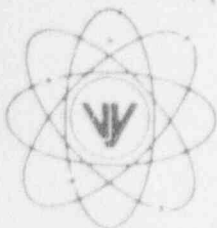


VERMONT YANKEE NUCLEAR POWER CORPORATION



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

November 02, 1994
BVY 94-106

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

Dear Sirs:

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

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

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ABSTRACT (Limit to 1400 spaces, i.e., approx. fifteen single-space 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)(BJ) and Reactor Core Isolation Cooling (RCIC)(BN) 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 presently under investigation. Actions and equipment surveillance completed to date have failed 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 (R369) Model 710DU Master Trip unit PC board (K1) relay may have malfunctioned after the performance of monthly surveillance earlier in the day, during which, the relay was cycled. Additional actions planned are to remove the suspect PC board prior to the next scheduled surveillance for further analysis.

NRC Form 366A 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.	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION			
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		YEAR	SEQ #
			REV #
VERMONT YANKEE NUCLEAR POWER CORPORATION	05000271	9 4 - 0 0 8 - 0 0	0 2 OF 0 4

TEXT (If more space is required, use additional 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 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 and RCIC 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.

CAUSE OF EVENT

The Root Cause of this event is presently under investigation with efforts ongoing. Strip chart trending of the process point was initiated on 10/5 to capture any rapid fluctuations or additional occurrences of downspiking which may be occurring in the instrument loop. To date, there has been no reoccurrence of spiking in the transmitter loop. Based on a search of Nuclear Plant Reliability Data System (NPRDS) records, it was revealed that similar problems had occurred at another facility which were attributed to the failure of calibration relay K1 in the master trip unit. The failures were attributed to contact sets within the K1 relay which failed intermittently during and after loop calibration. In all cases, the failures were noted to occur within a 24 hour period after functional calibration was completed.

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Several hours prior to the event at Vermont Yankee, I&C personnel satisfactorily completed a routine functional check of the instrument loop as part of scheduled monthly surveillance. It is presently believed that this event is also attributed to contact failure within the K1 calibration relay. It is theorized that one or more sets of contacts within K1 which are associated with the transmitter loop current path, may have malfunctioned after calibration. There are multiple contact failure modes which could result in a reduction of the indicated process relative to the actual process value. Additionally, it is believed that the functional surveillance performed subsequent to the event during which the relay contacts were exercised, may have temporarily remedied the problem. Discussions with the equipment manufacturer also suggest that the downspiking experienced is not a typical failure mode for the transmitter itself and is more likely to be associated with a malfunction of the master trip unit.

ANALYSIS OF EVENT

The event is considered significant in that it resulted in both HPCI and RCIC being declared inoperable which resulted in the entry into a Technical Specifications required 24 hour plant shutdown. However, no ECCS systems were required to operate and no ECCS signals were present during the course of the event. In the event of a low-low reactor water level signal, HPCI and RCIC would have responded as designed although the logic permissive for LT-2-3-72B would have come in at a higher water level due to the type of failure postulated. The loss of high water level trip capability for HPCI and RCIC during ECCS initiation would present minimal safety concerns based on operator ability to manually trip both systems under High Water level conditions. Additionally, monitoring of the process point which was initiated subsequent to the event has not identified any additional operational concerns to date with the instrument loop.

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 and is continuing. No further evidence of downspiking or abnormal responses have been noted to date. Trending of the process point will continue until the suspect trip unit is removed from service for further analysis.
3. Additional plans are to remove the suspect master trip unit and return it to Rosemount for failure analysis prior to the next scheduled monthly surveillance (11/7). Rosemount has expressed a strong desire to examine the unit based on Vermont Yankee being the second facility to experience this type of failure.

Long Term

1. Additional actions will be specified as necessary based on the results of Rosemount's failure analysis of the master trip unit.

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ADDITIONAL INFORMATION

The replacement of the master trip unit will require an additional Potentially Reportable Occurrence (PRO) and Licensee Event Report (LER) to be generated due to reentry into the Technical Specifications required 24 hour shutdown. The LER supplement will provide discussion of further developments and plant activities associated with the above corrective actions.

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

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

B040

REACTOR WATER LEVEL 72B

159.61

IN

