

A. Alan Blind
Vice President

Consolidated Edison Company of New York, Inc.
Indian Point Station
Broadway & Bleakley Avenue
Buchanan, NY 10511
Telephone (914) 734-5340
Fax: (914) 734-5718
blinda@coned.com

January 24, 2000

Re: Indian Point Unit No. 2
Docket No. 50-247
LER 99-020-00

Document Control Desk
US Nuclear Regulatory Commission
Mail Station PI-137
Washington, DC 20555-0001

The attached Licensee Event Report 99-020-00 is hereby submitted in accordance with the requirements of 10 CFR 50.73.

Very truly yours,



Attachment

C: Mr. Hubert J. Miller
Regional Administrator - Region I
US Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. Jefferey Harold, Project Manager
Project Directorate I-1
Division of Reactor Projects I/II
US Nuclear Regulatory Commission
Mail Stop 14B-2
Washington, DC 20555

Senior Resident Inspector
US Nuclear Regulatory Commission
PO Box 38
Buchanan, NY 10511



NRC FORM 366 (6-1998)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001 Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If 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) (See reverse for required number of digits/characters for each block)		

FACILITY NAME (1) Indian Point No. 2	DOCKET NUMBER (2) 05000-247	PAGE (3) 1 OF 9
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TITLE (4)
 Failure of Cable Spreading Room Fire Dampers to Close During Surveillance Testing

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
12	23	1999	1999	-- 020 --	00	01	24	2000		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)	99		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)				

LICENSEE CONTACT FOR THIS LER (12)

NAME Richard T. Louie, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) 914-734-5678
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

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

On December 23, 1999, with the unit at 99 percent steady state power, approximately one-half of the Cable Spreading Room (CSR) fire dampers failed to close upon receipt of a halon fire suppression system actuation signal which was transmitted while performing surveillance test PT-EM19, "Cable Spreading Room Halon System." The affected fire dampers were FD-01, FD-02, FD-03, FD-06 and FD-07. Proper closure of the CSR fire dampers upon halon system actuation is necessary to ensure that the required halon concentration is achieved within the CSR in the event of a fire. The cause of this failure has been attributed to incorrectly wired electrical controls for the damper closure circuit. These incorrectly wired electrical circuits were corrected and the associated fire dampers re-tested successfully. An investigation to determine the root cause of this event has been initiated.

This report is being made per 10 CFR 50.73(a)(2)(ii)(B) as a condition found to be outside the design basis of the plant. Pursuant to 10 CFR 50.72(b)(1)(ii)(B), this event was reported to the NRC on December 23, 1999.

The health and safety of the public was not affected by this event.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Indian Point No. 2	05000-247	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 9
		1999	-- 020	-- 00	

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

PLANT AND SYSTEM IDENTIFICATION:

Westinghouse 4-Loop Pressurized Water Reactor

EVENT IDENTIFICATION:

Failure of Cable Spreading Room Fire Dampers to Close During Surveillance Testing

EVENT DATE:

December 23, 1999

REFERENCES:

Condition Report (CR) Nos: 199909486, 199909492, 200000041

PAST SIMILAR EVENTS:

None

EVENT DESCRIPTION:

On December 23, 1999, with the unit at 99 percent steady state power, approximately one-half of the Cable Spreading Room (CSR) fire dampers failed to close upon receipt of a halon fire suppression system actuation signal which was transmitted while performing surveillance test PT-EM19, "Cable Spreading Room Halon System." The affected fire dampers were FD-01, FD-02, FD-03, FD-06 and FD-07. Proper closure of the CSR fire dampers upon halon system actuation is necessary to ensure that the required halon concentration is achieved within the CSR in the event of a fire. With these fire dampers not fully closed, it cannot be assured that the required provisions of the NRC-approved fire protection program as described in the IP-2 Fire Protection Program Plan (FPPP) could be maintained. The cause of this failure has been attributed to incorrectly wired electrical controls for the damper closure circuit. The actuation circuit for the halon system was investigated, and it was determined that two pairs of wires were incorrectly installed on a terminal block within junction box EWH-12. Fire damper closure by other means such as main transformer deluge actuation was not affected by this condition. At approximately 1600 hours on December 23, 1999 the incorrectly wired electrical circuit was corrected and the associated fire dampers re-tested successfully. An investigation to determine the root cause of this event was initiated.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Indian Point No. 2	05000-247	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 9
		1999	-- 020	-- 00	

