Entergy

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**J. E. Pollock**
Site Vice President

May 27, 2008
Indian Point Unit No. 2
Docket No. 50-247
NL-08-076

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

Subject: Licensee Event Report # 2008-002-00, "Technical Specification Prohibited Condition Due to Exceeding the Allowed Completion Time for an Inoperable Engineered Safety Feature Actuation System Automatic Actuation Logic and Actuation Relay Caused by Improper Relay Wiring"

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2008-002-00. The attached LER identifies an event where there was a Technical Specification prohibited condition that exceeded the Allowed Completion Time for an Inoperable Engineered Safety Feature Actuation System Automatic Actuation Logic and Actuation Relay, which is reportable under 10 CFR 50.73(a)(2)(i)(B) . This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP2-2008-01482.

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) 734-6710.

Sincerely,

J. E. Pollock
Site Vice President
Indian Point Energy Center

cc: Mr. Samuel J Collins, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 2
Mr. Paul Eddy, New York State Public Service Commission
INPO Record Center

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NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 8/31/2010

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

# LICENSEE EVENT REPORT (LER)

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

| 1. FACILITY NAME: | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
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**4. TITLE:** Technical Specification Prohibited Condition Due to Exceeding the Allowed Completion Time for an Inoperable Engineered Safety Feature Actuation System Automatic Actuation Logic and Actuation Relay Caused by Improper Relay Wiring

| 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 |
| | | | | | | | | | | 05000 |
| 3 | 28 | 2008 | 2008 | 002 - | 00 | 5 | 27 | 2008 | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | | 05000 |

**9. OPERATING MODE**

6

**10. POWER LEVEL**

0%

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

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

| NAME | TELEPHONE NUMBER *(Include Area Code)* |
|---|---|
| Anthony King, Design Engineer | (914) 271-7477 |

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

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| B | JE | RLY | W120 | Y | | | | | |

**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 March 27, 2008, during Safety Injection (SI) and Black Out testing, with the unit shutdown for a refueling outage, a 480 V breaker {BKR} on Safeguards Bus 2A {ED} did not close during a surveillance test. Troubleshooting discovered that SI Logic Train A, relay 3-2, contact 17-21, when closed had high contact resistance. Relay 3-2 is part of the Engineered Safety Feature Actuation System (ESFAS), whose design function is to actuate safeguards equipment required to mitigate an accident. On March 28, 2008, troubleshooting discovered relay 3-2 did not have wires associated with 23 Fan Cooler Unit (FCU) Breaker connected to it in accordance with plant design. The wires were found landed on an adjacent SI Logic Train A relay 3-3. Subsequently equivalent wires on the SI Logic Train B relays, 3-12 and 3-13, were discovered to be similarly mis-wired. The incorrect wiring associated the 23 FCU with Bus 5A rather than its assigned Bus 2A. If power was lost on Bus 5A during an SI, the mis-wiring would prevent the automatic start of the 23 FCU even though its assigned Bus 2A was energized. The apparent cause of the circuit anomaly was an improperly implemented design change by the original plant installer in 1973. The design schematic was properly revised by the design change but the wiring lists and plant were not. The specific cause can not be determined due to the passage of time. Corrective actions included re-wiring of relay contacts in accordance with re-verified design documents. An extent of condition was performed and no additional wiring anomalies were identified. The event had no effect on public health and safety.

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**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 March 27, 2008, with the unit shutdown for a refueling outage (Mode 5), a 480 V breaker {BKR} on Safeguards Bus 2A {ED} did not close during a surveillance test.

Troubleshooting on March 28, 2008, to evaluate this failure, while in Mode 6, identified a wiring problem with the 23 Fan Cooler Unit (FCU) {BK}. The SI logic train A {JE} had two relays (i.e., 3-2 and 3-3) {RLY} with wires associated with 23 FCU on terminal points associated with 480 V bus 5A (relay 3-3) rather than bus 2A (relay 3-2), the power supply for 23 FCU. These relays act to sequence FCUs onto the bus following a loss of offsite power and have restraining contacts which prevent them from sequencing FCUs if there is an undervoltage signal on the bus. The SI logic train B had the same wiring issue associated with sequencing relays 3-12 and 3-13.

The identified wiring anomaly with a loss of offsite power and a single failure to power bus 5A, would result in less than minimum safeguards equipment because 21 FCU, 22 FCU, and 21 Containment Spray pump {BE} would not have automatically started per design (as well as preventing the automatic loading of 23 FCU).

Engineering review of drawings found discrepancies between the present schematics and the Rack G1 and G2 wire lists. Plant schematics show the desired configuration (i.e., relays 3-2 and 3-12 wired into the 23 FCU control circuit so they will only be restrained upon a loss of power to Bus 2A). The wire lists showed the as found conditions (i.e., connections for 23 FCU on relays 3-3 and 3-13, which are both associated with bus 5A). Westinghouse schematics 449B444 Sheet 47, Rev. 6 (1970) showed the as found condition while Revision 8 (1973) showed the desired condition.

Engineering concluded that an Engineering Change Notice (ECN) was made in accordance with the process in effect by the original installer (Westinghouse), to either Revision 7 (Westinghouse ECN-9642) or Revision 8 (Westinghouse ECN-9823), but not reflected on the wiring lists or in the as-built plant.

