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NL-13-016

January 28, 2013

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

SUBJECT: Licensee Event Report # 2012-009-00, "Unanalyzed Condition and Safety System Functional Failure due to Use of Rad Bypass Switch for Steam Generator Blowdown Isolation Valves which Defeats Their Automatic Isolation for Analyzed Events"
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) 2012-009-00. The attached LER identifies an event where there was an unanalyzed condition and a safety system functional failure due to use of the Rad Bypass switch for Steam Generator blowdown isolation valves during maintenance activities which defeats their automatic isolation for analyzed events. This condition is reportable under 10 CFR 50.73(a)(2)(ii)(B) and 10CFR50.73(a)(2)(v)(B). This condition was recorded in the Entergy Corrective Action Program as Condition Report CR-IP2-2012-02408, CR-IP2-2012-06920, CR-IP2-2012-06952, CR-IP2-2012-07356 and CR-IP2-2013-00191.

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) 254-6710.

Sincerely,

Patrick W. Conway for John A. Ventosa

JAV/cbr

cc: Mr. William Dean, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 2
Mrs. Bridget Frymire, New York State Public Service Commission
LEREvents@inpo.org

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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
05000-2473. PAGE
1 OF 6

4. TITLE: Unanalyzed Condition and Safety System Functional Failure due to Use of Rad Bypass Switch for Steam Generator Blowdown Isolation Valves which Defeats Their Automatic Isolation for Analyzed Events

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	28	2012	2012-	009	- 00	01	28	2013	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	<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 checked="" 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 checked="" 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)	

10. POWER LEVEL
100%

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME Tom Cramer, Assistant Operations Manager Support	TELEPHONE NUMBER (Include Area Code) (914) 254- 5821
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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

14. SUPPLEMENTAL REPORT EXPECTED

☒ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☐ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
4	15	2013

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

On November 26, 2012, Operator review of a tag-out for a Preventive Maintenance of the Steam Generator (SG) blowdown (SGBD) radiation monitor R-49 determined the tagout would have placed all the SGBD isolation valves (ISVs) in Rad Bypass. Operators could not identify any procedure allowing this action and determined this action was previously reported in LER-2012-004 as an unanalyzed condition and safety system functional failure when an Auxiliary Feedwater pump is out of service. The normal ISV position is open which allows the ISVs to Auto close for heat sink events (Loss of Normal Feedwater, Loss of All AC Power to the Station Auxiliaries) in addition to containment Phase A isolation. Analyzed degraded heat sink events assume SGBD isolation occurs and continuous SGBD during these events has not been analyzed. SG inventory would not be maintained if only one motor-driven AFW pump was operable as it may not provide adequate flow with the SGBD ISVs open. A review identified previous tagouts that placed the SGBD ISVs in Rad Bypass with an Auxiliary Feedwater pump or its emergency power supply inoperable. The apparent cause has not been determined. Corrective action was revision of procedure 2-PC-2Y23-49 to delete steps to place in Rad Bypass while performing Radiation Monitor R-49 calibration and installation of a test jumper to disable the blowdown function (as reported in LER-2012-004). Applicable archived tagouts were locked from further use. UFSAR Section 14.1.9 was revised to state SGBD isolation is assumed starting from event initiation. An apparent cause evaluation will be performed. 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 November 26, 2012, Operator review of a tag-out for Preventive Maintenance (PM) of the Steam Generator (SG) blowdown (BD) (SGBD) {WI} radiation monitor R-49 {IL} determined the tagout would place all the SGBD isolation valves (ISVs) in Rad Bypass. Operators could not identify any procedure allowing this action and determined that a similar condition was previously reported in LER-2012-004 as an unanalyzed condition and safety system functional failure. LER-2012-004 reported that use of the Rad Bypass switch position for SGBD ISVs would defeat the automatic isolation of the SGBD ISVs for degraded heat sink events. LER-2012-004 reported that on March 27, 2012, during management review of current condition reports (CR), a CR recorded a condition regarding the use of the Rad Bypass switch. Management review identified a past event at unit 3 which resulted in a reportable event. A CR was initiated (CR-IP2-2012-02408) for a review and evaluation on the use of the Rad Bypass feature associated with the control switches for the SGBD isolation valves {ISV}. The use of the Rad Bypass switch {HIS} position for SGBD isolation valves above mode 3 and when applicable in 4 would defeat the automatic isolation of the blowdown isolation valves for degraded heat sink events [Loss of Normal Feedwater (UFSAR Section 14.1.9), Loss of All AC Power to Station Auxiliaries (UFSAR Section 14.1.12)]. The normal SGBD isolation valve position is open which allows the ISVs to Auto close for heat sink events in addition to containment Phase A isolation. The Containment Phase A isolation function is unaffected. These analyzed events assume SGBD isolation occurs and continuous SGBD during these events has not been analyzed. SG inventory may not be maintained because one Auxiliary Feedwater (AFW) {BA} pump {P} would not provide adequate flow with the blowdown isolation valves open.

