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J. E. Pollock  
Site Vice President

January 7, 2008  
Indian Point Unit No. 3  
Docket No. 50-286  
NL-07-150

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

Subject: Licensee Event Report # 2007-003-00, "Technical Specification Prohibited Condition Due to Exceeding the Allowed Completion Time for an Inoperable Recirculation Pump Caused by a Potential Strong Pump-Weak Pump Interaction During a Small Break LOCA"

Dear Sir or Madam:

Pursuant to 10 CFR 50.73(a)(1), Entergy Nuclear Operations Inc. (ENO) hereby provides Licensee Event Report (LER) 2007-003-00. The attached LER identifies an event where there was a Technical Specification prohibited condition that exceeded the Allowed Completion Time for a train of the Emergency Core Cooling System, 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-IP3-2007-04212.

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 3  
Mr. Paul Eddy, New York State Public Service Commission  
INPO Record Center

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NRR

# 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

05000-286

3. PAGE

1 OF 5

4. TITLE: Technical Specification Prohibited Condition Due to Exceeding the Allowed Completion Time for an Inoperable Recirculation Pump Caused by a Potential Strong Pump-Weak Pump Interaction During a Small Break LOCA

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
11	08	2007	2007-	003	- 00	1	7	2008	FACILITY NAME	DOCKET NUMBER <b>05000</b>
									FACILITY NAME	DOCKET NUMBER <b>05000</b>

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"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)								
10. POWER LEVEL  100%	<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 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 checked="" 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: Valerie Cambigianis, Design Engineering Supervisor  
 TELEPHONE NUMBER (Include Area Code): (914) 271-7284

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
B	BP	P	I075	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 November 8, 2007, during an NRC Component Design Basis Inspection, a condition was identified where a pump of the Emergency Core Cooling Internal Recirculation (IR) System could be inoperable during operator response actions for certain Small Break Loss of Coolant Accidents (SBLOCAs). The condition is due to a procedure requirement (Emergency Operating Procedures ES-1.3 and ES-1.4) to start a second IR pump resulting in a potential strong pump/weak pump interaction that could result in a less than acceptable flow rate through the weak pump causing it to become inoperable. During past plant operation, this unknown condition resulted in exceeding the allowed outage time of Technical Specification 3.5.2 for an inoperable ECCS train. The apparent cause of the condition was inadequate analysis during original plant design due to insufficient engineering rigor which failed to identify the strong pump/weak pump interaction of the recirculation pumps for SBLOCAs. This condition was also determined to be applicable to unit 2. Immediate corrective actions were to declare a train of IR inoperable and revise ES-1.3 and ES-1.4 to eliminate the requirement to start a second IR Pump for a SBLOCA. The UFSAR will be revised and a review of other applicable safety related pumps will be performed for potential impact from strong pump/weak pump interactions and necessary actions taken. 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 November 8, 2007, at approximately 17:30 hours, while at 100% steady state reactor power, the 31 Internal Recirculation {BP} pump {P} (IRP) was declared inoperable and Technical Specification 3.5.2, "Emergency Core Cooling Systems (ECCS)," Condition A was entered for one or more ECCS trains inoperable. The 31 IRP was determined to be potentially inoperable as a result of a finding by the NRC during a Component Design Basis Inspection (CDBI). During design review of the Internal Recirculation System (IRS), a condition was identified in which an IRP could become inoperable during operator response actions for certain Reactor Coolant System (RCS) small break sizes (less than 3 inches) [Small Break Loss of Coolant Accidents (SBLOCAs)]. The condition is due to a potential strong pump/weak pump interaction where the stronger pump would shut the discharge check valve {V} of the weaker pump causing it to dead head. The dead head condition could result in a less than acceptable flow rate through the weak pump causing it to become inoperable. On November 9, 2007, at 20:22 hours, TS 3.5.2 was exited for the inoperable train of ECCS. The condition was recorded in the Indian Point Corrective Action Program (CAP) as CR-IP3-2007-04212. An additional concern identified by the NRC was the basis for IRP minimum flow acceptability. This concern is being addressed in CR-IP3-2007-4296. Corrective actions under CR-IP3-2007-04212 will verify manufacturer minimum flow acceptance criteria for all applicable safety pumps and confirm the validity of the evaluation of pertinent pump operating conditions.

The Recirculation System (IRS) is one of three subsystems of the ECCS that is composed of two 100% capacity subsystems with one pump for each subsystem. The other two subsystems are the High Head Safety Injection System (HHSIS) {BQ} composed of three 50% capacity subsystems which share two pump discharge headers, with one pump for each subsystem, and the Residual Heat Removal System (RHRS) {BP} composed of two 100% subsystems with one pump for each subsystem. After the injection phase post LOCA, the coolant spilled from the break and collected in the containment {NH} recirculation sump is cooled and returned to the RCS {AB} by the IRS. During this recirculation phase of a LOCA recovery, the IRPs take suction from the containment recirculation sump and direct flow through the RHR heat exchangers {HX} to the Reactor Coolant System (RCS). The RHR Pumps can be used to provide a backup method of recirculation but would take suction from a separate containment sump. For SBLOCAs where the recirculated sump water must be injected against higher pressures, the HHSI pumps are used to augment the flow-pressure capacity of the IRPs in returning spilled coolant to the reactor. The high head recirculation flow path via the HHSI pumps is only required for the range of break sizes for which the RCS pressure remains in excess of the shutoff head of the IRPs.