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

EVENT ANALYSIS:

This report is being made per 10 CFR 50.73(a)(2)(ii)(B), as a condition found to be outside the design basis of the plant. The health and safety of the public were not affected since an actual fire requiring the CSR halon system to function did not occur.

Following recovery from this event, a team was established to determine the root cause for the failure of the CSR fire dampers to close. The focal points of the team's root cause evaluation were 1) the technical adequacy of the engineering modifications performed, including documentation; 2) the adequacy of the 1997 post-modification testing; 3) the adequacy of subsequent surveillance testing, including implementation and scheduling; 4) the existence of any other maintenance activities that could have potentially affected the damper circuits subsequent to the installation of the modification; and 5) any "Extent of Condition" reviews resulting from the items mentioned above.

CSR Halon System Design

The CSR halon system is a total flooding, manually actuated system which may be manually released by two means. The first is an electrical release of the actuating nitrogen from the pilot release assembly that is activated by the manual pull station located adjacent to the control panel, and the other is by a push button on the pilot release assembly that directly releases the actuating nitrogen. When the system is actuated, the CSR dampers will close and halon gas will be released via discharge nozzles into the CSR. The Cable Spreading Room/Electrical Tunnel Exhaust Fans are first manually tripped in order to ensure that the required halon concentration is achieved within the CSR. The fire dampers are held open with an "electro-thermal" link (ETL) that is designed to melt when exposed to heat, or in response to an electrical voltage. This separates the link into two pieces which then allows the dampers to physically close.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point No. 2	05000-247	1999 --	20 --	00	4 OF 9

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

Modification and Post-Modification Testing

In May of 1997 Con Edison completed a modification which upgraded the CSR fire dampers from 1-1/2 hour-rated to 3 hour-rated. This upgrade (Modification No. CPC-85-40836) entailed installation of new fire dampers for the CSR and the 480V Switchgear Room on the north wall of the control building, new ETLs, and new control wiring. The documentation for this modification was prepared in two parts: a civil/mechanical specification which addressed the fire damper installation, and an electrical specification which addressed the installation of the ETL control wiring. The mechanical specification required that a test of the dampers be performed by actuating or melting the new ETLs. The electrical specification initially required that a test be performed by actuation of each initiation signal (i.e., halon, and deluge). However, prior to the implementation of the modification package, the electrical test requirements were amended to allow the performance of continuity checks, and megger testing of the newly installed cables, and a full operational test of the fire dampers in lieu of active actuation of each signal.

The investigation following the December 23, 1999 event determined that the cause of the failure was an incorrectly wired control circuit associated with fire damper closure contained within junction box EWH-12. Post-modification testing performed in June of 1997 failed to detect the incorrectly wired control circuits because the testing had not included the halon actuation portion of the circuitry. The post-modification testing failed to detect the incorrectly wired control circuits because closure of the dampers was actuated via the transformer deluge circuit only. In lieu of actively testing this circuit, the modification test requirement to perform continuity checks (to be accomplished by point-to-point wire checks with Quality Control verifications), and limited meggering was relied upon instead of an operational test of the circuit.

