:00 hours, performed electrical verification of offsite power sources and AC distribution. At 4:05 hours, restored 138 kV power and exited TS 3.8.1 Condition A for offsite sources inoperable.

The Indian Point Entergy Center (IPEC) uses a HCB-1 pilot wire protection system manufactured by Westinghouse/ABB {W120}. For redundancy the protection includes independent primary and backup systems. The pilot wire protection compares the current on both ends of the feeder (Buchanan Switchyard and Indian Point) to each other. This comparison is used to detect fault conditions on the feeder. When a fault is detected within the zone of protection, both ends of the feeder are cleared (circuit breakers tripped open), thereby de-energizing the feeder and clearing the fault. Investigations determined that only the IPEC 138 kV Primary Pilot Wire relay tripped. For this event, relay 87L1/138 tripped its associated LOR (86/STP), thus tripping breakers ST5, and ST-6 (6.9 kV breakers) and BT5-6 (138 kV breaker). The Buchanan switchyard 138 kV Primary Pilot Wire relay did not trip therefore breaker BT2-6 remained closed and the feeder remained energized up to 6.9 kV breakers ST5 and ST6.

**LICENSEE EVENT REPORT (LER)**

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2011	- 005	- 01	3 OF 5

The trip of the IPEC Primary Pilot Wire relay (87L1/138) is being considered a relay misoperation and not a fault. Investigation did not identify signs of an actual fault and no other protective relays were found tripped.

The plant turbine generator is the main source of 6.9 kV auxiliary electric power during on-line operation. Power to the auxiliaries on 6.9 kV buses 1-4 is supplied by the UAT which is connected to the main generator. Power to auxiliaries on 6.9 kV buses 5 and 6 during on-line operation is supplied by the SAT which is connected to 138 kV offsite power sources. Alternatively, buses 5 and 6 can be powered from a 13.8 kV offsite power source. The on-site AC power distribution system includes 480 Volt AC buses 5A, 6A, 2A and 3A which are divided into three safeguards power trains.

The three safeguards power trains are train 5A (Bus 5A and EDG-33), Train 6A (Bus 6A and EDG-32), and Train 2A/3A (Bus 2A and 3A and EDG-31). The 480 Volt AC safeguards buses receive power from 6.9 kV bus sections through their respective Station Service Transformer {FK} (SST) or from associated on-site EDGs. The 480 Volt safeguard buses are designed with protection against undervoltage (UV) and degraded grid voltage (DGV) using relays that sense UV or DGV conditions.

An extent of condition review was performed. There was one protective relay actuation during the past two years attributed to lightning (LER-2009-006). During the past review period, there have been lightning storms in the area but they did not result in relay operation. It was concluded that further protective relay misoperations could potentially occur at Unit 3 during lightning storms.

An evaluation of the grounding at IPEC was conducted in October 2011 and documented in Engineering Report IP-RPT-11-00046. The evaluation determined the station is susceptible to high ground potential rises (GPR) during system faults and lightning events. The worst case GPR for a system fault was calculated to be approximately 1550 volts. While not calculated as a part of the study, the GPR from a lightning strike would be much higher than from a system fault. This magnitude of GPR would make the pilot wires susceptible to lightning induced events since it is greater than the insulation rating of the pilot wires (600V). The study did not identify any material deficiencies with the Station Grounding {FC} from its original design that result in the high GPR. The susceptibility of the 138kV Primary Pilot Wires to GPR is also increased by the following: 1) The wires being utilized between the Unit 3 138kV Control House and the Buchanan switchyard are not twisted pair. Twisted pair wiring is recommended by the vendor and are less susceptible to GPR and induced voltages, 2) The pilot wire system {FK} was not provided with equipment to protect against GPR. Equipment (e.g., neutralizing reactors) can be applied to the pilot wire system to protect it from GPR that exceeds its insulation rating. Use of neutralizing reactors for the IPEC pilot wires which use DC monitoring relays ensure both relays remain at station ground potential, 3) The insulation of the pilot wire is degraded. Reduced insulation resistance could make the wires more susceptible to GPR during a lightning event.

**Cause of Event**

The direct cause of the transient was loss of power to 480 volt safeguards buses 5A and 6A due to a trip of the 138 kV Primary Pilot Wire relay (87L1/138) that isolated the 138 kV feeder 95331 to the Station Auxiliary Transformer {FK}. The root cause was the 138 kV Primary Pilot Wire System is susceptible to the maximum ground potential rise (GPR) based on the original design. The susceptibility to GPR is due to 1) the calculated worst case GPR is higher than the insulating rating of the pilot wires, 2) the wires being utilized between Unit 3 138 kV Control House and the Buchanan switchyard are not twisted pair, 3) The pilot wire system was not provided with equipment to protect against GPR, 4) The insulation system of the pilot wire is degraded.

