

Indian Point 3  
Nuclear Power Plant  
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John H. Garrity  
Resident Manager

December 22, 1993  
IPN-93-164

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Stop PI-137  
Washington, D.C. 20555

SUBJECT: Indian Point 3 Nuclear Power Plant  
Docket No. 50-286  
Licensee Event Report # 93-052-00  
"Condensate Storage Tank Instrument Loops  
Violation of Separation Criteria, Due to  
Personnel Error, Place The Plant Outside  
Design Basis"

Dear Sir:

The attached Licensee Event Report (LER) 93-052-00 is hereby submitted in accordance with the requirements of 10CFR50.73. This event is of the type defined in the requirements pursuant to 10CFR50.73(a)(2)(ii)(B). Also attached are the commitments made by the Authority in this LER.

Very Truly Yours,

A handwritten signature in cursive script that reads 'John H. Garrity'.

John H. Garrity  
Resident Manager  
Indian Point 3 Nuclear Power Plant

JHG/vjm

cc: See Next Page

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S PDR

Handwritten initials 'JHG' and the date '11/22' written vertically.

Docket No. 50-286  
IPN-93-164  
Page 2 of 3

Mr. Thomas T. Martin  
Regional Administrator  
Region 1  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, Pennsylvania 19406

INPO Records Center  
700 Galleria Parkway  
Atlanta, Georgia 30339-5957

U.S. NRC Resident Inspector's Office  
Indian Point 3

Attachment 1  
List of Commitments

Number	Commitment	Due
IPN-93-164-01	A modification (MMP 93-3-363 COND) will revise the Condensate Storage Tank level control circuitry to meet RG 1.97 criteria. The modification will relocate the power supply (LQ-1128) and all associated internal wiring inside rack D-9 for the LT-1128 loop to the Channel I section of control room rack D-9.	Startup
IPN-93-164-02	A review will be conducted of control room racks which supply power to multiple instrumentation channels that require separation to maintain redundancy to verify that cross channelization does not exist. LER 93-052-00 will be supplemented to report findings, if identified and required.	January 14, 1994
IPN-93-164-03	The plant design drawings for those control room racks which supply power to multiple instrumentation channels requiring separation to maintain redundancy will be updated to indicate the electrical channel that each device is assigned to.	December 31, 1994
IPN-93-164-04	The original plant design electrical separation implementation criteria will be updated and converted into a permanent plant design guide that can be easily referenced and updated as changes or additions are made in the future.	December 31, 1994

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Indian Point Unit 3		DOCKET NUMBER (2) 05000286	PAGE (3) 1 OF 6
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TITLE (4) Condensate Storage Tank Instrument Loops Violation of Separation Criteria, Due to Personnel Error, Place The Plant Outside Design Basis

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	22	93	93	-- 052 --	00	12	22	93	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 000	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)						
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER						
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
	20.405(a)(1)(iv)	✓ 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)							
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)								

LICENSEE CONTACT FOR THIS LER (12)

NAME David Alley, Site Engineering	TELEPHONE NUMBER (Include Area Code) (914) 736-8392
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	✓	NO					

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

On November 22, 1993 at approximately 1100 hours with the plant in a cold shutdown condition, Site Engineering identified redundant condensate storage tank level transmitters that were powered from the same power supply. This condition is outside the plant design basis. The cause of the event is personnel error, a misjudgment due to inadequate verification during a modification. Site Engineering will determine the extent of condition by reviewing control room racks with redundant instrumentation. The Authority will take additional corrective action by relocating the power supply for one level transmitter loop prior to startup, adding the power supply channel assignment to plant design drawings for control room racks with redundant instruments and updating the electrical design guide.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)		PAGE (3)
Indian Point Unit 3	05000286	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
		93	-- 052 --	00
				2 OF 6

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

DESCRIPTION OF THE EVENT

On November 22, 1993, at 1100 hours, with the reactor in cold shutdown (reactor power level at 8 cps, reactor coolant temperature at 105 degrees F, reactor coolant pressure at atmospheric and pressurizer level at 28%), Site Engineering issued Deviation Event Report (DER) 93-762 to document a design error in the Condensate Storage Tank (CST) (TK) level instrumentation (LI). During a walkdown of the CST level instrumentation for modification MMP 93-3-363 COND, Site Engineering discovered that the power supply for CST level transmitter LT-1128 was located in the Channel IV portion of control room rack D-9 and was powered from a Channel IV receptacle in this rack. All of the external cabling for this transmitter loop is routed in Channel I raceway. This condition is not consistent with the redundancy requirements of Regulatory Guide 1.97 that were committed to in 1986 because the redundant level instrumentation is also powered from Channel IV. Site Engineering reviewed the events leading to this condition.