The investigation included a review of the modification's work verification package. The purpose of the work verification package is to ensure that the modification is completed in accordance with design requirements. Review of the termination sheets for the incorrectly wired control circuits within junction box EWH-12 indicated that the work was completed and Quality Control verified as required by the modification. These terminations matched the wiring schedule requirements, but were contrary to the as-found field conditions.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER			PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point No. 2	0500-247	1999	020	-- 00	5 OF 9

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

Surveillance Test Requirements

The Facility Operating License (No. DPR-26) for Indian Point 2 (IP-2) contains license condition 2. K. which states, in part, that "...all provisions of the NRC approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR) for the facility and as approved in Safety Evaluation Reports...." shall be implemented and maintained in effect. The Fire Protection Program Plan (FPPP) document provides a consolidated description of the IP-2 fire protection program, and serves as a reference document for information pertaining to the program and controls for fire protection program activities. Station Administrative Order (SAO) -700 implements aspects of the NRC approved fire protection program. Further, SAO-703, Addendum II, requires that the CSR halon system be demonstrated operable by the performance of a system functional test once per 18 months. This test verifies that the system, including ventilation dampers and fans, actuates properly upon receipt of a manual simulated test signal. During the root cause investigation of this event, it was determined that the damper portion of CSR system functional test had not been performed within the 18 month frequency as required by SAO-703.

On February 9, 1998, the CSR halon system functional test was performed. A temporary procedural change (TPC) to PT-EM19 was written to delete the damper drop test, since the test had been performed only 8 months prior. Credit was taken for the post-modification test performed on June 4, 1997. Thus, actuation of the dampers from the halon system was not performed on February 9, 1998. A satisfactory test of only the halon actuation portion of the system was completed on February 12, 1998. However, due to a scheduling error, the next functional test was performed on December 23, 1999. This exceeded the 18 month interval for the damper drop test as required by SAO-703. The due date for the test had been erroneously scheduled from February 12, 1998 instead of the correct date of June 4, 1997.

The cause of this event is attributed to incorrectly wired control circuits associated with fire damper closure contained in junction box EWH-12. Root cause investigation following the December 23, 1999 test failure concluded that this incorrect wiring most probably occurred while implementing the modification which upgraded the CSR fire dampers in May of 1997. Inadequate post-modification testing and delayed surveillance testing prevented the timely discovery of the wiring error. As a result, the inoperability of the CSR halon system was not known until the failure of PT-EM19 on December 23, 1999.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER			PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point No. 2	0500-247	1999	020	-- 00	6 OF 9

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

EVENT SAFETY SIGNIFICANCE:

The CSR halon system is described in Con Edison licensing submittals dated September 18, 1978 and November 16, 1978 and in NRC SER dated January 31, 1979 as a manually-actuated system that will be utilized at the discretion of the fire brigade leader, dependent on the specific fire conditions encountered in the zone. These documents identify the halon system as a secondary or supplemental fire suppression capability, with primary reliance placed on manual fire suppression. Therefore, it is likely that a postulated fire would be extinguished without the need to actuate the halon system.

The design and licensing basis of the CSR halon system does not specify the fire hazard of concern. However, the predominant combustible loading in this room is cable in overhead cable trays, but the cables do not present a significant/credible ignition source. Power and control cables are provided with overcurrent protection in accordance with IP2 design guidelines, and instrumentation cables are inherently energy-limited, precluding any concern relative to faults capable of causing a fire in cables. Further, the IP2 Individual Plant Examination of External Events-Fire Analysis established that cabinet fires and floor-based transient combustible fires are the dominant/credible fire events in the CSR. These fire hazards would be below the level of the wall opening that was unsealed due to the failure of the dampers to actuate.

Due to the sealed nature of the cabinets in the CSR, it is unlikely that the halon would penetrate sufficient to extinguish a postulated fire. This type of fire would most likely be manually extinguished using fire extinguishers or hose stream. The halon system can be expected to be very effective against the floor-based transient combustible fires, which would not be characterized as deep-seated fires, and which would be located below the level of the unsealed opening. As noted in National Fire Protection Association (NFPA) 2001-1996, Appendix B, Section B-1.2.2.5, "Enclosures with large overhead leaks but no significant leaks in the floor slab and walls will yield unrealistically short retention time predictions. Experience has shown that enclosures of this type can be capable of retaining clean agent for prolonged periods."

