Entergy

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Fred Dacimo
Site Vice President
Administration

October 23, 2006
Indian Point Unit No. 2
Docket No. 50-247
NL-06-095

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: Licensee Event Report # 2006-004-00, "Automatic Actuation of Both Motor Driven Auxiliary Feedwater Pumps Due to Trip of 21 Main Feedwater Pump Caused by High Vibrations."

Dear Sir:

The attached Licensee Event Report (LER) 2006-004-00 is the follow-up written report submitted in accordance with 10 CFR 50.73. This event is of the type defined in 10 CFR 50.73(a)(2)(iv)(A) for an event recorded in the Entergy corrective action process as Condition CR-IP2-2005-05098.

There are no commitments contained in this letter. Should you or your staff have any questions regarding this matter, please contact Mr. Patric W. Conroy, Manager, Licensing, Indian Point Energy Center at (914) 734-6668.

Sincerely,

Fred R. Dacimo
Site Vice President
Indian Point Energy Center

IE22

Attachment: LER-2006-004-00

cc:

Mr. Samuel J. Collins
Regional Administrator – Region I
U.S. Nuclear Regulatory Commission

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Resident Inspector Indian Point Unit 2

Mr. Paul Eddy
State of New York Public Service Commission

INPO Record Center

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES: 06/30/2007

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
INDIAN POINT 2	05000-247	1 OF 3

4. TITLE: Automatic Actuation of Both Motor Driven Auxiliary Feedwater Pumps Due to Trip of 21 Main Feedwater Pump Caused by High Vibration

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
8	24	2006	2006 -	004 -	00	10	23	2006		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

2

10. POWER LEVEL

5%

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)*
Thomas Foley, System Engineer	(914) 734-6760

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTU RER	REPORTABLE TO EPIX

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 August 24, 2006, while performing a plant startup, the 21 Main Boiler Feedwater Pump (MBFP) tripped as a result of high vibration initiating the automatic actuation of both motor driven Auxiliary Feedwater Pumps (AFWP). At the time of the event both AFWPs were in operation, both MBFP's isolated and the 22 MBFP was shutdown. Operations was starting the 21 MBFP by rolling up the steam turbine. During the turbine rollup the MBFP turbine was near the low end of the turbine critical speed while operators were transferring MBFP turbine control. MBFP turbine vibration increased significantly during transition through the critical speed and the high vibration actuated one of the MBFP trip devices. As a result of the MBFP trip, both motor driven AFW pumps received start signals. The direct cause of the event was turbine vibration due to excitation of the turbine rotor and casing as a result of the rotor being near the turbine critical speed. The apparent cause was weak procedural guidance in the main feedwater (FW) system operating procedure (SOP) which provided a critical speed that was too narrow. Corrective actions include; a brief of operations on the event, a review for revision of the FW SOP to include a wider critical speed range and delay of turbine control transfer past the critical speed and to allow the MBFP turbine to be rolled on steam via Lovejoy controls past the critical speeds. Necessary procedure revisions will be implemented. 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 brackets { }

DESCRIPTION OF EVENT

On August 24, 2006, while performing a plant startup, with the plant at approximately 5% reactor power, the 21 Main Boiler Feedwater Pump (MBFP) {SJ} tripped at approximately 11:15 hours, as a result of high vibration. In accordance with design the trip of either MBFP actuates the automatic start of both motor driven Auxiliary Feedwater (AFW) {BA} Pumps (AFWP). At the time of the event both AFWPs were in operation, both MBFP isolated and the 22 MBFP was shutdown. Operations was starting the 21 MBFP by rolling up the steam turbine. During the turbine rollup the MBFP turbine was near the low end of the turbine critical speed range while operators were transferring MBFP turbine control. MBFP turbine vibration increased significantly during transition through the critical speed and the high vibration actuated one of the MBFP trip devices. As a result of the MBFP trip, both motor driven AFW pumps received start signals. Vibration of the MBFP turbine is an expected condition during transition through the turbine critical speed range (2100-2400 RPM). Any time spent near the critical speed will cause turbine vibration to increase significantly. During MBFP turbine roll-up, the turbine speed reached 2050 RPM while using the Lovejoy control station startup signal. The MBFP turbine was near the critical speed range when operators were transferring turbine control from Lovejoy Station to Foxboro Station. During this control transfer, the MBFP turbine vibration exceeded 13.5 mils relative vibration on both the turbine inboard and outboard vibration probes. On August 24, 2006, at 3:20 hours, an eight hour non-emergency notification was made to the NRC (Log Number 42217) for a valid actuation of the AFW system under 10CFR50.72(b)(3)(iv)(A). The event was recorded in the Indian Point Energy Center corrective action program (CAP) as CR-IP2-2006-05098. An extent of condition review was performed and determined the following; the turbines for the MBFP and the main turbine-generator have documented critical speeds that are published in existing procedures. The critical speed range for unit 3 MBFP is wider (2000 to 2500 RPM) and the unit 3 SOP allows the MBFP turbine to be rolled on steam with the Lovejoy Startup Station well past the critical speed range.

