VERMONT YANKEE
NUCLEAR POWER CORPORATION

P.O. Box 157, Governor Hunt Road
Vernon, Vermont 05354-0157
(802) 257-7711

November 17 1994
BVY 94-117

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

REFERENCE: Operating License DPR-28
Docket No. 50-271
Reportable Occurrence No. LER 94-12

Dear Sirs:

As defined by 10 CFR 50.73, we are reporting the attached Reportable Occurrence as LER 94-12.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Robert J. Wanczyk
Robert J. Wanczyk
Plant Manager

cc: Regional Administrator
USNRC
Region I
475 Allendale Road
King of Prussia, PA 19406

220035

IE22

NRC Form 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-89)

APPROVED OMS NO. 3150-0104
EXPIRES 4/30/92
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-350), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20603.

FACILITY NAME (1)	DOCKET NO. (2)	PAGE (3)
VERMONT YANKEE NUCLEAR POWER STATION	0 5 0 0 0 2 7 1	0 1 OF 0 4

TITLE (4)Exceeded Core Thermal License Limit by 0.75 MWTH due to the Isolation of the Feedwater Pressure Transmitter that Supplies a Signal to the Computer Program that Calculates Core Thermal Power

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQ #	REV #	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NO. (S)
1 0	1 0	9 4	9 4	- 0 1 2	- 0 0	1 1	1 7	9 4		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO REQ'MTS OF 10 CFR §: CHECK ONE OR MORE (11)							
POWER LEVEL (10)	1 0 0		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)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
.....			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 NO.
ROBERT J. WANCZYK, PLANT MANAGER	AREA CODE 8 0 2 2 5 7 - 7 7 1 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYST	COMPONENT	MFR	REPORTABLE TO NPRDS		CAUSE	SYST	COMPONENT	MFR	REPORTABLE TO NPRDS	
NA						NA					
NA						NA					

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

ABSTRACT (Limit to 1400 spaces, i.e., approx. fifteen single-space typewritten lines) (16)

On 10/24/94, it was discovered that during the period 10/10/94 through 10/21/94 Core Thermal Power (CTP) as calculated by the process computer was non-conservatively low by 1.6 Megawatts Thermal (MWTH). This calculation, used to determine reactor power, allowed Vermont Yankee to unknowingly exceed its license limit by a maximum of 0.75 MWTH. A feedwater pressure transmitter, whose signal is used as an input to the computer CTP calculation, was isolated according to procedure due to a leak in its sensing line. However, the operator did not realize that the transmitter provided data to the CTP calculation.

The root cause of this event is inadequate administrative controls. No source of information was available to the operators to allow them to assess the impact on the process computer calculations of CTP induced by a loss of an input signal.
A contributing cause was a lack of communications between the Operations and the Computer Engineering Group (CEG), on this issue, as no attempt was made to contact the CEG to determine the impact of the loss of the signal input due to isolation of the transmitter.

Immediate corrective action was to manually substitute a fixed value for the feedwater pressure signal. The CTP calculation then reported a correct value with a special status that the CTP was using a substituted value. Long term corrective actions will include evaluations: to improve the fault tolerance of the heat balance calculation; for additional training of the operators to improve their knowledge of the process computer and to create a document that provides information on each critical computer point.

DESCRIPTION OF EVENT

On 10/24/94 with the plant at 100% power, it was discovered that during the period 10/10/94 through 10/21/94 Core Thermal Power (CTP) as calculated by the process computer was non-conservatively low by 1.5 Megawatts Thermal (MWTH). This calculation, used to determine reactor power, allowed Vermont Yankee to unknowingly exceed its license limit by a maximum of 0.75 MWTH. During this period, the plant was shutdown between October 14, 1994 and October 17, 1994.

A leak had developed in the sensing line to the feedwater pressure transmitter (EIIS = PIT) that is used as an input to the computer CTP calculation and also provides indication in the control room. The signal does not directly provide any safety function(s). On October 10, 1994 a switching and tagging order was initiated and both isolation valves in the sensing line were closed. This isolated the pressure transmitter and the pressure in the line dropped to approximately 10 psig. The drop in pressure, sensed by the computer, resulted in errors being introduced into the feedwater density and feedwater enthalpy calculations which in turn caused the CTP calculations to be incorrect and produce a non-conservative CTP error of 1.5 MWTH.

Following the discovery of the error in the CTP calculation, the Reactor and Computer Engineering Department completed some trending to determine if any CTP limits had been exceeded. The analysis indicated that Vermont Yankee had not exceeded any limits. On October 24 additional analyses were completed and it was determined at that time that CTP had been exceeded by a maximum of 0.75 MWTH for the worst case.

