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NL-15-065

June 8, 2015

U.S. Nuclear Regulatory Commission
Document Control Desk
11545 Rockville Pike, TWFN-2 F1
Rockville, MD 20852-2738

SUBJECT: Licensee Event Report # 2015-003-00, "Technical Specification Prohibited Condition Caused by Failure to Meet Containment Fan Cooler Unit Service Water (SW) Flow Rate Due to Improper SW Surveillance Test Configuration"
Indian Point Unit No. 3
Docket No. 50-286
DPR-64

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2015-003-00. The attached LER identifies an event where containment fan cooler unit service water flow rates did not meet test criteria as a result of improper test configuration, which is reportable under 10 CFR 50.73(a)(2)(i)(B) as a Technical Specification Prohibited Condition during past operation. This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP3-2015-01063 and CR-IP3-2015-02448.

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

Sincerely,

LC/cbr

cc: Mr. Daniel H. Dorman, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 3
Ms. Bridget Frymire, New York State Public Service Commission

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NRR

NRC FORM 366 (01-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES: 01/31/2017

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 Records and FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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
INDIAN POINT 3	05000-286	1 OF 5

4. TITLE: Technical Specification Prohibited Condition Caused by Failure to Meet Containment Fan Cooler Unit Service Water (SW) Flow Rate Due to Improper SW Surveillance Test Configuration

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
4	9	2015	2015	003	- 00	6	8	2015		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

5

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)*
Edward F. Bauer, Mechanical Engineer, Design Engineering	(914) 254-6604

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
X	BI	V	J010	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 3, 2015, while in Mode 5 (cold shutdown) for a refueling outage, during performance of 3-PT-R200 (Essential Service Water Header Flow Balance) the As-Found service water (SW) flow rates for the 31 Fan Cooler Unit (FCU), 32 FCU and 33 FCU were less than the Technical Specification (TS) 3.6.6 (Containment Spray and Containment Fan Cooler System) Surveillance Requirement (SR) 3.6.6.3 flow of 1430 gpm. The SW essential header was re-balanced by adjusting FCU throttle valves to obtain a minimum of 1430 gpm for all five FCUs. On April 9, 2015, an engineering review of test data recorded from test 3-PT-R200, determined that the quarterly test (3-PT-Q016) that verifies FCU flows is not performed in the correct alignment for validating SW flow for the FCUs per TS SR 3.6.6.3. Test 3-PT-Q016 tests SW flow through FCU with SW isolated through the Emergency Diesel Generator (EDG) coolers. This configuration is not consistent with post accident operation in which SW is aligned to the FCUs and EDGs. The apparent cause was improper implementation of improved TS requirements. Corrective action was a revision of procedure 3-PT-Q016 to require validation of FCU SW flow with the EDG SW flow control valves and FCU outlet temperature control valves open. The event had no significant effect on public health and safety.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2015	- 003	- 00	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 March 3, 2015, while in Mode 5 during shutdown for a refueling outage, the Operations test group commenced performance of 3-PT-R200 (Essential Service Water Header Flow Balance) at approximately 19:00 hours (this test was last performed in 1997). The purpose of the flow balance test is to verify accident Service Water (SW) {BI} flow rates are met for safety related components with the SW system in its design basis alignment. Performance of the test includes the use of Ultrasonic Flow Meters (UTs) installed on the Fan Cooler Unit (FCU) {FCU} SW outlet lines. The test acceptance criteria for minimum SW flow on the FCU discharge flow indicator is equal to or greater than 1575 gpm. The As-Found FCU outlet SW flow of 1575 gpm for the five Fan Cooling Unit (FCU) cooling coils could not be obtained during performance of 3-PT-R200. The As-Found SW flow rates for the 31 FCU, 32 FCU and 33 FCU were also less than the quarterly test [3-PT-Q016 (EDG and VC Temperature Valves SWN-FCV-1176 and 1176A, and SWN-TCV-1104 and 1105)] acceptance criteria flow of 1430 gpm used to demonstrate operability in accordance with Surveillance Requirement (SR) 3.6.6.3 of Technical Specification 3.6.6 (Containment Spray and Containment Fan Cooler System). The test procedure (3-PT-R200) FCU SW flow rate of 1575 gpm is a bounding value for assumed worst case SWS condition and to provide margin over the required flow rate of 1430 gpm specified in surveillance procedure 3-PT-Q016 used to verify operability to the TS SR 3.6.6.3 value of equal to or greater than 1400 gpm. Test acceptance criteria for FCU flows have a 30 gpm correction factor for instrument error. The test was stopped per the procedure and Engineering and test supervisor notified for further guidance. After review, engineering directed the test to continue and re-balancing performed to obtain a minimum FCU outlet SW flow of 1430 gpm. The test was resumed and the essential SW header was re-balanced by adjusting FCU throttle valves (SWN-44-1, SWN-44-2, SWN-44-3, SWN-44-4, SWN-44-5) to obtain a minimum of 1430 gpm for all five FCUs. As-Left FCU outlet SW flow indications in the Safety Injection Mode were 1480, 1435, 1460, 1500 and 1496 gpm for 31 through 35 FCUs respectively. In the recirculation Mode, all FCU outlet SW flow indications were greater than 1575 gpm. The condition in which the As-found FCU outlet SW flow of 1575 gpm was not obtained in accordance with 3-PT-R200 was recorded in the Indian Point Energy Center (IPEC) Corrective Action Program (CAP) as Condition Report CR-IP3-2015-01063. Included in CR-IP3-2015-01063 was a corrective action for engineering to justify the acceptability of the SW flow balance FCU outlet flow test acceptance criteria reduction from 1575 gpm to 1430 gpm.

