

November 6, 2006

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 1 and Unit 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: LER 1-06-004, Both Offsite Circuits Inoperable

This Licensee Event Report (LER) addresses a condition that could have prevented fulfillment of a safety function and a condition prohibited by Technical Specifications. In response to INPO SOER 99-1 Loss of Grid – Addendum recommendation 4, an Engineering review of the site voltage regulation study calculation identified an error in the post unit trip voltage drop limit. The site voltage regulation study calculation was determined to be non-conservative and could have resulted in actuation of the 4kV safeguard bus degraded voltage relays following a unit trip caused by a design basis loss of coolant accident (LOCA). This non-conservatism could have resulted in a loss of one or both in-service offsite circuits.

Report Number: 1-06-004
Revision: 00
Event Date: November 11, 2005
Discovered Date: September 7, 2006
Report Date: November 6, 2006

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v)(d) and 10CFR50.73(a)(2)(i)(B).

There are no commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Original signed by Chris Mudrick for

Ron J. DeGregorio
Vice President – Limerick
Exelon Generation Company, LLC

cc: S. J. Collins, Administrator Region I, USNRC
S. L. Hansell, USNRC Senior Resident Inspector, LGS

LICENSEE EVENT REPORT (LER)

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

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 Limerick Generating Station, Unit 1	2. DOCKET NUMBER 05000352	3. PAGE 1 OF 4
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4. TITLE
Offsite Circuits Inoperable Due To Site Voltage Regulation Study Calculation Error

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	11	2005	2006	- 004 -	0	11	06	2006	Limerick Unit 2	05000353
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
	<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)						
10. POWER LEVEL 100	<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 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 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 checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A						

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Robert E. Kreider, Manager – Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) 610-718-3400
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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	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO			

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

In response to INPO SOER 99-1 Loss of Grid – Addendum recommendation 4, an Engineering review of the site voltage regulation study calculation identified an error in the voltage drop limit. The site voltage regulation study calculation was determined to be non-conservative and could have resulted in actuation of the 4kV safeguard bus degraded voltage relays following a unit trip caused by a design bases loss of coolant accident (LOCA). This non-conservatism could have resulted in a loss of one or both in-service offsite circuits. Station procedures have been revised to declare the offsite sources inoperable when grid conditions do not support operability and direct initiation of appropriate compensatory measures. The site voltage regulation study calculation has been revised to correct the error.

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

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. Unit 2 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On December 27, 1999, INPO issued SOER 99-1 Loss of Grid. On December 9, 2004 INPO issued SOER 99-1 Loss of Grid - Addendum. Recommendation 4 of the addendum stated the following:

Periodically review, confirm and update the grid reliability and stability design assumptions to ensure they remain valid following changes or modifications to the plant and to the grid. The review should include the following, as a minimum:

- Grid restoration time assumptions to restore off-site power sources to the plant
- The impact on plant voltage limits and voltage predictions following a generator trip, including whether a generator trip could result in a loss of off-site power

Engineering performed a review as a result of the SOER Addendum recommendation and identified that the voltage regulation study (Calculation 6300E.20) assumptions did not match the current transmission system (EIS:FK) operating strategy. The calculation incorrectly assumed a 1.7% grid voltage drop upon a trip of an operating unit. This value is non-conservative in that the Transmission System Operator (TSO) can, under unusual grid conditions, operate the grid to a post trip contingency voltage limit of 7%, and interfaces had not been established between the TSO and Limerick Operations for notification if the calculated limits were exceeded.

A review of the prior three years of operating history identified several occasions when calculated post trip contingency voltages could have resulted in actuation of the 4 kV safeguard bus degraded voltage relays (EIS:RLY). Two periods, during single offsite circuit operation, were identified when a LOCA on an operating unit could have caused an actuation of the degraded voltage relays resulting in a loss of the only in-service offsite circuit. A review of actual selected grid configurations during a two-week period in the summer of 2006 identified occasions when a LOCA on an operating unit could have resulted in the loss of both offsite circuits.

