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10CFR 50.73

February 07, 1996
Docket Nos. 50-352
50-353
License Nos. NPF-39
NPF-85

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Licensee Event Report
Limerick Generating Station - Units 1 & 2

This LER reports a condition where Unit 1 and Unit 2 were in non-compliance with the requirements of the Facility Operating Licenses NPF-39 and NPF-85, Condition 2.C.1. Both units were discovered to have operated in excess of 100% rated power due to a core thermal power calculation methodology error.

Reference:	Docket Nos. 50-352 50-353
Report Number:	1-96-002
Revision Number:	00
Event Date:	January 18, 1996
Report Date:	February 07, 1996
Facility:	Limerick Generating Station P.O. Box 2300, Sanatoga, PA 19464-2300

This LER is being submitted pursuant to the requirements of License Conditions 2.F and 2.E for Unit 1 and Unit 2 respectively, which require a 30-day written followup report.

Very truly yours,

DMS:cah

cc: T. T. Martin, Administrator Region I, USNRC
N. S. Perry, USNRC Senior Resident Inspector, LGS

IE22

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Limerick Generating Station, Unit 1	05000 352	1 OF 4

TITLE (4) Operation in Excess of 100 Percent Rated Thermal Power due to Core Thermal Power Calculation Methodology Error.

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
									LGS, Unit 2	05000 353
01	18	96	96	-- 002 --	00	02		96	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)		
POWER LEVEL (10)	100		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)	X	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	TELEPHONE NUMBER (Include Area Code)
J. L. Kantner, Manager - Experience Assessment, LGS	(610) 718-3400

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)	X	NO				

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

On January 18, 1996, station personnel identified non-compliances with the Operating License Condition 2.C.1 resulting from Unit 1 and Unit 2 previously operating marginally above the nominal 100% of rated Core Thermal Power (CTP) (i.e., 3293/3458 Megawatts thermal (MWt)) by a maximum of 0.45 MWt. These conditions were caused by a failure to account for approximately 3 gpm flow from the Control Rod Drive (CRD) system to the reactor recirculation pumps in the Nuclear Steam Supply System (NSSS) heat balance and plant CTP calculations. Based on the low order of magnitude of error and conservatism inherent in the accident analysis, these conditions did not result in any adverse impact to the health and safety of the general public or plant personnel. The Unit 2 heat balance has been adjusted to correct for the CRD flow. Unit 1, which was in end of cycle coastdown at the time of identification, will have its heat balance corrected prior to startup from the planned refueling outage in February 1996. This event is reportable under Operating Licenses NPF-39 Section 2.F for Unit 1, and NPF-85 Section 2.E for Unit 2.

Unit Conditions Prior to the Event:

On January 18, 1996, Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at 89% power level in end of cycle coastdown. Unit 2 was in OPCON 1 at 100% power level.

Description of the Event:

On December 15, 1995, plant personnel were notified of a potential nonconservative error in the process computer calculation for CTP. Operations promptly reduced Unit 2 reactor power by one MWth to ensure compliance with the licensed maximum CTP for the unit. No action was required for Unit 1 due to the fact that the reactor was in end of cycle coast down. Engineering personnel initiated an analysis of the calculation and the Unit 1 and 2 CTP operating histories.

On January 18, 1996 at 1500 hours, station personnel identified that Unit 1 and Unit 2 had previously operated marginally above 100% of rated Core Thermal Power (CTP) (i.e., 3293/3458 Megawatts thermal power (MWt) respectively). Specifically, flow from the Control Rod Drive (CRD) system was not properly accounted for in the Nuclear Steam Supply System (NSSS) heat balance and CTP calculation. The system flow in question was approximately 3 gpm which resulted in an actual reactor power that exceeded indicated power by no more than 0.45 Mwt.

