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Site Vice President

NL-10-055

June 22, 2010

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

SUBJECT: Licensee Event Report # 2010-005-00, "Technical Specification Prohibited Condition Due to an Inoperable Control Room Ventilation System Caused by a Closed Normally Open Damper"
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) 2010-005-00. The attached LER identifies an event where there was a Technical Specification prohibited condition due to an inoperable Control Room Ventilation System (CRVS) due to a closed damper, which is reportable under 10 CFR 50.73(a)(2)(i)(B). The condition also resulted in an inoperable CRVS which is a safety system functional failure reportable under 10CFR50.73(a)(2)(v). This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP2-2010-03076.

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,

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

IE22
NRR

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 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-I0202, (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.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME:	2. DOCKET NUMBER	3. PAGE
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4. TITLE: Technical Specification Prohibited Condition Due to an Inoperable Control Room Ventilation System Caused by a Closed Normally Open Damper

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
04	23	2010	2010-	005 -	00	06	22	2010	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

1

10. POWER LEVEL

100%

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

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER *(Include Area Code)*
Robert Trombetta, Maintenance Engineer	(914) 736-8505

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
A	VI	DMP	R411	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 April 23, 2010, during scheduled testing of the Control Room Ventilation System (CRVS), results showed less than required flow rates. An investigation and troubleshooting discovered the normally open "B" damper (CCRB1) on the suction duct for the carbon/HEPA filter and CRVS booster fans was closed preventing design flow rates. The damper was re-opened and secured in position and the CRVS re-tested satisfactorily. The bar used for maintaining the damper blocked open was found off and without a securing device on its attachment point. A review of past work history determined that on June 4, 2009, periodic testing was performed satisfactorily verifying the damper was open at that time. A review of work activities performed in proximity to damper (CCRB1) determined that during the spring refueling outage 2010, the "A" (CCRA1) damper and a ventilation duct section were replaced. The "A" damper is in very close proximity to the "B" damper. Maintenance concluded the "B" damper blocking bar was most likely contacted during damper "A" work activities. The apparent cause was Human Performance tools were not applied to ensure work activities did not affect other equipment in the area. Contributing cause was damper "B" had no blocking bar positive locking device. Corrective actions include reopening the "B" damper, re-testing to verify CRVS fully functional, and installation of a new cotter pin to secure the damper blocking bar. Coaching and a brief will be provided to applicable personnel on lessons learned and management expectations on use of human performance tools. The damper will be added to a check of list (COL). 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 April 23, 2010, during scheduled test activities of the Control Room Ventilation System (CRVS) {VI}, results showed less than expected design flow rates. An investigation discovered the normally open damper (CCRB1) {DMP} on the suction duct {DUCT} for the Carbon/HEPA filter {FLT} and CRVS booster fans {FAN} was closed preventing design flow rates. The damper was opened and secured in position and re-tested satisfactorily.

Testing of the CRVS was initiated on April 23, 2010, to satisfy Technical Specification (TS) Surveillance Requirement (SR) 3.7.10.4. TS SR 3.7.10.4 requires Control Room Envelope (CRE) boundary {NA} unfiltered air in-leakage testing in accordance with the testing specified in the Control Room Envelope Habitability Program. The Control Room Envelope Habitability Program is specified in TS 5.5.16. In order to perform the unfiltered air in-leakage testing, CRVS flow rates are measured and recorded for input data. The initial CRVS flow rate test was performed with the CRVS in Mode 2 (Pressurization mode) and the results were not as expected. Further testing confirmed improper flow rates. Troubleshooting was performed including a system walk down. The troubleshooting discovered that the normally open CRVS inlet manual damper (CCRB1) was closed. Engineering advised operations the likely cause of low CRVS flow rate was the closed damper but further testing and troubleshooting would be required. The damper was reopened and testing confirmed proper CRVS flow rates. To verify the damper was the cause of the low flow rates the damper was re-closed and CRVS flow rates re-tested. Re-testing with the damper closed verified the cause was the closed damper. The damper was reopened and secured and the CRVS tested satisfactorily. Testing to verify CRVS flow rates used the method that is performed for compliance with TS SR 3.7.10.4 (hot wire anemometer). Engineering notified operations of the results of troubleshooting and satisfactory re-testing of the CRVS. The event was recorded in the Indian Point Energy Center corrective action program (CAP) as condition report CR-IP2-2010-03076.