An engineering review of test data recorded from test 3-PT-R200 was performed and on April 9, 2015, engineering determined that the quarterly test (3-PT-Q016) is not performed in the correct alignment for validating SW flow for the FCUs per TS SR 3.6.6.3. Test 3-PT-Q016 tests SW flow through FCUs with SW isolated through the Emergency Diesel Generator (EDG) coolers. This configuration is not consistent with post accident operation in which SW is aligned to the FCUs and EDGs. A review of prior procedure revisions identified that a procedure revision was made to incorporate improved TS (ITS) surveillance requirements (3-PT-Q016 Revision 13 preparer approval dated March 8, 2001). Performance of FCU SW flow measurements was incorporated in the procedure after stroke testing of the EDG SW outlet valves whose position switch was returned to its normal position of AUTO. This position of EDG SW outlet valves causes the valves to close. A review of previous essential SW header flow balancing determined that the last documented essential SW header flow balance was performed in 1997 under ENG-281B. The condition in which the evaluation of test data recorded under SW flow balance test 3-PT-R200 discovered that the quarterly surveillance was not performed in the correct alignment was recorded in the IPEC CAP as Condition Report CR-IP3-2015-02448.

The SW System (SWS) provides a heat sink for the removal of process and operating heat from safety related components during a Design Basis Accident (DBA) or transient. During normal operation, and a normal shutdown, the SWS also provides this function for various safety related and non-safety related components. The SWS consists of two separate, 100 percent capacity safety related cooling water headers. Each header is supplied by three pumps and includes the piping up to and including the isolation valves on individual components cooled by the SW. SWS heat loads are designed as either essential or nonessential. The essential SWS heat loads are those which must be supplied with cooling water immediately in the event of a LOCA and/or loss of offsite power (LOOP) (e.g., EDGs, FCUs, control room air conditioning system). The non-essential SWS heat loads are those which are required only following the switch over to the recirculation phase following a postulated LOCA. The FCUs are connected in parallel to the essential SWS header. Normal SWS flow to the FCUs is controlled by valve TCV-1103. Required Engineered Safety Feature Actuation System (ESFAS) flow to all five FCUs is initiated when either of the redundant SWS to FCU ESFAS valves (TCV-1104 or TCV-1105) opens automatically in response to an ESFAS actuation signal. The EDGs are connected in parallel to the essential SWS header. Required ESFAS flow to all three EDGs is initiated when either of the redundant SWS to EDG ESFAS valves (FCV-1176 or FCV-1176A) opens automatically in response to an ESFAS actuation signal which starts the EDGs.

The Containment Spray System and Containment Fan Cooler System provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than design values. The Containment Spray System and Containment Fan Cooler System provide redundant methods to limit and maintain post accident conditions to less than the containment design values. The containment fan cooler system consists of five 20 percent capacity FCUs located inside containment. These FCUs are used for both normal and post-accident cooling of the containment atmosphere. SW is supplied to the FCU cooling coils to perform the heat removal function. During normal operation SW is supplied to all five FCUs and two or more FCUs are typically operated to limit the ambient containment air temperature. In post-accident operations following an actuation signal, the containment cooling system fans are designed to start automatically. The accident analysis assumes 1400 gpm of service (cooling) water with a maximum river water inlet temperature of 95 degrees F is supplied to each FCU. The requirements for the five FCUs are designed by grouping the five FCUs into three trains based on the safeguards power train needed to support operability [Fan Cooler Train 5A consists of FCU 31 and FCU 33, Fan Cooler Train 2A/3A consists of FCU 32 and FCU 34, Fan Cooler Train 6A consists of FCU 35]. FCU throttle valves (SWN-44-1, SWN-44-2, SWN-44-3, SWN-44-4, SWN-44-5) are 10 inch Butterfly valves {V} manufactured by Jamesbury Corp {J010}.