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER			PAGE
Indian Point No. 2	0500-247	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 9
		1999	- 020	-- 00	

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

The 7-ft height from the floor slab to the bottom of the unsealed ventilation opening can be considered to be the effective "ceiling" height. A portion of the discharged gas would disperse out this opening, and would be replaced in the upper portion of the room with fresh outdoor air. This will cause the halon interface to recede into the lower portion of the room - ultimately below the bottom of the unsealed opening. At this point, further dilution of the halon concentration will be minimized, as there is no static pressure (exhaust fans are not operating) to cause halon to be dispersed out the ventilation opening in the upper portion of the room, and leakage paths in the lower wall and floor areas are insignificant. Therefore, considering a 2 percent concentration margin and an additional allocation of halon from the Electrical Tunnel (the tunnel is provided with a preaction sprinkler system - the 500 lbs. of halon discharged up the tunnel will settle back into the CSR due to the slope of the tunnel, and help to offset any minor leakage of halon from the CSR). Thus, the halon content should be effectively retained in the lower portion of the room throughout a projected 10-minute soak time.

The CSR contains the normal power supplies for safe shutdown equipment and is separated from other areas of the plant that contain the alternate power supplies by 3-hour rated fire barriers. Thus, even if it is assumed that a postulated fire is not extinguished in a timely manner, it is reasonable to expect that the safe shutdown of the plant would not be adversely impacted.

Therefore, based on the above, the safety significance of the inoperability of the CSR halon system is minimized.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER			PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point No. 2	0500-247	1999	020	00	8 OF 9

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

CORRECTIVE ACTION:

One of the items initially completed by the root cause investigation team was the "Extent of Condition" review. The purpose of an "Extent of Condition" review is to determine whether another condition similar to the incorrectly wired circuit could exist, which had not yet been discovered. This review focused upon those recently modified systems which were still awaiting the completion of surveillance testing. The review concluded that the modifications made to those systems had no impact on their operability, and any errors made would have been subsequently detected during either post-modification testing, routine surveillance testing, or routine plant operation.

The following corrective actions will be taken in order to prevent a recurrence of this type of event:

Complete an extent of condition review of failed post-modification tests for Class A (i.e., safety-related) electrical modification work. The purpose of this review is to determine if electrical workmanship deficiencies exist which were not identified and corrected by the Quality Control verification process. This action will be completed by February 28, 2000.

Perform a sample review of the inspection activities performed by the particular Quality Control individual involved with this event. This action will be performed by February 28, 2000.

Identify and revise appropriate station procedures to require that future modifications issued by Engineering include testing requirements that specify test objectives, scope, general method, and acceptance criteria to assure demonstration of correct functioning of structures, systems, and components affected by the modification. This action will be completed by March 31, 2000.

Revise SAO-470, "Surveillance Test Program" to enhance administrative controls for partial surveillance tests. These are those tests which are performed in sections, at different times, which, when assembled, constitute a complete test. Whenever this is performed, the decision must be documented in order to identify the justification, the purpose for each partial test, and emphasize that all test requirements need to be met. The proposed revision will require that the next performance date of a test be calculated using the earliest date of the particular partial tests, as applicable. This action will be performed by March 31, 2000.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER			PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Indian Point No. 2	0500-247	1999	- 020	-- 00	9 OF 9

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

Although it is not possible to specifically determine why the incorrectly wired control circuit was missed by the Quality Control inspector, it should be noted that at least two past similar instances were found of Quality Control inspectors failing to detect errors. The cause for those errors was attributed to the inspectors becoming too involved with the actual completion of the work activity as opposed to its work quality, thus losing objectivity. The corrective actions implemented to address those errors were identified in Condition Reports 199703947 and 199803414.