**LICENSEE EVENT REPORT (LER)**

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2011	- 005	- 01	4 OF 5

**NARRATIVE** (If more space is required, use additional copies of NRC Form 366A) (17)

**Corrective Actions**

The following corrective actions have been or will be performed under the Corrective Action Program (CAP) to address the cause of this event.

- Completed a walkdown and inspection of feeder 95331 from the SAT to breaker BT2-6.
- Completed restoration of feeder 138 kV 95331 to service and return of 480 volt buses 5A and 6A to normal feeds, re-alignment of 32 and 33 EDGs for unit operation and placement in Auto, securing of the 32 and 33 AFWPs and alignment for automatic operation.
- Troubleshooting of pilot wire and associated relays was performed.
- Ground grid testing and evaluation was conducted in October 2011 and documented in Engineering Report IP-RPT-11-00046.
- The 138 kV and 345 kV pilot wire systems will be replaced.
- Enhancements identified in Engineering Report IP-RPT-11-00046 will be implemented to the Station Grounding Plan.

**Event Analysis**

The event is reportable under 10CFR50.73(a)(2)(iv)(A). The licensee shall report any event or condition that resulted in the manual or automatic actuation of any system listed in 10CFR50.73(a)(2)(iv)(B). The systems to which the requirements of 10CFR50.73(a)(2)(iv)(A) apply include (#8) Emergency AC electrical power systems including Emergency Diesel Generators and (#6) Auxiliary Feedwater System. The actuation and start of the EDGs and AFWPs due to undervoltage on buses 5A and 6A from the loss of offsite power meets the reporting criteria. Because plant shutdown was not completed for TS 3.0.3 as a result of inoperable BC-31 and BC-32, the TS 3.0.3 entry is not reportable under 10CFR50.73(a)(2)(i)(A).

The loss of the offsite feeder did not result in the failure of any primary system to function properly. The last time the 32 CCW pump was tested was during the Appendix R test on July 1, 2011. During the time of inoperability, the 31 and 33 CCW Pumps were operable therefore, there was no TS violation. There was no safety system functional failure reportable under 10CFR50.73(a)(2)(v) as the minimum required safeguards components were available. In accordance with reporting guidance in NUREG-1022, an additional random single failure need not be assumed in that system during the condition.

**Past Similar Events**

A review was performed of Licensee Event Report's (LERs) for the past three years for any events reporting inadvertent EDG or AFWs actuation as a result of a lightning strike. One LER was identified, LER-2009-009 reported an automatic reactor and turbine trip due to actuation of the generator protection system lockout relay during a severe storm with heavy lightning. The cause was indeterminate but the ground mat was a possible cause. A corrective action (CA) was to evaluate the ground grid condition for adequacy requiring testing by a vendor. The testing is expected to be completed by the end of 2011.

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000-286	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 5
		2011	- 005	- 01	

## NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

## Safety Significance

This event had no significant effect on the health and safety of the public. There were no actual safety consequences for the event because there were no accidents and the emergency AC power system was available to power required safeguards buses. Power from alternate offsite sources and onsite emergency power were available and the actuation circuitry and EDGs performed in accordance with design and minimum safeguards power was available to power safety loads. All plant parameters responded normally for the transient and remained within operating limits.

There were no significant potential safety consequences of this event. This event was bounded by the analyzed event described in UFSAR Section 14.1.12 (Loss of all AC Power to the Station Auxiliaries). The plant is designed for a LOOP and has safety related emergency AC power by EDGs to start on a 480 VAC safety bus undervoltage and power the 480 VAC safety buses (2A/3A, 5A, 6A). Results of the analysis show that for the loss of offsite power to the station auxiliaries all safety criteria are met. The Auxiliary Feedwater capacity is sufficient to prevent water relief through the pressurizer relief and safety valves assuring the reactor coolant system (RCS) is not over pressurized. The analysis also demonstrates that sufficient long term heat removal capability exists by the natural circulation capability of the RCS following reactor coolant pump coast down to prevent fuel or clad damage. The loss of BCs is an expected condition for a LOOP which results in the motor control centers powering the BCs from bus 5A and 6A to trip and require reset. There are four BCs and an installed spare in BC-35 which can supply BC loads for one of the 31-34 BCs. Each battery has been sized to carry its expected shutdown loads for a period of 2 hours following a plant trip and a loss of all AC power. All equipment supplied by the batteries were maintained operable with minimum expected voltages at the battery terminals during the 2 hours. During this event the 31 BC and 32 BC were unavailable for approximately 57 minutes (discovery at 18:05 hours, restoration at 19:02 hours) which is within the battery design capability of 2 hours. When the 32 CCW pump failed to start the 31 and 33 CCW pumps auto started per design during the Non-SI Blackout sequence so there was no loss of CCW.

In addition, there is an independent station blackout (SBO)/Appendix R diesel generator and associated switchgear necessary to achieve and maintain cold shutdown conditions independent of the normal safeguards and instrumentation power supplies which also functions as the alternate AC power supply operated from outside the Control Room.