

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Sequoyah, Unit 2						DOCKET NUMBER (2) 0 5 0 0 0 3 2 8			PAGE (3) 1 OF 0 5		
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Spurious Spiking On The Upper Compartment Radiation Monitor Particulate Channel Resulting From A Degraded Detector Preamplifier Causes Two Containment Ventilation Isolations

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)
09	19	88	88	037	00	10	06	88			0 5 0 0 0
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THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)											
OPERATING MODE (9)		20.402(b)		20.406(c)		XX		50.73(a)(2)(iv)		73.71(b)	
POWER LEVEL (10)		20.405(a)(1)(ii)		50.36(a)(1)				50.73(a)(2)(v)		73.71(c)	
097		20.405(a)(1)(ii)		50.36(a)(2)				50.73(a)(2)(vi)		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)(vii)(A)			
		20.405(a)(1)(iv)		50.73(a)(2)(ii)				50.73(a)(2)(vii)(B)			
		20.405(a)(1)(v)		50.73(a)(2)(iii)				50.73(a)(2)(ix)			

LICENSEE CONTACT FOR THIS LER (12)											
NAME K. W. Fenn, Plant Reporting Section								TELEPHONE NUMBER 6 1 5 8 7 0 - 6 5 1 1			

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)														
CAUSE	SYSTEM	COMPONENT	MANUFAC TURE	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFAC TURE	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFAC TURE	REPORTABLE TO NRC
X	I	L	A	M	P	G	1	0	6	13	YES			

SUPPLEMENTAL REPORT EXPECTED (14)											
YES (If yes, complete EXPECTED SUBMISSION DATE)										NO	
										XX	

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

On September 19, 1988, at 1827 EDT, with unit 2 in mode 1 (97-percent power), a Containment Ventilation Isolation (CVI) occurred as a result of a spurious series of spikes on the containment upper compartment Radiation Monitor (RM) particulate channel 2-RM-90-112A. Operations personnel immediately verified that no actual high radiation levels existed and then proceeded to perform steps for recovery from the CVI. An immediate investigation into the actuation did not discover any conclusive cause that may have attributed to the spurious signal. On September 21, 1988, at 1909 EDT, another CVI occurred similar to the previous one on September 19, 1988, as a result of spurious spiking on the output of 2-RM-90-112A. Operations personnel again verified that the signal was inadvertent and proceeded with recovery from the CVI. Subsequent to the second CVI recovery, the RM remained out of service for instrument and systems personnel to perform additional troubleshooting. During this troubleshooting, a spurious AC ripple voltage was discovered on the 24VDC power supply output which coincided with the high radiation spikes. The power supply was replaced and the RM returned to service. The output of the RM was monitored closely and some reduced spurious spiking was still observed as the RM electronics warmed back up. During additional testing, spurious electrical spiking was observed on the particulate detector output to the main processing module in the MCR. The detector preamplifier assembly was replaced and the RM returned to service on September 23, 1988. TVA concluded that both CVIs had been caused by the particulate detector preamplifier degrading over a period of time. Since no actual high radiation levels existed during these events and all CVI equipment actuated as designed, this condition is not considered to have had an adverse impact on nuclear safety. To prevent recurrence, the applicable RM functional test surveillance instructions will be revised to include testing for detection of AC ripple voltage on the 24VDC power supply.

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

DESCRIPTION OF EVENT

On September 19, 1988, at approximately 1827 EDT with unit 2 in mode 1 (97-percent power, 2235 psig, 576 degrees F), a Containment Ventilation Isolation (CVI) (EIS Code JM) occurred as a result of a spurious signal on the containment upper compartment Radiation Monitor (RM) particulate channel, 2-RM-90-112A (EIS Code IL).

Prior to this event, 2-RM-90-112A was indicating an activity level of approximately 1×10^4 counts per minute (cpm) on indicator RI-90-112A and recorder RR-90-112, both in the main control room (EIS Code NA). The unit 2 high radiation relay (K2-R112A) for the particulate channel is set to actuate at a setpoint of 1.98×10^5 cpm above background activity level. This relay actuation in turn initiates both trains of CVI through the solid state protection system (SSPS) (EIS Code JG).