An investigation of the condition determined that "B" damper (CCRB1) is identified as "Locked Open" on system diagrams. The mechanism used to hold the damper in the open position and block it from closing is a steel bar. In this event the blocking bar was found off and the damper closed. The damper blocking mechanism did not have a securing device on its attachment point when the device was found disconnected. A review of past work history determined that on June 4, 2009, periodic test PT-EM13 was performed satisfactorily verifying the damper was open at that time. Work activities performed in proximity to damper (CCRB1) were reviewed. During the spring refueling outage 2010, "A" (CCRA1) damper and a ventilation duct section were replaced. The "A" damper is in very close proximity to the "B" damper but the "B" damper was not involved in the "A" damper replacement activities. A section of duct work was replaced along with dampers a few feet from the "B" damper. The area of the dampers and duct work are in a tight area and elevated approximately twelve feet from the floor. A walkdown and evaluation concluded that the "B" damper components were either jarred or impacted during work activities on damper "A" and associated ductwork. As the "B" damper was not part of the work package, the post modification test was only performed for demonstrating operability of the damper "A" function.

The original design of the CRVS was modified and damper CCRB1 had its actuator removed and damper linkage barred open. The damper was manufactured by Ruskin Manufacturing Company {R411}.

The CRVS provides a protected environment from which control room operators can control the unit following a release of radioactivity, toxic gas or smoke. The CRVS consists of: 1) an air conditioning (AC) unit complete with fan and heating coil, and a backup fan of the same design capacity installed in parallel, 2) A single filter unit composed of two high efficiency particulate air (HEPA) filters, 3) two activated charcoal adsorbers, 4) Two 100% capacity filter booster fans (21 CCRBF and 22 CCRBF), 5) one locker room and toilet exhaust fan, and 6) a single duct system that uses redundant dampers, controls and associated accessories to provide for three different air flow configurations. CRVS damper CCRB1 is in the pathway for supplying outside air to the filter unit.

The three CRVS air flow configurations are: 1) Normal mode (mode 1) in which air is recirculated through the AC unit with outside makeup air exhausted through the toilet exhaust fan, 2) Pressurization mode (mode 2) which is used to protect against airborne radiation where the CRE is pressurized with outside air that is drawn through the HEPA/adsorber filter unit. Pressurization of the CRE with filtered air minimizes in-leakage of unfiltered air. In the pressurization mode, either of the two filter booster fans will maintain the CRE at a slight positive pressure relative to adjacent areas, and 3) Incident 100% recirculation mode (mode 3) which is used for toxic gas or smoke where the CRVS is aligned for 100% recirculation of CRE through the AC unit with no outside air makeup.

The mechanical components needed in the pressurization mode (mode 2) are redundant and composed of the following two trains: 1) CRVS Train A consists of a filter booster fan (21CCRBF) and associated isolation damper (CCRF-1), HEPA/adsorber filter unit bypass damper (CCRA1), Toilet area exhaust fan (K-8) isolation damper (CCRD4), and AC unit backup fan (CCRCF), 2) Train B consists of a filter booster fan (22CCRBF) and associated isolation damper (CCRG-1), HEPA/adsorber filter unit bypass damper (CCRA2), Toilet area exhaust fan (K-8) isolation damper (CCRD5), and AC unit fan (21CCRF). This event is only applicable to mode 2 as damper CCRB1 is on the supply to the filter unit which is only used in mode 2. Mode 2 is initiated by a safety injection signal or high radiation signal from either CRE radiation monitor. In the pressurization mode (mode 2) either of the two filter booster fans (21CCRBF or 22CCRBF) will maintain the CRE at a slight positive pressure relative to adjacent areas. The toilet exhaust fan would be tripped and the associated exhaust flow path in series dampers would be isolated. Dampers CCRA1 and CCRA2 in the flowpath that allows outside air to bypass the HEPA/adsorber filter unit would close.

An extent of condition (EOC) was performed where the remaining dampers were inspected. The condition was determined to be unique to this damper (CCRB1) as other dampers that are secured with a similar blocking bar (CCRD1 and CCRD2) are followed by a blank-off plate so their position would have no effect on system operation.

Cause of Event

The apparent cause was Human Performance tools not applied. Human Performance tools were not applied to ensure work activities did not affect other equipment in the cramped work area. A contributing cause was there was no positive locking mechanism contrary to CRVS design drawings showing locked open. A potential programmatic weakness was not including the damper in a check-off list (COL) to ensure the damper is in the correct position.