The present surveillance tests for this circuitry (Periodic Test 2-PT-R013, "Safety Injection," and 2-PT-R014, "Automatic Safety Injection System Electrical Load and Blackout Test") would not have identified this wiring error since the relays in each logic train are normally actuated simultaneously. The purpose of the functional testing is to verify that the associated devices and circuits function, not to separately actuate individual relays to ensure that only the components associated with a particular relay actuated.

In 1996 the NRC issued Generic Letter 96-01, which required all nuclear plants ensure that all safety related logic including parallel contacts was tested. The anomaly that occurred in the 23 FCU control circuit was not discovered while this program was being conducted because the evaluation was focused on ensuring that all safety related logic, including parallel contacts, was functionally tested. The nature of this wiring anomaly is that it is possible for all devices and contacts to be tested and the anomaly would still not be detected.

An extent of condition (EOC) review for similar wiring errors, which could have occurred on other relays, was performed to provide reasonable assurance that the wiring problem found in the 23 FCU control circuit is an isolated case. The EOC also considered wiring anomalies at unit 3. The results demonstrate the anomaly is an isolated case. Some issues limited to minor drawing discrepancies with no impact on the operating plant were identified.

Cause of Event

The apparent cause of the event was an inadequately processed engineering design change (ECN) by the original installer in 1973, which did not revise wiring diagrams used to install wiring for the control circuits associated with 23 FCU. The apparent contributing cause was the failure to adequately test the circuitry induced by the failure to change the wire lists during preoperational testing. The details of the event are not recoverable due to the passage of time.

Corrective Actions

The following corrective actions have been performed under Entergy's Corrective Action Program to address the cause and prevent recurrence:

- The appropriate relay contacts for 23 FCU were re-wired in accordance with re-verified design documents and satisfactorily tested.
- An extent of condition inspection was performed and no additional wiring anomalies were identified.
- The process at IPEC was assessed for the same potential. The Entergy Nuclear engineering change (EC) and engineering change notice (ECN) process, as described in EN-DC-115 "Engineering Change" and EN-DC-116 "Engineering Change Installation" require review and design verification (if safety related) of all documents. All affected active drawings are marked-up and provided to the installer including wiring diagrams as well as schematics. The installers work to wiring drawings, while testing normally is developed using schematics. As such, this usually provides a cross check between the two types of drawings. EN-DC-117 "Post Modification Testing and Special Instructions" requires that modifications be tested "under all configurations, even those which may not "normally" be expected to occur. This includes testing all functions of the affected portion of the system." The Return to Service and Closeout process of EN-DC-118, 'Engineering Change Closure', provides a check that all installation and testing requirements have been met prior to placing the modified equipment back into service.

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

Event Analysis

The event is reportable under 10 CFR 50.73(a)(2)(i)(B), operation or condition which is prohibited by the plant Technical Specification (TS). TS 3.3.2, requires Safety Injection, Automatic Actuation Logic and Actuation Relays to be OPERABLE in modes 1, 2, 3 & 4. The required relays were not operable since they would not have performed their required function assuming a single failure of one diesel to supply power to bus 5A and loss of offsite power during a design basis accident. In this scenario bus 2A is available but the associated 23 FCU can not receive an automatic start as a result of its actuating relay being restrained due to no power to bus 5A.

The relays automatically actuate the Fan Cooler Units. TS 3.6.6, "Containment Spray System and Containment Fan Cooler Unit (FCU) System," LCO requires two trains of containment spray and three trains of FCUs OPERABLE in modes 1, 2, 3 & 4. The required FCU trains would not have performed the required function assuming a single failure of one diesel to supply power to bus 5A and loss of offsite power during a design basis accident. In this scenario the 5A train is unavailable and the 2A train is degraded since the 23 FCU does not receive a start. The 23 FCU is however available for manual start.

No safety system functional failure (SSFF) occurred. A SSFF could occur if all power was lost to bus 5A. This would result in no power to the 21 and 22 FCU as well as the 21 Containment Spray Pump. It would also result in relay 3-3 and 3-13 not actuating the 23 FCU on bus 2A. No SSFF has occurred because there has been no reported loss of offsite power to bus 5A concurrent with a failure of the capability to power bus 5A with its assigned EDG during times applicable safeguards equipment were required to be operable. In accordance with the guidelines of NUREG-1022, an additional random single failure does not have to be assumed in that system for reportability.

PAST SIMILAR EVENTS

A review was performed of Licensee Event Reports (LERs) for the past three years for any events that involved mis-wiring of logic relays or loss of emergency bus. No LERs were identified that reported similar failures.

SAFETY SIGNIFICANCE

This event had no effect on the health and safety of the public. There were no actual safety consequences for the event because there were no accidents requiring the affected safety equipment during the time of the anomaly. However, if an event had occurred with the condition mentioned above (loss of bus 5A), then minimum safeguards equipment would not have automatically started as required by design. The option for FCU manual start was always available to mitigate the consequences of this postulated scenario. A risk assessment evaluated the condition with 23 FCU breaker out of service and determined there is no measureable impact on Core Damage Frequency (CDF). The incremental CDF change of 1.38E-8 events per year resulted in a CDF of 1.7887E-5 events per year from a CDF of 1.7874E-5 events per year.