At approximately 1827 EDT, the particulate channel began experiencing continuous spurious spiking as indicated by the recorder RR-90-112 chart, reaching levels of approximately 1×10^7 cpm. The CVI actuation occurred as the output signal spiked above the particulate channel high radiation setpoint and the spurious spiking continued for approximately one minute. The automatic isolation of the CVI valves resulted in the isolation of flow through the pump for 2-PM-90-106 (Lower Compartment Radiation Monitor) and its' subsequent trip.

Operations personnel verified by indications in the main control room that both trains of CVI had actuated properly and verified that no actual high radiation levels were present by comparing the other containment radiation monitors (Containment Lower Compartment, RM-90-106 and Containment Purge Exhaust, RM-90-130, -131). The appropriate actions of Technical Specifications (TSs) -3.4.6.1 (Reactor Coolant System Leakage Detection) (EIS Code IJ), -3.3.2 (Engineered Safety Feature Actuation System) (EIS Code JE), and -3.3.3.1 (Radiation Monitoring) were immediately complied with as a result of the events.

Subsequent to the CVI being verified as inadvertent, operations personnel proceeded with recovery steps for the CVI in accordance with System Operating Instruction (SOI)-30.2, "Containment Purge System Operation" and SOI-88.1, "Containment Isolation System". The 2-RM-90-112A particulate channel was blocked until troubleshooting could be performed on the RM, the CVI was reset, and 2-RM-90-106 was returned to service. An investigation was immediately initiated to determine the cause of the RM output spiking, but no activities were discovered that could have caused the high radiation signals. Troubleshooting also was performed on the RM under work request (WR)-B293715, but no anomalies were found with the RM operation. Hence, the RM was returned to service at approximately 0945 EDT, on September 20, 1988.

At approximately 1909 EDT, on September 21, 1988, another CVI occurred on unit 2 similar to the recent CVI on September 19, 1988. Immediate investigation showed that the CVI again had occurred from spurious signal spiking on the 2-RM-90-112A output.

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The CVI was again verified to be a result of an inadvertent signal and recovery from the CVI was completed by Operations personnel at approximately 1945 EDT, on the same day. The RM remained out of service while troubleshooting again was performed under WR-B294577.

During the troubleshooting of 2-RM-90-112, it was discovered that the 24VDC power supply for the analyzer was experiencing AC electrical noise spikes of approximately 70 to 130 mV which coincided with the high radiation spikes as noted on the recorder RR-90-112. The instrument maintenance personnel suspected the power supply to be defective and hence, replaced the analyzer power supply and returned the RM to service for monitoring purposes at approximately 0112 EDT, on September 22, 1988. With the new power supply installed, the RM output was closely monitored. Initially the RM output remained steady, but as the monitor electronics warmed back up from being energized some additional spiking was noted but not of sufficient amplitude to actuate the high radiation relays. At approximately 0930 EDT, on September 22, 1988, the 2-RM-90-112A output was blocked from the main control room to prevent any further inadvertent actuations. An additional WR-B769911 was initiated to monitor the RM signals more extensively, and spiking was observed on the input signal to the RP-30 processing module in the main control room which indicated the noise signals were being derived from the particulate detector assembly. The detector was replaced with a test assembly and the signals monitored for several more hours with no additional spiking noted. The preamplifier was replaced in the defective detector assembly and the detector replaced. The RM was returned to service at approximately 1655 EDT, on September 23, 1988. The RM output was closely monitored for approximately two days, and no additional spiking was observed.

Hence, it was concluded that the two CVIs on September 19 and 21, 1988 were a result of the defective particulate detector preamplifier assembly.

CAUSE OF EVENT

The immediate cause of both CVI actuations was the spurious high radiation signals on the output of 2-RM-90-112A, which exceeded the high radiation setpoint.