For eight of the days Vermont Yankee was at power, with the feedwater pressure sensor isolated, the Operators controlled power based on 10 minute, one hour, four hour and eight hour averages of CTP. These calculations were also non-conservative by 1.5 MWTH. On several shift change boundaries, the eight hour average of CTP, when corrected by 1.5 MWTH, exceeded the Vermont Yankee Operating License Limit of 1593 MWTH. The worst case example occurred on October 21, 1994 at 0758 hours when a power level of 1593.75 MWTH was reached. It was discovered that the feedwater pressure signal was periodically dropping below its lower limit of 0 PSIG which momentarily caused the CTP calculation to be reported as invalid. Subsequently, the process computer signal for feedwater header pressure had a fixed value manually substituted which caused a valid CTP value to be calculated. The Operations Department was simultaneously informed of the problem and the immediate resolution. Operations began controlling power based on the valid CTP.

CAUSE OF EVENT

The root cause of this event is inadequate administrative controls. No source of information was available to the operators to allow them to assess the impact on the process computer calculations of CTP induced by a loss of an input signal.

CAUSE OF EVENT (CONT.)

There are two contributing causes to this event.

1) A lack of communications between Operations and the Computer Engineering Group (CEG), on this issue, in that no attempt was made to contact the CEG to determine the impact of the loss of the signal input and,

2) Failure of the process computer to alert control room operators when heat balance inputs are out of their normal range but not yet failed downscale.

ANALYSIS OF EVENT

The Vermont Yankee Fuel Reload Analysis for the current cycle assumes a Core Thermal Power (CTP) level in excess of 102% for all of it's FSAR accident and transient analysis, therefore, the 0.75 MWTH overpower is well within the analyzed range and had no safety significance. The slight overpower condition was consistent with all of the assumptions used for the analysis which therefore remains valid. Any similar postulated signal failure that could cause CTP to be non-conservative by values approaching two percent would be readily detected by the deviation from alternate measures of CTP which are based on high pressure turbine exhaust pressure or gross electrical generation. Operators would take action based on the non-conservative CTP value prior to exceeding any of these conditions. The Fuel Reload Analysis considers a wide range of reasonable and credible alternative conditions all of which resulted in acceptable analysis results.

The 0.75 MWTH error was most limiting at rated core thermal power. This error becomes smaller at lower power levels.

SOER 90-03 "Nuclear Instrument Miscalibration" collectively addressed several similar industry events . Vermont Yankee took several corrective actions related to this SOER. An alternate CTP calculation was developed on the process computer based on the high pressure turbine exhaust pressure. The instrumentation used by the CTP calculation had the following appropriately condensed note added to the Vermont Yankee Maintenance Planning and Control (MPAC) system equipment database, "Work on this component may have an affect on core thermal power calculated by the process computer. Notify Reactor and Computer Engineering and the control room prior to starting work." It was not considered practical or advisable to add this note to all non-instrumentation equipment that could affect the CTP calculation. Consequently, the valves that were tagged to isolate the feedwater pressure instrument did not have this note attached to their MPAC database.

General training (SOER 90-03) had previously been conducted to sensitize Operations and Technical Staff to the possibilities of errors in the CTP calculation.

CORRECTIVE ACTIONS

IMMEDIATE CORRECTIVE ACTIONS

1) The immediate corrective action was to manually substitute a fixed value for the feedwater pressure signal. The CTP calculation then reported a correct value with a special status to indicate that the CTP was using a substituted value.

2) The Operations Department was provided with a list of all heat balance computer inputs for immediate reference use along with actions to be taken and notifications to be made in response to failed or out-of-service heat balance inputs.

3) All other heat balance computer inputs were checked and found to be correctly reporting.

LONG TERM CORRECTIVE ACTIONS

1) Evaluate the need to improve the fault tolerance of the heat balance calculation to detect off-normal signals and automatically alert, correct, or compensate for the error. This will be completed by 1/28/95.

2) Create a reference document that provides the bases for each critical computer input signal. This will be completed by 10/30/95.

3) Evaluate the need to conduct additional training for the operators to improve their knowledge of the process computer and to improve their communications with the CEG when problems arise with the process computer. This will be completed by 12/30/94.

4) Create a process which specifies the actions to be taken by control room operators in response to failed or out-of-service computer inputs. This will be completed by 07/21/95

ADDITIONAL INFORMATION

No similar events have occurred at this facility in the last five years.