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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:

- Damper "B" (CCRB1) was re-opened and the blocking mechanism installed.
- A new pin with a locking cotter pin was installed to secure the damper "B" blocking mechanism in place.
- The CRVS testing was performed and satisfactorily completed demonstrating system functionality.
- Applicable personnel will be briefed on lessons learned and coached on management's expectations on use of Human Performance tools such as self checking, peer checking and questioning attitude. The event will be included in future pre-outage Operating Experience (OE) and 12 week work.
- The damper will be added to a check off list (COL).

Event Analysis

The event is reportable under 10CFR50.73(a)(2)(i)(B). The licensee shall report any operation or condition which was prohibited by the plant's Technical Specifications. Technical Specification (TS) 3.7.10 (Control Room Ventilation System), Limiting Condition for Operation (LCO) requires two CRVS trains to be operable in Modes 1,2,3 and 4 and during movement of recently irradiated fuel assemblies. Condition C, Two CRVS trains inoperable for reasons other than Condition B, Required Action C.1, is restoration of CRVS to operable status in 72 hours. Although CRVS damper CCRB1 was not worked on during the spring 2010 refueling outage, an adjacent damper CCRA1 did have major work and maintenance activities that are believed to have caused the damper to close. Work on damper CCRA1 was completed in the spring refueling outage. There was no movement of recently irradiated fuel assemblies during the period that the CRVS damper B was closed. Mode 4 was achieved on April 7, 2010, and initial criticality achieved on April 10, 2010. The CRVS damper CCRB1 was discovered closed on April 23, 2010, a period of inoperability of approximately 16 days. As required by TS 3.7.10 Condition C.1, actions were not taken within the allowed completion time of 72 hours, therefore, the condition was a TS violation.

The inoperable CRVS for mode 2 (Pressurization mode) resulted in a loss of safety function as the closed damper (CCRB1) that isolated suction to the CRVS charcoal and HVAC filters and booster fans, would have prevented the CRVS from meeting system testing criteria for operability. Therefore, the condition was a safety system functional failure reportable under 10CFR50.73(a)(2)(v)(D).

Past Similar Events

A review was performed of the past three years of Licensee Event Reports (LERs) for events that involved an inoperable CRE. LER-2007-003 reported a TS violation due to CRVS not in compliance with the TS surveillance requirement as a result of CRVS booster fans exceeding the TS required flow range. Cause was human error on fan flow adjustments. Corrective action for LER-2007-003 would not have prevented this event as the causes were different.

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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 events requiring the CRE or CRVS accident mitigating function. There was no DBA, toxic gas or smoke release during the time the CRVS damper (CRRB1) was closed.

The CRE is the area within the confines of the CRE boundary that contains the spaces that the CR occupants inhabit to control the unit during normal and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations and equipment that physically form the CRE. In accordance with TS 3.7.10 Basis, the operability of the CRE boundary must be maintained to ensure that the in-leakage of unfiltered air into the CRE will not exceed the in-leakage assumed in the licensing bases analysis of the design basis accident (DBA) consequences to the control room operators. The CRE and its boundary are defined in the Control Room Habitability Program. CR radiological consequence analysis modeled the CRE air filtration system in the pressurization mode (mode 2) to demonstrate compliance with 10CFR50.67.

As discussed in TS Basis 3.7.10, the dose to CR personnel is affected more by the in-leakage of unfiltered air than by the intake of filtered air. As discussed in Chapter 14 of the UFSAR, the calculated dose to a CRE occupant for design basis accidents (DBA) [Large Break Loss of Coolant Accident (LBLOCA), Steam Line Break (MSLB), and Steam Generator Tube Rupture (SGTR) was below the acceptance criteria of 10CFR50.67. The analysis assumed 1800 cfm outside air was drawn through HEPA and charcoal filters via booster fans and discharged into the CRE. The analysis also assumes 700 cfm of unfiltered leakage into the CRE. For this event flow through the CRVS with the damper closed was approximately 500 cfm using a tracer gas method of flow determination.

An evaluation of the radiological consequences from a limiting DBA was performed based on the measured filtered and unfiltered flow rates. The limiting DBA for CR habitability is a LBLOCA. Other DBAs were also evaluated (SGTR and MSLB) for the as-found damper condition and the dose consequences remain non-limiting and well below 10CFR50.67 limits. The radiological consequences evaluation for the as-found condition was based on measured containment and Emergency Core Cooling System (ECCS) leakage values with a conservative safety margin. The evaluation included radiation fields from external sources affecting CR habitability. The evaluation determined that if a LBLOCA had occurred under the as-found condition, the dose to CR personnel would have been less than 5 rem total effective dose equivalent (TEDE) as required by 10CFR50.67.