NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
VERMONT YANKEE NUCLEAR POWER STATION	0 5 0 0 0 2 7 1	1 OF 0 4

TITLE (4)
REACTOR SCRAM DUE TO SUSPECTED TURBINE PRESSURE CONTROL MALFUNCTION

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 NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
0 7	0 3	8 8	8 8	— 0 0 9	— 0 0	0 8	0 2	8 8	N/A	0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 0 0 1

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

20.402(b)	20.405(c)	X 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 (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	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 NUMBER (AREA CODE)
JAMES P. PELLETIER, PLANT MANAGER	8 0 2 2 5 7 - 7 7 1 1

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
NA					NA				
NA					NA				

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 fifteen single-space typewritten lines) (16)

ABSTRACT

On 7-3-88, with the Plant operating at 58% power, a shutdown was commenced to allow repair of a steam leak. At 13:45, approximately 30 minutes after the Main Turbine was taken offline, operators observed a Reactor pressure decrease from 930 PSIG to 872 PSIG over a five minute period with no operator action at a power level of approximately 5%.

Operators then used various modes of the Mechanical Hydraulic Control (MHC) (EIIS=JI) System, which controls and stabilizes Reactor pressure. MHC was found to operate erratically in all modes. Attempts to control pressure by positioning Main Steam Bypass Valves resulted in large valve position changes and subsequent Reactor pressure/water level oscillations. At 14:11, during a high level oscillation, the single operating Feedwater (EIIS=SJ) pump tripped. A standby Feedwater pump was started at 14:15 to maintain water level. The resulting introduction of relatively cold water into the Reactor vessel caused a rapid neutron flux/power increase which resulted in a high Intermediate Range Monitor (IRM)(EIIS=IG) flux scram from less than 1% power at 14:16. All safety systems responded as designed.

The root cause of this event is suspected as being a malfunction of the MHC hydraulic control oil system most probably caused by dirt/grit being lodged in a control oil pressure control valve.

Corrective action consisted of extensive MHC testing while shutdown, testing for proper operation of MHC during the subsequent startup, and plans for further MHC maintenance during the next refueling outage.

(Note, If additional pertinent information concerning the MHC malfunction is discovered during the upcoming refueling outage, a supplemental LER will be provided.)

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NRC Form 366A (9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

DESCRIPTION OF EVENT

On 7-3-88, with the Plant operating at 58% power, a shutdown was commenced to allow repair of a steam leak in the Feedwater Heater (EIIS=SM) system. At 13:45, approximately 30 minutes after the Main Turbine was taken offline, operators observed a decrease in Reactor pressure from 930 PSIG to 872 PSIG over a five minute period with no operator action. This pressure decrease occurred at a power level of approximately 5%.

(Note: Reactor pressure is normally controlled by the Mechanical Hydraulic Control (MHC)(EIIS=JI) System. This system consists of three pressure control modes; the Electrical Pressure Regulator (EPR), the Mechanical Pressure Regulator (MPR), and the Bypass Valve Opening Jack (BPOJ). The MHC system regulates system pressure during power operations by positioning Main Steam Control Valves at the Main Turbine inlet. When the Turbine is offline, as in this event, MHC regulates pressure by positioning a series of Bypass Valves which bypass steam directly from the Reactor to the Main Condenser. Each regulator may override the other and the regulator set for the lowest demanded pressure is in actual control.)

During the above described pressure decrease, Control Room indication showed both MPR and EPR regulators to be in primary pressure control simultaneously. The EPR, which was controlling pressure until the decrease, was apparently functioning below its normal operating pressure range. The EPR pressure setpoint was then raised to remove it from control. Operators then attempted to establish MPR control by lowering the MPR pressure setpoint. This attempt continued for approximately five minutes with little or no change in the indicated MPR setpoint. Reactor pressure was 850 PSIG at this point.

Next, operators attempted to assume pressure control with the BPOJ. (Note: The BPOJ allows for demand of a set Reactor pressure with no pressure sensing feedback mechanism.) However, BPOJ pressure control can only be assumed if it has the lowest demanded pressure. Therefore, BPOJ control resulted in further Bypass Valve opening and additional depressurization. The BPOJ did allow coarse adjustment of Bypass Valve position. Due to the greatly reduced power level at this point (approximately 1.5%), these position changes created Reactor pressure/water level oscillations.

At 14:11, during one of the high water level oscillations, the single operating Feedwater (EIIS=SJ) pump tripped. Reactor water level then began to decrease until a standby Feedwater pump was started at 14:15. The resulting introduction of relatively cold water into the Reactor after starting the backup pump caused a rapid neutron flux/power increase. This flux increase caused a corresponding increase in Intermediate Range Monitor (IRM)(EIIS=IG) indication and IRM high flux scram from less than 1% power at 14:16.

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CAUSE OF EVENT

The immediate cause of this event was the rapid power increase resulting from cold water injection upon starting the standby Feedwater pump.

Intermediate causes of this event are as follows:

a) Current plant procedures do not address response to low Reactor pressure when out of the "RUN" mode as in this event.

b) Personnel cognitive error was involved in that the use of any MHC pressure regulating mode during the depressurization event would serve to further depressurize the Reactor.

The suspected root cause of this event is a malfunction of the MHC system in the MPR mode. Although subsequent testing/troubleshooting did not identify the source of the malfunction, it is suspected that the MHC control oil system may have operated improperly due to dirt/grit lodging in oil system pressure control valves. This would have caused the MHC system to be unresponsive and operate eradically.

ANALYSIS OF EVENT

The events detailed in this report had no adverse safety implications to plant equipment, personnel, or to the public for the following reasons:

1) All safety systems, including the IRM high flux scram, responded as designed.

2) Reactor vessel heatup/cooldown limits were satisfied at all times.

3) Technical Specification requirements were satisfied at all times.

CORRECTIVE ACTION

1) Prior to subsequent plant startup, extensive testing and oil system regulating valve cycling was performed on the MHC system. Results of this testing were satisfactory. In addition, MHC was tested in both the EPR and MPR modes over a variety of pressures while at low power during startup, again with satisfactory results. Affected oil systems will receive an extensive flush/cleanup and additional maintenance during the 1989 refueling outage.

2) Shutdown and transient procedures will be reviewed for any improvements that are necessary to give additional guidance in responding to pressure control problems. Additional personnel training corresponding to these improvements will also be performed. To preclude BPOJ use in similar situations, a caution tag has been added to its control switch to instruct operators to not use the BPOJ unless the Reactor is shutdown or as required by plant emergency procedures.

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ADDITIONAL INFORMATION

A previous MHC system malfunction was reported to the Commission in 1987 as LER 87-U5.

Note: An in-house report on MHC operation is being prepared and will be routed to appropriate plant personnel upon completion. If additional pertinent information concerning the MHC malfunction is discovered in this report or during the 1989 outage, a supplemental LER will be provided.

VERMONT YANKEE NUCLEAR POWER CORPORATION

P. O. BOX 157
GOVERNOR HUNT ROAD
VERNON, VERMONT 05 54

August 2, 1988
VYV 88-167

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

REFERENCE: Operating License DPR-28
Docket No. 50-271
Reportable Occurrence No. 88-09

Dear Sirs:

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 88-09.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

James P. Pelletier

James P. Pelletier
Plant Manager

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

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