An extent of condition (EOC) review identified the same quarterly FCU SW flow test at Unit 2. However, the Unit 2 EDG SW outlet valves are normally open and testing of FCU SW flow is conducted in the correct configuration.

The Cause of Event

The apparent cause was improper implementation of improved TS requirements. The quarterly surveillance test 3-PT-Q016 was initially a valve stroke test. When the improved TS were adopted, the additional verification of FCU SW flows per TS SR 3.6.6.3 was incorporated. Surveillance 3-PT-Q016 was revised to the new ITS SR in revision 13, preparer approval dated March 8, 2001. License Amendment 205 dated February 27, 2001 approved conversion to the ITS. The quarterly test procedure 3-PT-Q016 first directs stroke testing of the EDG SW outlet valves SWN-FCV-1176 and SWN-FCV-1176A and upon completion returns the valve control switches to AUTO after which FCU SW outlet flows are measured.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2015	- 003	- 00	4 OF 5

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

This normal position of the EDG flow control switch closes the flow control valves. While the normal position of the EDG flow control valves is closed, they are designed to automatically open on receipt of a SI signal. Quarterly TS SR Testing of the FCU outlet flow with the EDG SW outlet valves closed results in higher FCU SW outlet flows than if the FCU outlet flows were measured with the EDG SW outlet valves open. Unlike the quarterly surveillance test, the SWS flow balance procedure (3-PT-R200) directs that the EDG SW outlet valves be open by placing the control switch in the OPEN position.

Corrective Actions

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

- Procedure 3-PT-Q016 was revised to perform FCU outlet SW flow with EDG cooling water valve SWN-FCV-1176 and SWN-FCV-1176A, and FCU outlet temperature control valve SWN-TCV-1104, and SWN-TCV-1105 in the full open position.

Event Analysis

The event is reportable under 10 CFR 50.73(a)(2)(i)(B). The licensee shall report any operation or condition which was prohibited by the plant's TS. This condition meets the reporting criteria because during past operation the SW flow through 3 of 5 FCUs did not meet required minimum FCU SW flow specified in TS SR 3.6.6.3 due to improper SWS flow balancing. Engineering discovered this condition on April 9, 2015, during their review of test data recorded in test 3-PT-R200.

The event is not reportable under 10CFR50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to (D) mitigate the consequences of an accident (safety system functional failure). An engineering calculation that evaluated fan cooler thermal performance during a LOCA under reduced SW cooling flow determined that with an average cooling water flow of 1330 gpm per FCU, the FCUs would still meet their heat removal requirement during a design basis LOCA. An engineering review of the As-Found FCU SW flows obtained from 3-PT-R200 determined the average as-found FCU flowrate from 3-PT-R200 corrected for instrument uncertainties was 1372 gpm. This flow rate takes into account failure of the containment fan cooler train associated with the highest as-found FCU flow (FCU 35). Since the average as-found FCU SW flow from 3-PT-R200 was greater than the average flow required to meet the design basis heat removal, the safety function would have been met.

Past Similar Events

A review was performed of the past three years of Licensee Event Reports (LERs) for events that involved TS prohibited conditions due to inadequate FCU SW flow capability. No LERs were identified.

Safety Significance

This event had no significant effect on the health and safety of the public. There were no actual safety consequences for the condition because there were no accidents, transients or seismic events during the time of the condition.

The Containment Spray System and Containment Fan Cooler System limit the temperature and pressure that could be experienced following a DBA. The limiting DBAs are the loss of coolant accident (LOCA) and the steam line break (SLB). No DBAs are assumed to occur simultaneously or consecutively.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point Unit 3	05000-286	2015	- 003	- 00	5 OF 5

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

The postulated DBAs are analyzed with regard to containment engineered safety features (ESF) systems, assuming the loss of one safeguards power train, which is the worst case single active failure and results in one train of Containment Spray and Containment Fan Coolers being rendered inoperable. Accident analysis results show that containment air cooling and iodine removal are met by one containment spray train and two fan cooler trains (i.e., four FCUs).

An engineering calculation (Calculation No. 83990.003-8-SW-209) evaluated fan cooler thermal performance during a LOCA under reduced SW cooling flow conditions. Under the case of maximum fouling in the FCUs, the calculation determined that with an average cooling water flow of 1330 gpm per FCU, the FCUs would still meet the design basis heat removal rate assuming maximum fouling (a tube fouling factor of 0.004, and 4 percent tube plugging). An engineering review of the As-Found FCU SW flows obtained from 3-PT-R200 determined the average as-found FCU flowrate from 3-PT-R200 corrected for instrument uncertainties was 1372 gpm. This flow rate takes into account failure of the containment fan cooler train associated with the highest as-found FCU flow (FCU 35). Since the average as-found FCU SW flow from 3-PT-R200 was greater than the average flow required to meet the design basis heat removal, the safety function would have been met.