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These events involved a condition that could have prevented fulfillment of the safety function for the offsite power sources. In addition one or both offsite circuits may have been inoperable for periods that exceeded the Technical Specification 3.8.1.1 Action "g" allowable outage time of 24 hours. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(v)(d) and 10CFR50.73(a)(2)(i)(B).

Analysis of the Event

There were no actual safety consequences associated with this event. The potential safety consequences of this event were minimal. The calculation error resulted in brief periods during operation with degraded grid conditions when the 4 kV safeguard bus degraded voltage relays could have actuated following a LOCA on an operating unit. An actuation of the 4 kV safeguard bus degraded voltage relays would have tripped the offsite circuit feeder breakers to the affected 4 kV safeguard buses. The on-site emergency diesel power supply (EIS:EK) operability was not affected.

Limerick Offsite Power System design consists of one 13 kV circuit from the 220 kV substation and one 13 kV circuit from the tertiary of a transformer (EIS:XFMR) that connects the 220 kV substation and the 500 kV substations. The circuit from the 220 kV substation utilizes 10 station auxiliary transformer and "101" safeguard transformer to feed "101" safeguard 4 kV bus. The circuit from the tertiary utilizes "20" regulating transformer and "201" Safeguard Transformer to feed "201" safeguard 4 kV bus. Each unit has four 4kV safeguard buses. Two 4kV safeguard buses on each unit are normally energized from "101" bus and two buses on each unit are normally energized from "201" bus. Limerick has a robust onsite power supply that consists of eight emergency diesel generators (EDGs). The eight EDGs can provide power to the eight 4 kV safeguard buses.

Each 4 kV safeguard bus voltage is monitored by a set of degraded voltage relays. These relays open the source breaker supplying the bus when bus voltage remains below the setpoint for periods that exceed the time delays.

The 4 Kv safeguard bus degraded voltage relay time delays vary with bus voltage as follows: 1) 3910 volts 61 second delay, 2) 3640 volts 52 second delay, and 3) 2905 volts 1 second delay. The 3910 volts delay is reduced to 10 seconds during LOCA conditions. The short LOCA time delay challenges the offsite circuit transformers automatic voltage control (AVC) capability to raise voltage above the relay setpoint to prevent relay actuation and subsequent trip of the offsite circuits 4 kV breakers. The long time delay for non-LOCA conditions allows the transformer AVC to increase voltage and prevent a relay actuation.

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Cause of the Event

The site voltage regulation study calculation was based on a voltage drop limit of 1.7% and the TSO operational limit was 7%. Interfaces had not been established between the TSO and Limerick Operations for notification if the calculated limits were exceeded. In addition, the post trip contingency percentage voltage drop was not previously considered when determining offsite source operability.

Corrective Action Completed

The site voltage regulation study calculation has been revised.

The 101 and 201 safeguard transformer load tap changer (LTC) time delays were modified to provide more operational margin and the transformer tap changers are now required to be maintained in automatic mode.

An interface agreement was established with the TSO to require a prompt notification to the station when the post trip contingency voltage drop due to a potential Limerick unit trip exceeds the calculation values.

The station grid emergency procedure (E-5) has been revised to properly address degraded grid conditions and station electrical alignments. The procedure identifies the grid conditions and electrical alignments that require the offsite circuits to be declared inoperable. Compensatory measures are also directed by the procedure to preclude offsite source inoperability.

Station procedures have also been revised to initiate compensatory measures to obtain additional post trip contingency voltage margin under certain plant configurations (ST-6-092-365-0 and ST-6-092-366-0).

Previous Similar Occurrences

There was a previous occurrence of unplanned inoperability of the offsite circuits that was reported in LER 1-05-005. The implementation of a modification on the 101 and 201 transformer automatic tap changer time delays did not ensure that procedures require the offsite circuit to be declared inoperable when the tap changer was placed in manual mode.