

James S. Baumstark
Vice President
Nuclear Engineering

Consolidated Edison Company of New York, Inc.
Indian Point 2 Station
Broadway & Bleakley Avenue
Buchanan, New York 10511

Internet: baumstarkj@coned.com
Telephone: (914) 734-5354
Cellular: (914) 391-9005
Pager: (917) 457-9698
Fax: (914) 734-5718

April 27, 2000

Re: Indian Point Unit No. 2
Docket No. 50-247
LER 1998-007-01

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

The attached Licensee Event Report 1998-007-01 is hereby submitted in accordance with the requirements of 10 CFR 50.73.

Sincerely,



Attachment

cc: 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

JE28

LICENSEE EVENT REPORT (LER)

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

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.

FACILITY NAME (1)

Indian Point No. 2

DOCKET NUMBER (2)

05000-247

PAGE (3)

1 OF 5

TITLE (4)

Failure of Gas Turbine Output Breaker to Close onto a De-energized Bus

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																																														
05	22	1998	1998	-- 007	-- 01	04	27	2000		05000																																														
<table border="1"> <tr> <td>OPERATING MODE (9)</td> <td>N</td> <td colspan="9">THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)</td> </tr> <tr> <td>POWER LEVEL (10)</td> <td>000</td> <td>20.2201(b)</td> <td>20.2203(a)(2)(v)</td> <td>50.73(a)(2)(i)</td> <td>50.73(a)(2)(viii)</td> </tr> <tr> <td></td> <td></td> <td>20.2203(a)(1)</td> <td>20.2203(a)(3)(i)</td> <td>X 50.73(a)(2)(ii)</td> <td>50.73(a)(2)(x)</td> </tr> <tr> <td></td> <td></td> <td>20.2203(a)(2)(I)</td> <td>20.2203(a)(3)(ii)</td> <td>50.73(a)(2)(iii)</td> <td>73.71</td> </tr> <tr> <td></td> <td></td> <td>20.2203(a)(2)(ii)</td> <td>20.2203(a)(4)</td> <td>50.73(a)(2)(iv)</td> <td>OTHER</td> </tr> <tr> <td></td> <td></td> <td>20.2203(a)(2)(iii)</td> <td>50.36(c)(1)</td> <td>50.73(a)(2)(v)</td> <td rowspan="2">Specify in Abstract below or in NRC Form 366A</td> </tr> <tr> <td></td> <td></td> <td>20.2203(a)(2)(iv)</td> <td>50.36(c)(2)</td> <td>50.73(a)(2)(vii)</td> </tr> </table>											OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									POWER LEVEL (10)	000	20.2201(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)
OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)																																																						
POWER LEVEL (10)	000	20.2201(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

James J. Maylath, Senior Engineer

TELEPHONE NUMBER (Include Area Code)

(914) 734-5356

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
D	EA	CPU	W290	Y					
E	EA	CPU	W290	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).

X NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

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

On May 22, 1998, and with the unit at cold shutdown, during phase testing of the Gas Turbine No. 3 (GT3) control wiring, it was determined that the GT3 breaker was not capable of being closed onto a de-energized bus. GT3 is one of three gas turbines that comprise the Alternate AC (AAC) System for Indian Point No.2 under the Station Blackout Rule in accordance with 10CFR50.63. Following the failure to close the GT3 output breaker to a de-energized bus, the GT3 output breaker controls were modified, and the GT3 output breaker was successfully closed onto a de-energized bus. Initial testing under the Station Blackout Rule provided for starting each gas turbine with a black start diesel and no other external power supplying the gas turbine auxiliaries. However, the initial testing provided for synchronizing the gas turbine output to an energized bus. Only one gas turbine, GT1, had been tested where the output breaker was closed to a de-energized bus. This test on GT1 was performed following a modification to the gas turbine output breaker controls. On June 16, 1998, a test similar to the May 22, 1998 GT3 test was performed on GT2, and it was determined that the GT2 breaker was also not capable of being closed onto a de-energized bus. The GT2 output breaker controls were then modified, and the GT2 output breaker was successfully closed onto a de-energized bus. These events were caused by the gas turbines control system configuration, which was not common for GT2 and GT3, preventing the closure of the output breaker to a de-energized bus. The root cause for failing to previously detect these configurations was determined to be an insufficiently comprehensive test for anomalies in the gas turbine control system when GT2 and GT3 were deployed as AAC System sources.