A previous review of past operation for usage of Rad Bypass identified that on January 19, 2011, test 2-PC-2Y23-49 (Liquid Radiation Monitor Calibration) was initiated and on January 22, 2011, at 17:00 hours, the SGBD isolation valve switches were positioned in Rad Bypass. Test 2-PC-2Y23-49 was exited on January 27, 2011. During this time on January 20, 2011, the 21 Auxiliary Feedwater Pump (AFWP) was removed from service for testing. For degraded heat sink events, failure to close the SGBD isolation valves would result in inadequate maintenance of SG inventory because one Auxiliary Feedwater pump would not provide adequate flow with the blowdown isolation valves open. Although the turbine driven AFW pump was available, this pump requires operator action to provide flow to the SGs. The condition was recorded in the Indian Point Energy Center (IPEC) Corrective Action Program (CAP) as Condition Report CR-IP2-2012-02408 (as reported in LER-2012-004).

Subsequently, on November 26, 2012, operators reviewing a draft tagout for a one year PM on radiation monitor R-49 (SGBD) questioned the tagout boundaries because the proposed tagout would place all the SGBD isolation valves in Rad Bypass. Operators could not identify any procedure that would allow placing the SGBD isolation valves in Rad Bypass. The draft tagout was developed from an archived tagout for the one year PM. Management responded to the operations question noting a previous LER reporting the improper use of the Rad Bypass switch. The condition was recorded in the IPEC CAP as CR-IP2-2012-06920. As a result of identifying this condition, operations revised (locked-out) the tagouts that would place the SGBD valves in Rad Bypass. The archived tagout used as a basis for a new tagout was 2C20-1/RM-133-R-49 1YR PM. A review determined that this tagout was hung on May 3, 2011 at 03:10 hours and removed on May 6, 2011 at 16:46 hours.

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A review of CR-IP2-2012-06920 noted on November 28, 2012 that during the time the R-49 tagout was in place on May 3-6, 2011, the 21 AFW pump was out of service to calibrate pump flow transmitters under tagout AFW-013-T-2-PC-EM8B and was inoperable from 06:05 hours to 23:16 hours on May 3, 2011. This condition was recorded as CR-IP2-2012-06952.

A review by Operations Support of tagout cycle folders for the previous three years for maintenance activities that had tagouts that placed the SGBD isolation in Rad Bypass identified ten additional tagouts. Further review of these tagouts identified one tagout which was implemented that also had the emergency power supply for one of the motor-driven AFW pumps out of service. The applicable tagout was Maintenance tagout SW-087-B-SWN-945 PM hung on December 8, 2009, at 02:34 hours and lifted at 17:50 hours. During tagout SW-087-B-SWN-945 PM in which the SGBD isolation valve switches were in Rad Bypass, the 23 EDG was tagged out from December 7, 2009, at 05:00 hours to December 9, 2009, at 23:55 hours. The 23 EDG powers 480 Volt bus 6A which supports the 23 AFW pump. As a result of these findings, CR-IP2-2012-07356 was initiated to assess understanding of the accident analysis assumptions as related to the Rad Bypass feature.

The primary function of the SG blowdown system is to aid in maintaining the secondary side water chemistry of the SGs within specification. Secondary functions include providing samples of water in the secondary side of the SG, and providing a means of draining the shell side of the SGs for inspection and maintenance. There are four SGs and one blowdown line for each SG. There are two connections (nozzles) taken from opposite sides of each SG just above the tube sheet and are headered together on the outside casing of the SG to form a 2 inch blowdown line, one for each SG. The blowdown lines for each SG exit containment and each header is equipped with two series containment solenoid operated isolation valves (SGBD isolation valves) which can be remotely operated from the Control Room (CR) {NA}. The eight SGBD isolation valves are air operated to open, and fail closed. After leaving containment the blowdown lines are routed to a blowdown flash tank which normally drains to the circulating water (CW) {KI} discharge canal via the service water (SW) return header. An alternate drain path is provided to the sump tank in the Liquid Waste Disposal system {WD}. The blowdown flash tank vents to atmosphere and is fitted with a spray system that can be used to condense the flashed blowdown. A SG sample line is taken from each blowdown line outside containment after the containment isolation valves. Sampling isolation valves HCV-5050 through HCV-5053 close automatically when either upstream SGBD isolation valve starts to close. A pressure reduction blowdown valve (MS-71) is provided which throttles blowdown flow. This valve can be adjusted to obtain blowdown rates up to 80 gpm. Valve MS-71 is normally adjusted to a blowdown rate of approximately 20 gpm.