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The ECCS subsystems, except the IRS, are actuated upon receipt of a Safety Injection signal {JE}. The IRPs are manually started during the switch over to cold leg recirculation. Initially, plant Emergency Operating Procedures (EOPs) require only one IRP to be started. In subsequent steps a second IRP will be started only if all power is available. With this configuration, injection flow to the reactor core would be established prior to the start of the second pump. The design vendor concluded this configuration would desensitize the system to dead-heading because the IRPs would be in the steeper portion of the pump head/flow curve. Upon further review, the original evaluation was determined not to be accurate for the SBLOCA accident scenario when total system flow could be less than 700 gpm since the pumps would not be operating at the steeper portion of their head/flow curve.

A review of the original FSAR Section 6.2, confirmed that the manual switchover sequence from the injection phase to the recirculation phase for LOCAs directed startup of first one then a second IRP. Therefore, the potential for a strong pump/weak pump interaction existed from initial plant startup. A review identified that there were missed opportunities that may have identified the condition such as during design review for post TMI action item implementation (e.g., I.C.1, II.K.3), preparation of the response to NRC Bulletin 88-04 (Potential Safety Related Pump Loss) and during processing of a modification to replace the IRPs.

An extent of condition review determined that the condition also exists at Indian Point 2. The unit 2 condition was recorded in the CAP as CR-IP2-2007-04558. This condition is reported in LER-2007-005.

Cause of Event

The cause of the condition was inadequate analysis during original plant design due to insufficient engineering rigor which failed to identify the strong pump/weak pump interaction of the IRPs for SBLOCAs. Previous evaluations of internal recirculation operating scenarios were not rigorous enough in that they did not fully evaluate IR pump conditions for SBLOCA. Procedures were developed based on the plant design that introduced a potential condition in which an IRP could fail. The EOPs (ES-1.3 and ES-1.4) included a requirement to start a second IR Pump during the recirculation phase of a SBLOCA.

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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:

- Procedures ES-1.3 and ES-1.4 were revised to preclude operating two IRPs in parallel during High Head recirculation scenarios.
- An UFSAR revision will be prepared to reflect the changes to the steps for the post LOCA switchover and processed for inclusion in the next scheduled revision of the UFSAR.
- A review of other applicable safety related pumps will be performed for potential impact from strong pump/weak pump interactions and any necessary action taken.

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 TS. The Action Statement for the ECCS Technical Specification (TS) Limiting Condition for Operation (LCO), TS 3.5.2 requires three trains of ECCS to be operable. The required action A.1 for TS 3.5.2 Condition A, One or more trains inoperable, is to restore the train(s) to operable within a completion time of 72 hours. This event meets the reporting criteria because the 31 IRP was determined to be inoperable under certain SBLOCA scenarios and that the condition was applicable during past operation. The time in which the condition existed during past operation was from initial plant operation. The inoperable condition during past operation exceeded the 72 hour allowed completion time for TS 3.5.2 and the required actions were not performed. Based on the original FSAR Section 6.2, which contains switchover sequence directions to start the second IRP, the condition existed from initial plant operation.

During the time the 31 IRP was inoperable, the 32 IRP was operable and available to perform the safety function. During past operation when a train was inoperable (e.g., testing/maintenance), the weak pump/strong pump interaction would not be applicable and the redundant train would have been fully functional. In accordance with reporting guidance in NUREG-1022, an additional random single failure need not be assumed in that system during the condition. Therefore, there was no safety system functional failure of the IRS reportable under 10 CFR 50.73(a)(2)(v) for the strong pump/weak pump interaction. Review of the condition for reporting under 10 CFR 50.73(a)(2)(ii)(B), "Any event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety," determined the event is not reportable under this criterion. Engineering judgment, as allowed by the guidelines of NUREG-1022, concluded that there is reasonable expectation that the safety function of the ECCS could be fulfilled (e.g., availability of RHR).

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Past Similar Events

A review was performed of Licensee Event Reports (LERs) for the past three years for any events due to inadequate design analysis. No LERs were identified that reported events based on this cause. LER-2006-001 reported a reactor trip as a result of a main generator trip from a short in the differential protection circuit caused by wires that had an inadequate design in material application.

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. Also, the ECCS design is robust in that the RHRS provides a backup capability to the IRS and at least one RHR train would have been available during the time the 31 IRP pump was potentially inoperable. As noted in FSAR Section 6.2.2, the RHRS provides a backup recirculation capability. Under postulated accidents that are discussed in FSAR Section 14.2, the analyzed LOCAs assume a loss of offsite power and a single failure disabling one ECCS train. This analyzed condition would result in only one train of IRS thereby preventing the potential for a strong pump/weak pump interaction.

An assessment was performed to determine the impact of the condition on Core Damage Frequency (CDF). The assessment of the IRP strong pump/weak pump interaction issue determined there would be a change in internal events CDF of no more than 5E-7 per year. That CDF impact is considered not significant (Green Band delta CDF/yr). Because the issue only impacts recirculation, which generally has little impact on large early release frequency, the controlling concern was the impact on CDF.