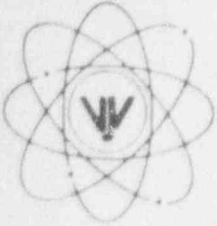


VERMONT YANKEE NUCLEAR POWER CORPORATION



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August 29, 1995
BVY # 95-014

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


REFERENCES: Operating License DPR-28
Docket No. 50-271
Reportable Occurrence No. LER 94-008-01

Dear Sirs:

As defined by 10 CFR 50.73, we are reporting the attached Reportable Occurrence as LER 94-008, Supplement 2.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION


for Robert A. Wangzyk
Plant Manager

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

650024

9509050149 950829
PDR ADOCK 05000271
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LICENSEE EVENT REPORT (LER)

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

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 (MNB 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.

FACILITY NAME (1)
VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NUMBER (2)
05000271

PAGE (3)
1 OF 4

TITLE (4)
HPCI/RCIC SYSTEM INOPERABLE DUE TO LOW SPIKING OF LEVEL TRANSMITTER LT-2-3-72B INSTRUMENT LOOP

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
10	03	94	94	-- 08 --	02	08	29	95	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)																
POWER LEVEL (10)	100	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	OTHER	(Specify in Abstract below and in Text, NRC Form 366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME
ROBERT J. WANCZYK, PLANT MANAGER

TELEPHONE NUMBER (Include Area Code)
(802) 257-7711

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
X	BN BJ	IMOD	R369	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 10/03/94 at 1520 hours, with the reactor operating at 100% steady state power and the plant preparing for a scheduled maintenance shutdown, several low spikes occurred in Reactor Water Level Instrument Loop LT-2-3-72B resulting in a momentary loss of high water level trip capability for High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems. Both systems were declared inoperable as a result of the event. The plant entered a Technical Specifications (TS) imposed 24 hour plant shutdown which was later exited at 2030 hours following completion of equipment troubleshooting by Instrumentation and Control personnel.

The root cause of this event is unknown. Actions and equipment surveillance completed to date have been unable to pinpoint the cause of the downspiking. Based on a review of similar events which have occurred elsewhere coupled with manufacturer discussions to date, it is believed that a Rosemount Model 710DU Master Trip unit PC board (K1) calibration relay may have malfunctioned after the performance of monthly surveillance earlier in the day, during which, the relay was cycled. On 11/07/94, the plant reentered the Tech Spec 24 hour shutdown action statement to replace the suspect trip unit, which was subsequently returned to the vendor for failure analysis. Vendor testing and inspections performed on the returned trip unit did not identify any operational deficiency or other direct evidence supporting the reported failure condition. There has been no reoccurrence of spurious spiking in the LT-2-3-72B instrument loop subsequent to replacement of the Master Trip Unit.

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

DESCRIPTION OF EVENT

On 10/03/94 at 1520 hours, with the reactor operating at 100% steady state power, and with the plant preparing for a scheduled maintenance shutdown, several down spikes occurred over a three minute period in the reactor water level instrument loop for LT-2-3-72B. The most significant spikes indicated a 25 inch drop in Reactor water level as recorded on the plant Emergency Response Facility Information System (ERFIS). The step change recorded on Attachment 1 shows a change from 160 inches to 135 inches which was not sufficient enough to generate an Engineered Safety Feature (ESF) system response.

Control Room personnel were first alerted to transients in the instrument loop by the plant process computer alarm typer which is set to alarm at a water level of 155 inches. After acknowledgement of the alarm, Control Room personnel were able to witness the downspiking for the duration of the event on Control Room panel indicator LI-2-3-72B. Other Reactor Water level instrumentation observed during the course of the event did not reveal the presence of water level transients and it was concluded that a malfunction had occurred in the LT-2-3-72B transmitter loop.

The LT-2-3-72B instrument loop is comprised of a Rosemount (*R369) Model 1152 transmitter and Rosemount 710DU Trip/ Calibration System. The instrument loop is one of four (4) water level instrument loops which provide input into initiation logic for ECCS systems. The trip system for Instrument Loop LT-2-3-72B consists of one (1) master trip unit and five (5) slave trip units. The master trip unit converts the transmitter 4-20 ma signal output to a 1-5 volt DC signal which is supplied to the Control Room indicator, plant process computer and associated slave trip units. The master trip unit and two of the slave trip units provide ECCS initiation signals on a "Low-Low" reactor water level of 87 inches. The remaining three slave trip units provide reactor high water level trip signals for HPCI, RCIC, Reactor Water Feedpumps and the Main Turbine. Based on the downspiking, it was concluded that the high water level trip capability for HPCI(*BJ) and RCIC(*BN) became inoperable which resulted in both HPCI and RCIC being declared inoperable. Concurrent with the declaration, a Technical Specifications imposed 24 hour plant shutdown LCO was entered during which reactor pressure is required to be reduced to 120 PSIG within 24 hours.

At 2030 hours, following the completion of functional surveillance and troubleshooting by Instrumentation and Control (I&C) personnel, the instrument loop was returned to service, at which time both HPCI and RCIC were declared operable and the LCO was exited. Due to the short duration of time the equipment remained out of service subsequent to the event, LCO actions relative to plant shutdown were not required.

In pursuit of the cause of the original event, with the belief that the event was triggered by a malfunction of the master trip unit (see Cause of Event), the decision was made by the plant to replace the suspect trip unit to allow its return to the vendor for failure analysis. Factors contributing to the decision were the short period of time needed to replace the trip unit (including reperformance of loop surveillance), generic defect concerns, and the fact that the minimum number of instrument channels required by Tech Spec for ECCS initiation would still be satisfied with the instrument loop out of service.