Automatic operation of the SGBD isolation valves (PCV-1214/1214A through PCV-1217/1217A) provides for automatic trip close on the following signal: 1) containment Isolation Phase A, 2) High Radiation as measured by R-49, 3) Automatic start signal for the motor driven AFWs, 4) ATWS Mitigation System Actuation Circuit (AMSAC) activation upon a very low SG water level. Any one of the trip signals is an abnormal condition indicated in the CR on Panel SC. For manual SGBD operations the blowdown isolation valves can be closed through the use of two single Close-Remote switches on Panel SN in the Control Room (one switch for the inboard CIV and one for the outboard CIV). When this switch is in the closed position, blowdown cannot be initiated. With this switch in the Remote position each pair of valves in a given blowdown line is under the control of eight three position Close-Open-Radiation Bypass switches located on Panel SC in the CR. Each valve is provided with position indicating lights in the Control Room.

The purpose of procedure 2-PC-2Y23-49 is to calibrate Liquid Radiation Monitor R-49.

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The procedure is an Instrumentation and Control (I&C) procedure with switch positioning performed by operations. The procedure has a Caution that during testing of monitor R-49, placing a SG blowdown valve control switch in Rad Bypass inhibits its automatic closure for AMSAC, Main Boiler Feed Pump trip, and AFWP start (AMSAC is degraded but not inoperable). Operators performing the test knew the cautions but performed the switch manipulation in accordance with the procedure as reported in LER-2012-004.

An extent of condition review was conducted to identify other procedures (I&C and Operations) that reference use of the Rad Bypass switch at unacceptable times as reported in LER-2012-004. The following procedures were identified: 1) 2-SOP-7.1 (SGBD Operations), 2) 2-SOP-1.11 (SG Filling, Wet Layup, Recirculation and Sparging), 3) 2-SOP-1.10 (SG Draining and dry Layup), 4) 2-PT-R141 (Phase A Testing), 5) 2-PC-2Y23-49 (Liquid Radiation Monitor Calibration), 6) 2-PC-Q76 (R-49 Channel Test), 7) 2-PT-M97 (R-49 source check), 8) 2-PT-Q70 (R-49 Flow Meters). The review determined only one procedure would provide an impact (2-PC-2Y23-49) and this procedure was revised. As a result of CR-IP2-2012-06952, an expanded extent of condition review determined that there were Maintenance activities requiring tagouts that used the Rad Bypass switches. In addition to the initial set of 10 tagouts discussed earlier, there were four additional Maintenance tagouts that put the SGBD isolation valves in Rad Bypass but these tagouts were greater than three years old. These tagouts were also locked out to prevent use as an archive tagout. No other unit 2 impacts were identified and unit 3 had this condition identified in 2001 and the corrections for that event were maintained (LER-2001-001).

The Cause of Event

The apparent cause for the condition has not yet been determined. The apparent cause for inappropriate use of the Rad Bypass Switch reported in LER-2012-004 was due to inadequate review during historical procedure review and inadequate implementation of the Operating Event (OE) for a Rad Bypass event at Unit 3 (OE 12628). The test procedure revision in 2002 deleted information from an OE that restricted when the blowdown radiation monitor could be tested. Procedure revision 3 had an inadequate review of the basis of revision 2 which incorporated the OE restricting the use of Rad Bypass when testing Radiation Monitor R-49 (SGBD) to when the reactor coolant system (RCS) is less than 350 degrees. Operators were aware of the purpose of the switch (to override closure signals), but were not aware of the assumptions for the applicable analyzed events in the UFSAR. The UFSAR for the analyzed events did not specifically state that SGBD isolation is assumed starting from event initiation.

Corrective Actions

The following corrective actions have been performed under the Corrective Action Program (CAP).

- Procedure 2-PC-2Y23-49 was revised to delete steps to place SG Blowdown Isolation Valves in Rad Bypass while performing Radiation Monitor R-49 calibration and to install a test jumper to disable the blowdown function from Radiation Monitor R-49 (as reported in LER-2012-004).
- Applicable Maintenance tagouts were locked-out to prevent their use as archive tagouts.