CAUSE OF EVENT

The direct cause of the AFWP actuation was an actuation signal from the 21 MBFP trip circuit as a result of actuation of at least one of the MBFP trip devices due to MBFP high vibrations. MBFP turbine vibration was due to excitation of the MBFP turbine rotor and casing from the rotor being near or at the beginning of the turbine critical speed range. The apparent cause was weak procedural guidance in system operating procedure 2-SOP-21-1, "Main Feedwater System," which identified too narrow a range for turbine critical speed.

CORRECTIVE ACTIONS

The following corrective actions have been or will be performed under the CAP to address the causes of this event and prevent recurrence.

- Operations personnel were briefed on the event and lessons learned. Included in the brief was the expectation that the MBFPs are to be rolled through the critical speed range in one step change of approximately 500 RPM.

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

- Procedure 2-SOP-21.1 will be reviewed for revision to provide a wider range for critical speed, and to allow the MBFP turbine to be rolled on steam via the Lovejoy startup station until past the critical speed range. The procedure is scheduled to be reviewed and recommendations identified by November 22, 2006. Necessary procedure revisions will be completed by December 29, 2006.

Event Analysis

The event is reportable under 10CFR50.73(a)(2)(iv)(A). The licensee shall report any event or condition that resulted in manual or automatic actuation of any of the systems listed under 10CFR50.73(a)(2)(iv)(B). Systems to which the requirements of 10CFR50.73(a)(2)(iv)(A) apply for this event include the AFWS. This event meets the reporting criteria because the AFWS was actuated in accordance with design as a result of a trip of the 21 MBFP.

Past Similar Events

A review of the past two years of Licensee Event Reports (LERs) for similar events that involved an ESF actuation identified one LER. LER-2005-003 reported actuation of both motor driven AFW pumps due to the trip of the 22 MBFP on low lube oil pressure during swap of the in-service lube oil cooler. The cause of LER-2005-003 was an inadequate MBFP lube oil system procedure (2-SOP-21.4) for venting the lube oil coolers. The cause of this LER was weak procedural guidance in the main FW system operating procedure (2-SOP-21.1). The corrective actions for this event were briefing operations and enhancement of the FW system operating procedure. The corrective actions for LER-2005-003 were revision of the system operating procedure for the MBFP lube oil system. Therefore, those corrective actions would not have prevented this event.

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 the AFWS was in operation and the MBFPs were not aligned to deliver flow to the SGs. The SGs had adequate FW flow from the AFWS to maintain SG water level. Operators had alarms/indications alerting them to MBFP trip and actuation of the AFWS and procedures to direct proper actions. Operators during this event recognized the MBFP trip and took appropriate actions in accordance with plant procedures.

There were no significant potential safety consequences of this event under reasonable and credible alternative conditions. Loss of FW at full power is a credible alternative condition. This event would be bounded by the analyzed event described in FSAR Section 14.1.9, Loss of Normal Feedwater. A loss of one MBFP at power will result in a plant trip on low SG level if operator action does not correct the FW flow imbalance. A Low-Low water level in any one SG initiates actuation of two motor-driven AFW pumps and a Low-Low water level in any two SGs actuates the steam driven AFW pump. The AFW System has adequate redundancy to provide the minimum required flow assuming a single failure. The analysis of a loss of normal FW shows that following a loss of normal FW, the AFWS is capable of removing the stored and residual heat plus reactor coolant pump heat, thereby preventing either over pressurization of the RCS or loss of water from the reactor coolant system and returning the plant to a safe condition.