On 11/07/94 at 1250 hours, the plant reentered the Tech Spec 24 hour shutdown action statement to replace the master trip unit. Following successful replacement of the master trip unit and completion of functional surveillance, the instrument loop was returned to service at 1430 hours. Strip chart trending of the process point was continued until 11/10/94, at which point, the monitoring was discontinued due to proper functioning of the instrument loop. The short duration of the 11/07/94 event did not require implementation of actions relative to the Tech Spec 24 hour plant shutdown action statement.

* Energy Information Identification System (EIS) Component Identifier

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

CAUSE OF EVENT

The Root Cause of this event is unknown. Monitoring of the instrument channel was initiated for the period of 10/05/94 to 11/07/94 via strip chart recorder. No additional evidence of spiking or instability in the instrument loop process was found during this period. Based on other industry reported failures of this model trip unit, which were similar to the event at Vermont Yankee, a malfunction of a subcomponent relay (K1) in the master trip unit was suspected to be the primary cause of the event. More specifically, the failures were attributed to certain failure modes of the relay contact sets which are integrated into the instrument current loop. The malfunctions experienced were noted to occur during or shortly after loop calibration, when the relay contact sets were exercised. Several hours prior to the event at Vermont Yankee, I&C personnel also satisfactorily completed a routine functional check of the instrument loop during scheduled monthly surveillance.

Subsequent evaluation of a process loop computer trend confirmed that the downspiking observed is consistent with one of the reported K1 relay contact failure modes. Subsequent discussions with the equipment manufacturer also suggest that the downspiking experienced is not a typical failure mode for the loop transmitter itself and is more likely to be associated with a malfunction of the master trip unit. In pursuit of the above belief, the master trip unit was replaced on 11/07/94 with a spare trip unit and the original returned to Rosemount for failure analysis. Strip chart trending of the process point was continued for a 3 day period subsequent to the replacement. Data reviewed during this period did not reveal the presence of any additional spiking in the instrument loop, and as a result, monitoring of the loop was terminated on 11/10/94.

Vendor failure analysis of the returned trip unit did not identify any operational deficiency or other direct evidence supporting the reported failure condition. Following satisfactory completion of acceptance testing at the vendor's facility, the K1 relay was removed from the trip unit and subjected to destructive failure analysis. Analysis results did not identify any degradation associated with the relay's actuator/contact assemblies which could have caused the relay to malfunction in the manner necessary for the downspiking to occur. The vendor is continuing investigation into the other industry events involving failed trip units.

ANALYSIS OF EVENT

Both events are considered significant in that it resulted in both HPCI and RCIC being declared inoperable which resulted into the entry of a Technical Specifications required 24 hour plant shutdown. However, no ECCS signals were present and no ECCS systems were required to operate during the short period of time the instrument loop remained out of service during each event.

ECCS systems which receive a trip permissive from LT-2-3-72B for low-low reactor water level are Core Spray (CS) (*BM), Automatic Depressurization System (ADS) (*JE), Low Pressure Cooling Injection (LPCI) (*BO) and HPCI. Other systems which also receive input from this instrument loop for a low-low reactor water level signal are Alternate Rod Injection/ Recirculation Pump Trip (ARI/RPT) (*AD) and RCIC.

* Energy Information Identification System (EIS) Component Identifier

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

During the first event on 10/03/94, the low-low water level trip setpoints for the above systems were considered operable based on the downward spiking which occurred in the process value. During the replacement of the master trip unit on 11/07/94 the low-low water trip setpoints were rendered inoperable for the duration of the event. However, if an actual low-low reactor water level signal occurred coincident with the instrument loop out of service, ECCS and other affected systems would have responded (as designed) since the minimum number of operable trip channels required by Tech Specs for each system were still available.

During both events, the high water level trip capability for HPCI and RCIC was rendered inoperable. This condition would not prevent the initiation of HPCI or RCIC, and would present minimal safety concerns based on the operator's ability to manually trip both systems on high reactor water level. Additionally, the HPCI turbine has been evaluated in Vermont Yankee's Final Safety Analysis Report (FSAR) and was determined to be able to withstand water slugs resulting from high water level due to instrument failure without incurring damage. Therefore, HPCI operation would not be permanently disabled due to the failure to trip on a high reactor water level.

CORRECTIVE ACTIONS

Short Term

1. I&C personnel performed troubleshooting and repeated the functional surveillance of the instrument loop prior to returning it to service. During the surveillance, the K1 relay was cycled repeatedly to verify proper operation of relay contacts.
2. Trending of the instrument loop was initiated on 10/5/94 and continued through the period of 11/10/94. No further evidence of downspiking or abnormal responses have been noted in the instrument loop during this period which also included an evaluation window with the replacement the master trip unit. Trending of the process point was terminated on 11/10/94 after determination by I&C personnel that the instrument loop was functioning properly with the replacement trip unit.

Long Term

1. The suspect master trip unit has been returned to Rosemount for failure analysis. Vendor testing and inspections performed on the returned trip unit did not identify any operational deficiency or other direct evidence supporting the reported failure condition. Destructive failure analysis of the K1 relay performed subsequent to operational testing did not identify any potential problems associated with the relay's actuator/contact assembly.

No additional actions are planned based on the results of Rosemount's failure analysis of the master trip unit.

ADDITIONAL INFORMATION

There have been no similar events reported to the commission within the last 5 years that were determined to be similar to this event.

ATTACHMENT 1, - LER 94-008

PLANT MODE: RUN ERFIS 10/03/94 15:09:32
LEVEL: 72B LEVEL

8040

REACTOR WATER LEVEL 72B

159.61 IN