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- UFSAR Section 14.1.9 was revised to state that SGBD isolation is assumed starting from event initiation (as reported in LER-2012-004). UFSAR Section 14.1.12 was not revised as it references UFSAR Section 14.1.9 for decay heat removal by the AFW System.
- An apparent cause evaluation will be performed for the events and this LER revised as necessary to identify the cause and any additional corrective actions

Event Analysis

The event is reportable under 10CFR50.73(a)(2)(ii)(B) and 10CFR50.73(a)(2)(v)(B). The licensee shall report any condition that resulted in: (B) The nuclear power plant being in an unanalyzed condition that significantly degraded plant safety, and any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to (B) Remove residual heat. This event meets the reporting criteria because placement of the switch for the SG Blowdown isolation valves in Rad Bypass on January 19-27, 2011, defeated their Auto close function for degraded heat sink events (Loss of Normal Feedwater, Loss of All AC Power to Station Auxiliaries) while the 21 AFW pump was out of service. Failure to close the SG blowdown isolation valves would result in inadequate maintenance of SG inventory because one motor driven Auxiliary Feedwater pump would not provide adequate flow with the blowdown isolation valves open. Each motor driven AFW pump feeds two SGs. The turbine driven AFW pump feeds all four SGs. Subsequently, on November 28, 2012, a review of the archived tagout condition recorded in CR-IP2-2012-06920 determined the tagout required the Rad Bypass switch to be in Rad Bypass and the 21 AFW pump was out of service on May 3, 2011. Further review identified another tagout on December 8, 2009, that required the Rad Bypass switch to be in bypass while the 23 EDG was out of service. The 23 EDG provides the emergency power for the 23 AFW pump which would be required for the analyzed events (LOOP, Loss of Normal Feedwater), which assume SGBD isolation. These analyzed events assume SGBD isolation occurs and continuous SGBD during these events has not been analyzed. The condition was a safety system functional failure (SSFF) since during the maintenance activity one motor driven AFWP was out of service or its emergency power supply was out of service resulting in inadequate maintenance of SG inventory. In accordance with reporting guidance in NUREG-1022, for a SSFF per 10CFR50.73(a)(2)(v), an additional random single failure need not be assumed during the condition. As a result of identifying additional conditions (tagout) that placed the Rad Bypass switches in Rad Bypass a review of LER-2012-004 determined the extent of condition missed the opportunity to identify the past tagout issues. This condition was recorded in CR-IP2-2013-00191. As the tagout conditions did not occur during a single activity over a reasonably short time a new LER was initiated.

Past Similar Events

A review was performed of the past three years of Licensee Event Reports (LERs) for events reporting control switches that could defeat or bypass automatic design features. One Unit 2 LER was identified (LER-2012-004). LER-2012-004 reported that use of the Rad Bypass switch position for SGBD ISVs would defeat the automatic isolation of the SGBD ISVs for degraded heat sink events. During the condition on January 19-27, 2011, the 21 AFW pump was out of service resulting in an unanalyzed condition and a SSFF.

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 applicable accidents or transients (LONF or LOOP) during the time testing was performed by 2-PC-2Y23-49 (LER-2012-004) and during the time that the tagouts in question were in place.

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During the time testing was being performed and during tagouts to support Maintenance work which required the SG blowdown isolation valve switches to be positioned in Rad Bypass, the turbine driven AFW Pump (AFWP) was available and capable of providing adequate feedwater flow to maintain SG inventory. Operators have CR instrumentation available for monitoring SG level and alarms to alert them to low levels. Alarm response procedures are provided for low SG level which would be entered and appropriate actions taken. Operators would know the SGBD isolation valves were in Rad Bypass and would take mitigating action if a heat sink event occurred. For the LONF or LOOP events, procedure 2-E-0 (Reactor Trip or Safety Injection) would be entered. At step 4 (check Safety Injection (SI) Status), for SI not required, the procedure requires 1) verification of AFWP(s) running as necessary to establish total feed flow greater than 760 gpm, 2) maintain total feed flow greater than 760 gpm, 3) Go to 2-ES-0.1 step 1. The basis for 2-E-0 states for SI not required, AFWPs are started to satisfy SPU LONF/LOAC Analysis requiring 760 gpm AFW flow within 10 minutes for heat removal if only one motor driven pump auto starts. Feedwater flow to the SGs will not be affected by the condition and heat sink cooling will be provided by use of the SG atmospheric dump valves (ADVs), or condenser steam dump, and in this case blowdown. SG inventory will be impacted but plant procedures will ensure SG narrow range level is reestablished in all SGs to maintain symmetric cooling of the RCS. Additionally, SG blowdown is normally throttled by valve MS-71 to approximately 20 gpm even with the SG blowdown isolation valves open. During the May 3, 2011 event per 2C20-1/RM-133-R-49 1YR PM, SG blowdown was approximately 25 gpm, and for the December 8, 2009 event, tagout SW-087-B-SWN-945 PM, SG blowdown was also approximately 25 gpm per SG.