Troubleshooting of the RM, subsequent to the CVI on September 19, 1988, discovered no anomalies and no absolute cause could be determined. Subsequent to the CVI on September 22, 1988, electrical noise was noted on the RM 24VDC power supply output, and a defective power supply was suspected to be the cause of the RM output spiking. However, after replacing the power supply and monitoring the RM output, reduced amplitudes of electrical noise were still observed. Additional troubleshooting discovered a defective detector preamplifier assembly. Hence, it was concluded that the defective preamplifier assembly was the cause of both CVIs detailed in this report. Additional investigation of previous CVIs noted that a similar CVI had occurred on June 19, 1988, and was actuated from the same RM (2-RM-90-112A).

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This CVI occurrence was detailed in Licensee Event Report (LER) SQRO-50-328/88029, but no absolute cause of the spurious spike could be determined. TVA suspects that the unit 2 CVI on June 19, 1988 also was a result of the particulate detector preamplifier assembly degrading over a period of time.

ANALYSIS OF EVENT

A CVI is an Engineered Safety Feature (ESF) actuation. Neither of the ESF actuations described in this report were part of a preplanned sequence, and as such, both are being reported in accordance with 10 CFR 50.73, paragraph a.2.iv.

During both of the events, all isolation equipment actuated as designed and hence if an actual high radiation condition had existed, the equipment would have performed its function in mitigating a design basis event.

Since this was an inadvertent actuation and no actual high radiation levels existed, no adverse safety consequences were created.

CORRECTIVE ACTION

Immediate corrective actions were to perform recovery steps for the CVI, which included reopening the affected valves, restarting RM pumps, and resetting the CVI signal.

Troubleshooting was performed on the RM equipment which detected an AC ripple voltage on the 24VDC power supply output. The 24VDC power supply was initially suspect as being defective and thus was replaced. Further monitoring and troubleshooting revealed a defective particulate channel detector preamplifier. The preamplifier was replaced and the RM returned to service at approximately 1655 EDT, on September 23, 1988. The RM output was monitored for an additional approximate two days showing no additional spurious false signals. To help prevent recurrence of this type of event, the RM functional test Surveillance Instructions (SI)-82, "Functional Tests For The Radiation Monitoring System-Unit Common and Unit 1" and SI-82.2, "Functional Tests For The Radiation Monitoring System-Unit 2," will be revised to include testing for detection of AC ripple voltage on the 24VDC power supply. This testing should help provide an early detection of any degrading components that could cause electrical noise on the output of the RMs. This testing will be included in SI-82 and SI-82.2 for all TS required RMs. These revisions will be completed by February 1, 1989.

ADDITIONAL INFORMATION

There have been no previous occurrences of a CVI caused by a failed detector assembly. The CVI on June 19, 1988 detailed in LER SQRO-50-328/88029 is suspected to have been caused by the failing detector preamplifier as detailed in this report.

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

The containment area RM particulate channels (RM-90-106A and -112A) are General Atomic, model RD 36-01.

The detector preamplifier units and 24VDC power supplies for these monitors are both General Atomic models RD-39 and RP-23, respectively.

COMMITMENTS

TVA will revise SI-82 and SI-82.2 to include steps for detection of AC ripple voltage on the radiation monitors 24VDC power supply. These revisions will be completed by February 1, 1989 (Site Procedures).

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TENNESSEE VALLEY AUTHORITY
Sequoyah Nuclear Plant
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October 6, 1988

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO.
50-328 - FACILITY OPERATING LICENSE DPR-79 - REPORTABLE OCCURRENCE REPORT
SQRO-50-328/88037

The enclosed licensee event report provides details concerning spurious spiking on the Upper Compartment Radiation Monitor Particulate Channel resulting from a degraded detector preamplifier which caused two Containment Ventilation Isolations. This event is reported in accordance with 10 CFR 50.73, paragraph a.2.iv.

Very truly yours,

TENNESSEE VALLEY AUTHORITY


S. J. Smith
Plant Manager

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