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J. E. Pollock
Site Vice President

NL-09-103

August 7, 2009

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

SUBJECT: Licensee Event Report # 2009-004-00, "Loss of Single Train 23 Charging Pump Required for Remote Plant Shutdown From the Control Room Due to a Failure of a Pump Internal Check Valve"
Indian Point Unit No. 2
Docket No. 50-247
DPR-26

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2009-004-00. The attached LER identifies an event where the Technical Specification 3.3.4 Remote Shutdown safety function for single train 23 charging pump was inoperable thereby not available for remote shutdown from the control room, which is reportable as a safety system functional failure under 10 CFR 50.73(a)(2)(v)(A). This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP2-2009-02376.

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,

Patrick W. Conway for J. Pollock
JEP/cbr

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
LEREvents@inpo.org

JEP22
NPR

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 2 | 2. DOCKET NUMBER 05000-247 | 3. PAGE 1 OF 4 |
|---|--------------------------------------|--------------------------|

4. TITLE: Loss of Single Train 23 Charging Pump Required for Remote Plant Shutdown From the Control Room Due to a Failure of a Pump Internal Check Valve

| 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 |
| 6 | 23 | 2009 | 2009 | 004 | 00 | 8 | 07 | 2009 | FACILITY NAME | DOCKET NUMBER 05000 |
| | | | | | | | | | FACILITY NAME | DOCKET NUMBER 05000 |

| | | | | |
|------------------------------------|---|---|---|---|
| 9. OPERATING MODE 1 | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: <i>(Check all that apply)</i> | | | |
| 10. POWER LEVEL 100% | <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 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 checked="" 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 or in NRC Form 366A | | | |

12. LICENSEE CONTACT FOR THIS LER

| | |
|--|--|
| NAME Tat Chan, Sr. System Engineer | TELEPHONE NUMBER <i>(Include Area Code)</i> (914) 734-6873 |
|--|--|

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 | CB | V | U055 | Y | | | | | |

| | | | | |
|---|-------------------------------------|-------|-----|------|
| 14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES <i>(If yes, complete 15. EXPECTED SUBMISSION DATE)</i> <input checked="" type="checkbox"/> NO | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
| | | | | |

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

On June 23, 2009, the 23 Charging Pump was removed from service after operators observed decreased pressureizer level and degraded output flow. The 21 charging pump was placed in service and the 23 Charging Pump was declared inoperable and Technical Specification (TS) 3.3.4 (Remote Shutdown) Condition A was entered. The 23 Charging Pump is a function specified in TS Basis Table 3.3.4-1 for reactor coolant system (RCS) inventory control. The inoperable 23 Charging Pump resulted in failure to meet the specified safety function of TS 3.3.4. The apparent cause of the degraded pump flow was a failure of one of ten internal check valves. The cause of the valve failure was a random event. This failure and previous failures were not confined to a specific location within the pump; are independent of service life; and independent of different specified valve materials. Corrective actions included replacement of the failed internal check valve and remaining pump internal check valves. The event had no significant 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 June 23, 2009, while at 100% steady state reactor power, at approximately 18:23 hours, control room (CR) operators started the 21 Charging Pump {CB} after observing decreased pressurizer {AB} and Volume Control Tank (VCT) {CB} level due to degraded 23 Charging Pump outlet flow. The 23 Charging Pump was removed from service and declared inoperable due to its inability to maintain pressurizer level. At 18:23 hours, Technical Specification (TS) 3.3.4 (Remote Shutdown) Condition A was entered. The 23 Charging Pump is credited in TS Basis Table 3.3.4-1 for reactor coolant system (RCS) {AB} inventory control. The inoperable 23 Charging Pump results in a failure to meet the specified safety function of TS 3.3.4 and meets the reporting criteria of 10CFR50.72(b)(3)(v)(A) for a condition that could have prevented the fulfillment of a safety function needed to shut down the reactor and maintain it in a safe shutdown condition. At 20:35 hours, an 8-hour non-emergency notification was made to the NRC for a safety system functional failure (EN #45152). The condition was recorded in the Indian Point Energy Center (IPEC) Corrective Action Program (CAP) as CR-IP2-2009-02376.

Troubleshooting for the cause of the 23 Charging Pump degraded capacity was initiated. The capacity of the pump was degraded by approximately 20 percent. The investigation concluded the 23 charging Pump degraded capacity was a result of failed internal check valve {V} assembly. A review was performed of the history of Charging Pump failures due to internal check valves. The review determined that internal check valve failures have occurred during past operation at Indian Point and other nuclear facilities that use similar equipment. The failures appear to be random based on the following: 1) failures of internal check valves were not confined to a specific location within the pump, 2) internal check valve failures appear to be independent of service life as failures have occurred over a wide range of service life, 3) failure of the internal check valves are independent of the different specified valve materials used. Fatigue life of the material does not appear to be a factor. As a result of previous internal check valve failures, the Charging Pump packing procedure (0-PMP-413-CVCS) was enhanced to require inspection of the pump internal check valves for signs of degradation. The enhanced procedure has identified previous early stages of check valve degradation which has allowed corrective actions to be initiated prior to pump capacity degrading to an inoperable condition.