LT-1128 and its associated power supply, LQ-1128, located in control room rack D-9, are original plant equipment installed during construction of the plant. The original plant design provided one level indication loop (LT-1128) for the CST. The transmitter function is to indicate CST level on the supervisory control panel (SCF) and the plant critical function monitoring system (CFMS). There is no automatic control function.

The Electrical Separation Implementation Design Guide (design guide) identifies the original electrical separation design criteria. These criteria did not require the LT-1128 loop to be channelized in any particular channel. Once a loop cable is run in any tray or conduit containing a cable from Channel I, II, III or IV, the design guide separation criteria considers the loop to be associated with that channel and restricts the loop cable to this channel (it may not enter another tray or conduit containing vital cables from a different channel). The original installation was in compliance with this design criterion since all LT-1128 loop cable external to control room rack D-9 is routed entirely in Channel I raceway.

In 1980, Indian Point 3 added a redundant level transmitter (LT-1128A) and a separate level indicator (LI-1128A) to the SCF to provide a more reliable means for the control room operators to monitor CST inventory and facilitate compliance with Technical Specification requirements for minimum tank inventory. The redundant transmitter (LT-1128A), associated power supply (LQ-1128A), indicator (LI-1128A) and all

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 6
		93	-- 052 --	00	

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

interconnecting cabling were all channelized in Channel IV. IQ-1128A was located in the Channel IV section of control room rack D-9 and powered from a Channel IV receptacle.

The design of the redundant level transmitter complied with the design guide criteria for channelizing (once a cable entered a raceway which was channelized that cable did not leave this channel and enter another channel containing vital cables) and was in a separate channel from the original level transmitter. The design was intended to but did not comply with electrical separation criteria (redundant components must be supplied from redundant power supplies) since the original level indicator was powered from channel IV, the same source as the new transmitter. The Site Engineering review concluded that there was inadequate design verification. The design group apparently did not fully recognize the lack of available information for electrical separation and take additional steps for verification (e.g., walkdown). When preparing the modification to add LT-1128A, the design group did not have plant drawings for the instrumentation racks in the control room that clearly indicated which receptacle was powered from which power source. These racks contain multiple channels. Since channelization of the original CST level indicator was not required it is not identified in the design guide. In addition to inadequate verification by the design group, the procedures in use at the time did not provide sufficient guidance to assure the design review was adequate. The failure to meet the electrical separation criteria at the time the modification was made is not reportable because compliance was not required to meet plant design bases (there was no regulatory requirement for redundant level indication).

In 1986, the Authority advised the NRC that the existing CST level instrumentation (L-1128 and L-1128A loops) were capable of meeting the requirements of Regulatory Guide (RG) 1.97 for providing the required information on CST level to the control room operators. The RG 1.97 requirement for redundant Category 1 variables states, "No single failure within either the accident-monitoring instrumentation, its auxiliary supporting features, or its power sources concurrent with the failures that are a condition or result of a specific accident should prevent the operators from being presented the information necessary for them to determine the safety status of the plant and to bring the plant to and maintain it in a safe condition following that accident." There was a survey to verify compliance with RG 1.97. The complete implementation of design criteria for the level transmitters was not verified as the basis for compliance.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)		PAGE (3)
Indian Point Unit 3	05000286	YEAR 93	SEQUENTIAL NUMBER -- 052 --	REVISION NUMBER 00
				4 OF 6

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

The current plant design has been in violation of RG 1.97 requirements since 1986 when the commitment to meet RG 1.97 was made. The failure to meet criteria when adding the second CST level indication loop caused both CST level indication loops to be powered from Instrument Bus 33, Circuit 27. This does not meet the RG 1.97 redundancy requirement. Loss of the circuit or instrument bus will disable all CST level indication in the control room. A failure in the LT-1128 (Channel I) loop could also result in the consequential loss of Instrument Bus 33, Circuit 27 due to an electrical fault in the LT-1128 loop, with a single failure of the power supply fuse in IQ-1128, thus causing the Instrument Bus 33, Circuit 27 to trip to clear the fault and all devices which are powered from this circuit to become inoperable.