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 5
		1998	-- 007	-- 01	

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

PLANT AND SYSTEM IDENTIFICATION:

Westinghouse 4-Loop Pressurized Water Reactor

IDENTIFICATION OF OCCURRENCE:

Failure of Gas Turbine Output Breaker to Close onto a De-energized Bus

EVENT DATE:

May 22, 1998

REPORT DUE DATE:

June 22, 1998

REVISION DATE:

April 27, 2000

REFERENCES:

Condition Identification and Tracking System (CITRS) No. 98-E04377

PAST SIMILAR OCCURRENCE:

None.

DESCRIPTION OF OCCURRENCE:

On May 22, 1998, with the unit at cold shutdown during phase testing of the Gas Turbine No. 3 (GT3) control wiring, the GT3 breaker was determined to be incapable of being closed onto a de-energized bus. This testing was being performed following a modification on the gas turbine output breaker synchronizing circuit. GT3 is one of three gas turbines that comprise the Alternate AC (AAC) System for Indian Point No. 2 under the Station Blackout Rule. Previous testing under the Station Blackout Rule provided for starting each gas turbine with a black start diesel and no other external power supplying the gas turbine auxiliaries. However, this testing provided for synchronizing the gas turbine output to an energized bus. Only GT1 had been tested for closure of its output breaker to a de-energized bus. This test had been performed during November 1995 following a modification that added a second potential transformer (PT) set on the 13.8 kV bus associated with

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	1998	-- 007 --	01	3 OF 5

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

DESCRIPTION OF OCCURRENCE (con't.):

the output of GT1. A similar modification had been performed on GT2 and GT3 prior to the modification on GT1. However, there is no record of similar testing being performed on GT2 or GT3.

Subsequent to the May 22, 1998 event, GT1 was successfully tested for closure of its output breaker to a de-energized bus. After modifications were implemented, GT3 was successfully tested for closure of its output breaker to a de-energized bus on June 8, 1998. A test of GT2 for closure of its output breaker to a de-energized bus was performed on June 16, 1998. The GT2 output breaker failed to close onto its associated de-energized bus. Subsequent to this failure, modifications were implemented, and on June 21, 1998 GT2 was successfully tested for closure of its output breaker to a de-energized bus.

ANALYSIS OF OCCURRENCE:

This report is being submitted in accordance with 10CFR50.73(a)(2)(ii) for a condition that is outside the plant design basis. This plant condition, as discovered, could have resulted in the AAC System not being capable of powering the shutdown (480 V) buses as stated in NRC letters dated November 21, 1991, "Safety Evaluation of the Indian Point Nuclear Generating Unit No. 2, Response to the Station Blackout Rule (TAC No. M68556)," and June 4, 1992, "Supplemental Safety Evaluation of Indian Point Nuclear Generating Unit No. 2, Response to the Station Blackout Rule (TAC No. M68556)." The AAC System consists of three gas turbines. At least one gas turbine and one blackstart diesel and associated switchgear (for connection to, as well as picking up load on the 480 V buses) must be operable for the AAC System to be considered operable.

The initial blackstart tests, which were considered successful, provided for starting each gas turbine from a blackstart diesel with no external power supplied to the gas turbine auxiliaries. Following the start of each gas turbine, the gas turbine output breaker was closed onto its associated 13.8 kV bus which was energized. As these breakers closed when required during the initial test, the breaker operation was considered successful. At that time (these initial tests were performed in 1993), the present Woodward Control System had not yet been installed on any of the three gas turbines. Subsequent to the failure of the GT2 and GT3 output breakers to close onto a de-energized bus, the initial tests performed on all three gas turbines in 1993 under the Station Blackout Rule were reviewed. This review showed that no condition existed during the performance of the initial tests that could have prevented these breakers from closing onto a de-energized bus. These breakers were successfully closed to an energized bus during the initial tests. Since the time for breaker closure is the same whether the bus is energized or de-energized, the initial tests are still valid.

Since November 21, 1993, when the AAC System was required to be operable, there have been no station blackout events at Indian Point No. 2. Plant Technical Specifications require at least one gas turbine to be operable at all times. If no gas turbine is operable, plant operation can continue for seven days before either establishing an alternate independent power system or initiating plant shutdown. Since this Technical

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	1998	-- 007 --	01	4 OF 5

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

ANALYSIS OF OCCURRENCE (con't.):

Specification requirement was issued prior to the Station Blackout Rule, AAC System capability is not required by Technical Specifications for gas turbine operability, although administratively AAC system capability was required for gas turbine operability. In compliance with the Station Blackout Rule, the AAC System was committed to be available at least 95% of the time that the reactor is operating. Except for two intervals in 1994 (9 days and 17 days), GT1 was available as an AAC source in accordance with Technical Specifications and administrative requirements. GT1 was also available as an AAC source for approximately 93% of the time that the plant was at power operation during the 1993 to 1998 period. Therefore, the de-energized closure status of GT2 and GT3 in relation to the AAC System had a minimal impact on safety and did not violate any Technical Specification requirements. This event did not result in any injuries to personnel or the public or damage to equipment.