There are three variable speed motor driven positive displacement charging pumps that take suction from the Volume Control System Tank (CVCT) and discharge to the reactor coolant system (RCS) and reactor coolant pump (RCP) shaft seals. The pumping action is produced in a single stage using spring-loaded poppet type suction and discharge valves internal to the pump which act as check valves. Each pump has a capacity of 98 gpm but the normal flow for one pump of 87 gpm is sufficient to supply the RCP seals and charging flow to the RCS. The charging pumps were originally manufactured by Union Pump Company {U055}.

The Control Room (CR) {NA} is designed for an unlikely event that the CR becomes inaccessible and operators are required to establish control and shutdown of the plant remote from the CR. The remote shutdown function provides designated equipment at appropriate locations outside the CR with the capability to promptly shut down and maintain the unit in a safe condition in Mode 3. The remote shutdown TS LCO provides the operability requirements of the instrumentation and controls necessary to place and maintain the unit in Mode 3 from a location other than the CR.

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The instrumentation and controls are identified in TS Basis Table B 3.3.4-1 and include the single train 23 Charging Pump local/remote transfer switch. Although the instrumentation and control was functioning, the function of reactor coolant system (RCS) inventory control was considered inoperable as a result of the degraded 23 Charging Pump capacity.

As there are only a total of six positive displacement pumps at Indian Point (units 2 and 3) that have internal check valves, no additional extent of condition was considered warranted.

The Cause of Event

The apparent cause of the inability to maintain pressurizer level program band was due to a reduction in the capacity of the 23 Charging Pump. The reduced capacity was due to the failure of one of ten internal check valve assemblies associated with the 23 charging Pump. The cause of the internal check valve failure was indeterminate. The failure of the charging pump internal check valve appears to be random. Previous failures of charging pump internal check valves have not been confined to a specific location within the pump; have been independent of service life; and have been independent of different specified valve materials. Effectiveness of the inspection of the internal pump check valves is monitored as part of the routine System Engineering function.

Corrective Actions

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

- The 23 Charging pump internal check valves were replaced and the pump returned to service.
- Monitoring of the effectiveness of inspections of pump internal check valves (ongoing).

Event Analysis

The event is reportable under 10CFR50.73(a)(2)(v), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) shut down the reactor and maintain it in a safe shutdown condition." On June 23, 2009, at approximately at 18:23 hours, operations entered Condition A of TS 3.3.4 for an inoperable 23 Charging Pump. The inoperability of the 23 Charging Pump was recognized as preventing the Technical Specification 3.3.4 (Remote Shutdown) function (TS Basis Table 3.3.4-1, Function 4.c, 23 Charging Pump Local/Remote Transfer Switch) for RCS inventory control. The inoperable single train remote shutdown feature 23 Charging Pump resulted in a safety system functional failure (SSFF). The pump was repaired, tested and returned to service on July 2, 2009.

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

Past Similar Events

A review was performed of the past three years of Licensee Event Reports (LERs) for events that involved inoperable remote shutdown functions. One Unit 2 LER was identified, LER-2009-003. LER-2009-003 reported a SSFF due to a loss of single train 21 Pressurizer Backup Heater required for remote shutdown from the Control Room caused by an inoperable breaker. The inability to reset and re-close the breaker for the 21 pressurizer B/U heater was due to a misaligned control relay trip (anti-pump) lever. LER-2009-003 had a different cause as the misaligned breaker lever was a result of a previous breaker rack-in whereas this LER was due to a failed component. Unit 3 reported in LER-2008-002 a loss of the single train 31 pressurizer heater. The unit 3 event was a different cause as that event was due to a failed pressurizer heater transformer.

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 or transients requiring shutdown outside the CR. If needed, a 45 gpm orifice can be put into service in lieu of the 75 gpm orifice which would reduce demand to approximately 54 gpm. With the 23 Charging Pump at approximately 80 percent capacity, the use of the 45 gpm orifice would be sufficient to maintain RCS inventory with the degraded 23 Charging Pump. Shutdown outside the CR could also be accomplished with the 21 Charging Pump. Procedural guidance is available for operators to use the 21 Charging Pump (2-AOP-SSD-1, "Control Room Inaccessibility Safe Shutdown Control"). This procedure allows at Shift Manager discretion the use of the 23 or the 21 Charging Pump depending on plant conditions. The 21 Charging Pump is capable of performing the same reactor coolant inventory control as the 23 Charging Pump. Additionally, procedure SOP-ESP-1 is available for starting the 21 Charging Pump at the 480 Volt Switchgear and local capability is available for adjustment of pump speed to maintain RCS inventory.

In accordance with NUREG-0800, Section 7.4, shutdown remote from the CR is not an event analyzed in the USFAR for accident analysis (Chapter 14). Specific scenarios are not specified on which the adequacy of shutdown capability remote from the CR is evaluated. A recognized type of event that could force the evacuation of the CR and the need to shut down remote from the CR is smoke from a fire. Fire damage limits as they impact safe shutdown do not require consideration of an additional random single failure in the capability to safely shut down. Therefore, application of single failure to remote shutdown is applicable only to other events that could cause the CR to become uninhabitable. These events would not result in consequential damage or unavailability of systems required for safe shutdown.