CAUSE OF THE EVENT

The cause of the event was personnel error, a misjudgment due to lack of verification (inadequate checking and design verification). In the 1980 modification that installed the redundant level transmitter loop (LT-1128A), the design personnel did not adequately research the installation of loop LT-1128 to verify complete channelization and verify that the new LT-1128A loop met design criteria for complete separation of redundant instrumentation.

CORRECTIVE ACTION

To correct this condition and to prevent recurrence, the following corrective actions will be performed:

- A modification (MMP 93-3-363 COND) will revise the Condensate Storage Tank level control circuitry to meet RG 1.97 criteria. The modification will relocate the power supply (IQ-1128) and all associated internal wiring inside rack D-9 for the LT-1128 loop to the Channel I section of control room rack D-9. This modification is scheduled to be completed before start-up.
- A review will be conducted of control room racks which supply power to multiple instrumentation channels that require separation to maintain redundancy to verify that cross channelization does not exist. LER 93-052-00 will be supplemented to report findings, if identified and required. This review is scheduled for completion by January 14, 1994.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)		PAGE (3)
Indian Point Unit 3	05000286	YEAR 93	SEQUENTIAL NUMBER -- 052 --	REVISION NUMBER 00
				5 OF 6

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

- The plant design drawings for those control room racks which supply power to multiple instrumentation channels requiring separation to maintain redundancy will be updated to indicate the electrical channel that each device is assigned to. This will be completed by December 31, 1994.
- The original plant design electrical separation implementation criteria will be updated and converted into a permanent plant design guide that can be easily referenced and updated as changes or additions are made in the future. This will be completed by December 31, 1994.

The modification process has been improved since the original error in 1980. The Modification Control Manuals (MCMs) were issued a few years ago and peer-checking and self-checking has been encouraged to improve the quality and effectiveness of the modification process. The MCM process requires a vigorous review and independent design review for all modifications involving safety related components. It was during a review process under the current MCM process that the channelization discrepancy described in this LER was discovered. The review was conducted to add a component to the CST level indication loop. The current MCM process coupled with the corrective actions being taken are considered adequate to prevent recurrence. The commitment process used for addressing RG 1.97 does not require corrective action since engineers should be able to rely on compliance with the criteria established for safety related designs.

ANALYSIS OF THE EVENT

This event is reportable under 10 CFR 50.73(a)(2)(ii)(b). The Licensee shall report any event or condition that resulted in the plant being in a condition that was outside the licensing design basis of the plant. The routing of redundant channels of an instrument loop in the same channel and powering them from the same source violates the plant licensing design basis.

Similar events have been reported in previous Licensee Event Reports (LER). Violations of electrical separation criteria were reported in LERs 93-026, 93-025, 93-006 and 92-006.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 6
		93	-- 052 --	00	

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

**SAFETY SIGNIFICANCE**

There is no effect on the public health and safety due to this condition. The two CST indication loops are powered from Instrument Bus 33, Circuit 27. A postulated failure in either CST indication loop can result in the consequential loss of the instrument bus circuit but the other components powered from this circuit have redundant components which are not affected. The postulated failure of the circuit or instrument bus will disable all CST level indication in the control room and the CST level is a parameter that the operators are required to have the capability to monitor per RG 1.97. The CST is required to have adequate water to support operation of the auxiliary feedwater system. If the two CST level indicators are lost, there is safety related local indication of the CST level. Local capability therefore remains to monitor any refill activities. During normal operation, the level of the CST is maintained in accordance with Technical Specification 3.4.A.3 (requires at least 360,000 gallons in the CST when the reactor is above 350 degrees). There are two safety related control room alarms (channels I and IV) to warn the operators when the CST reaches approximately 381,000 gallons. Additionally, the flow path to the main condenser, the major non safety user of CST water, is automatically terminated above the technical specification level.

Site Engineering will determine the extent of condition by reviewing control room racks which supply power to multiple instrumentation channels that require electrical separation to maintain redundancy. Isolation devices prevent a fault in a single power source from affecting multiple channels.