CAUSE OF OCCURRENCE:

The failure of the GT3 output breaker to close onto a de-energized bus resulted from three factors.

- One of the three voltage transducers that communicates the 'dead bus' signal to the GT3 Woodward Control System was reading 0.5 VAC on C-phase. All three voltage transducers must read 0 VAC to communicate a 'dead bus' signal to the Woodward Control System and permit output breaker closure.
- The 'dead bus closure' selection on the GT3 Woodward Control System was not configured for the proper communication path with the system computer logic.
- A component of the control circuit was wired to the feeder side of the PT which is de-energized when the output bus is de-energized. The Woodward Control System requires this control circuit to be energized to provide a close signal to the output breaker. Therefore, breaker closure was precluded by the output bus being de-energized.

The failure of the GT2 output breaker to close onto a de-energized bus resulted from a software problem in its Woodward Control System that would not permit closure of the GT2 output breaker without sensing voltage on the bus associated with the gas turbine. The conditions of the failures of the output breaker to close onto a de-energized bus for GT2 and GT3 were not common to both gas turbines and were apparently present since the Woodward Control Systems were installed in 1993. The root cause for failing to previously detect these conditions was the lack of a comprehensive test of the starting and loading of the gas turbines both with and without external power (associated bus de-energized) following the installation of the Woodward Control Systems and PTs on GT2 and GT3. At the time that the Woodward Control Systems were installed, GT2 and GT3 were maintained by a corporate centralized Gas Turbine Group (this group was responsible for about 2,000 MW of gas turbine capability on the Con Edison System). This Gas Turbine Group did not use the same design and drawing controls required at Indian Point No. 2. This factor led to the lack of performance of suitable postmaintenance tests, based on the application of GT2 and GT3 as AAC System sources, by the Gas

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	1998	-- 007 --	01	5 OF 5

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

CAUSE OF OCCURRENCE (con't.):

Turbine Group following the installation of the Woodward Control Systems. GT1, which was under station administrative controls, had been tested successfully for closure of its output breaker to a de-energized bus following installation of the second PT set in November 1995. GT2 and GT3 maintenance has been under station administrative controls since a corporate realignment of the Con Edison System gas turbines at the end of 1994. All three gas turbines are considered AAC System sources in accordance with NUMARC 87-00 (in lieu of Reg. Guide 1.155) as described in Con Edison's April 14, 1989 Station Blackout Rule submittal. These gas turbines are not listed in Con Edison's Appendix B or Appendix R QA programs and are not subject to Appendix B or Appendix R requirements as described in Con Edison's December 23, 1991 Station Blackout Rule submittal. GT1, GT2, and GT3 are under the requirements of the Maintenance Rule.

CORRECTIVE ACTION:

Following the May 22, 1998 event, a procedure change was implemented to allow the Operator to disconnect the output breaker connection to the Woodward Control System. With this change, the output breaker was successfully closed onto its associated de-energized bus, and the gas turbine was capable of being manually loaded. The Woodward Control System has since been corrected, and GT3 has been started and connected to its associated de-energized bus with the Woodward Control System. The tests that were performed on the three gas turbines in 1993 in compliance with the Station Blackout Rule were reviewed, and their results were confirmed. Since the plant returned to power operation in September 1998, the AAC System has been available at least 95% of the time that the reactor has been operating.

A test of GT2 for closure of its output breaker to a de-energized bus was also performed and was not successful. The Woodward Control System for GT2 was investigated for reconfiguration of the software to permit closure of the GT2 output breaker to a de-energized bus. The GT2 Woodward Control System software had used bus voltage as a permissive source for closing the gas turbine field breaker, as well as the output breaker. This was to assure that the machine was properly excited and had load to be assumed prior to admitting additional fuel to the machine. The GT2 Woodward Control System software was changed to permit closure of the GT2 output breaker to a de-energized bus. The source for determination of proper machine excitation by the Woodward Control System software was changed to the DC source that supplies the exciter. Upon completion of these changes, GT2 was started and connected to its associated de-energized bus with the Woodward Control System. GT1 had been tested successfully for closure of its output breaker to a de-energized bus during November 1995. In addition, a modification was performed on all three gas turbines that provides for approximately +/- 5 VAC tolerance (there was previously no tolerance) on the voltage transducers that communicate the "dead bus" signal to the Woodward Control System. This has enhanced communication of a "dead bus" signal to the Woodward Control System and assures output breaker closure when required.