The General Electric (GE) design of the CRD system requires approximately 3 gpm to be provided to the Reactor Recirculation System (RCS) pumps for seal staging flow. A review of GE Nuclear Energy Group (GE-NEG) documentation and discussions with GE personnel revealed that the flow from the CRD system to the RCS pumps has never been considered in the NSSS heat balance and CTP calculations for any BWR plant. GE was unable to determine why this value was not considered. In addition, GE determined that there was no margin in the CTP calculation methodology which would offset the 0.45 MWt error.

Several months of NSSS computer edits were reviewed to determine the operating margin to the licensed maximum power level. During this review, station personnel discovered that on August 7, 1995, the shift average for Unit 1, as indicated on the computer print out, exceeded the license limit by 0.1 MWt (3293.1). No discrepancies on the shift average for Unit 2 were identified during this review.

A 24-hour notification was made to the NRC at 1931 hours on January 18, 1996, in accordance with the requirements of Facility Operating License Conditions 2.F and 2.E for Unit 1 and Unit 2 respectively, since this event resulted in non-compliances with License Condition 2.C.1. License Condition 2.C.1 provides authorization to operate the Unit 1 and Unit 2 reactors at a maximum reactor CTP level of 100% rated power. Additionally, exceedance of the shift average for Unit 1 was reported in this notification. This report is being submitted in accordance with the requirements of License Conditions 2.F and 2.E, which require a 30-day followup written report.

Analysis:

Limerick Generating Station (LGS) accident analyses are performed at 102% CTP. Operation at 3293.45/3458.45 MWt (100.014%/100.013% rated CTP) is bounded by these analyses in Chapter 15, "Accident Analysis," of the Update Final Safety Analysis Report (UFSAR). This is consistent with the Unit 1 UFSAR Chapter 15, and the Power Rerate Safety Analysis Report for LGS Units 1 and 2. These analyses demonstrate that the emergency core cooling acceptance criteria of 10CFR50.46 would be met in the event of a design basis accident occurring at 102% of rated CTP. Since LGS Units 1 and 2 operated at a maximum of 100.014%/100.013% of rated CTP respectively, this event is within the bounds of the design basis accident analyses. The Unit 1 incident identified on August 7, 1995, is similarly bounded by this analysis based upon the initial analysis condition of 102% of rated CTP. In addition, the impact of the small nonconservative error in the CTP calculation on thermal limits is bounded by the inherent conservatism in the thermal limits calculation. Therefore, no thermal limits were violated. Based on the low order of magnitude of error and conservatism inherent in the accident analysis, these conditions did not result in any adverse impact to the health and safety of the general public or plant personnel. There was no release of radioactive material to the environment as a result of this event.

Cause of the Event:

The cause for omission of the additional CRD flow in the CTP calculation and heat balance for the RCS pump seal injection flow (original design) was inadequate review of system interactions by GE-NEG and LGS design engineering.

In the early 1970's, GE-NEG incorporated the CRD purge water design for the RCS pumps. At that time, GE did not recognize the system interaction or the impact to the NSSS heat balance and CTP calculation. In addition, review by LGS design engineering also failed to recognize the system interaction.

The cause for exceeding the Unit 1 shift average of 3293 MWt on August 7, 1995, was less than adequate attention to the thermal power average monitoring computer point on the part of control room personnel. A contributing factor was confusion over the format of the data displayed by the process computer's thermal power averaging software.

Corrective Actions:

The following corrective actions are being taken or have been completed to correct the condition and prevent recurrence:

1. The as-built reactor heat balance was revised to reflect the correct flow and enthalpies. The Unit 2 heat balance has been adjusted to correct for the CRD flow. The Unit 1 is currently in a refueling outage. The Unit 1 heat balance will be corrected prior to startup from this outage.

2. All Licensed Operators were briefed on the requirement to maintain the shift average core thermal power less than or equal to 3293/3458 MWt for Unit 1 and Unit 2 respectively and on the proper computer point to be used to monitor the shift average.

Previous Similar Occurrences:

None