

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Sequoyah, Unit 1	DOCKET NUMBER (2) J 5 0 0 0 3 2 7	PAGE (3) 1 OF 0 5
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Engineered Safety Feature Actuation Containment Ventilation Isolation Caused By
Electromagnetic Interference

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)
03	01	88	88	012	00	03	25	88	Sequoyah, Unit 2		05000328
03	01	88	88	012	00	03	25	88			050000

OPERATING MODE (9) 5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) 0.00	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
	20.405(a)(1)(i)	50.36(e)(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)	XX 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)(ix)								

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
NAME Tom Rogers B. E. Kilgore, Plant Operations Review Staff		AREA CODE 615	870-17087

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRD'S	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRD'S

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO				

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

On March 1, 1988 at 0243 EST, unit 1 was in mode 5 (cold shutdown) when a containment ventilation isolation (CVI) occurred. The cause was determined to be a spurious signal from electromagnetic interferences (EMIs) in the lower containment radiation monitor (RM) circuits. The EMI was caused by a low flow condition in the RM sample line resulting in the alarm circuit alternately energizing and deenergizing. The low flow condition was caused by the associated prefilters clogging due to suspended particulate in the vicinity of the RM caused by grinding and welding work being performed.

As corrective action, the operators determined that a high radiation condition did not exist, requested the prefilters be changed once per shift in lieu of the normal daily replacement, and then reset the CVI.

At approximately 1545 EST, a second CVI occurred from the same causes. The prefilters were then replaced every four hours and the CVI was reset.

EMI generated CVIs has been a recognized problem at Sequoyah and corrective action plans have been made; however, implementation of these plans had not been complete before these CVIs occurred. However, corrective actions were completed on March 17, 1988. These corrective actions included provisions to reduce EMI induced CVIs through improved cable bundling, removing local audible alarms, and providing a "seal in" feature in alarm circuits susceptible to relay chatter.

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

DESCRIPTION OF EVENT

On March 1, 1988, with unit 1 in mode 5 (0 percent power, 5 psig, 124 degrees F), two containment ventilation isolations (CVIs) (EIIS Code JM) occurred. Operations personnel discovered the first CVI at approximately 0243 EST when the containment ventilation isolation valves closure indicating lights for the unit 1 lower containment Radiation Monitor (RM) 1-RM-90-106 (EIIS Code IL) were actuated. A review of the RM trace recording revealed that the RM particulate and total gas channels recorded a high radiation spike, and a high radiation trip signal generated from the total gas channel. It was determined from control room indication that a high containment radiation condition did not exist. Control room indication is provided by a trace recorder and a ratemeter. These indicators did not maintain an abnormally high reading that would be characteristic of an actual high radiation condition. An investigation at the radiation monitor discovered a low flow alarm in the iodine channel. The actual flow was indicated at less than one cubic foot per minute (CFM) and the vacuum was indicated at approximately 4-inches of water. An inspection of the iodine prefilter found it to be quite dirty. Upon replacing the prefilter, the iodine flow and vacuum returned to normal. Clogging of the prefilter was occurring because of suspended particulate created from grinding and welding being done in the vicinity of the RM.

After the iodine prefilter was replaced, the assistant shift supervisor manually shutoff the iodine flow slowly to observe the effects of low flow. The radiation monitor low flow alarm began chattering (i.e., energizing and deenergizing) until the flow was completely shutoff. Completely shutting off flow resulted in a low flow alarm with no chatter. At 0340 EST, the assistant shift engineer requested chemistry personnel to increase the replacement of the prefilters from the normal daily frequency to every eight hours until the prefilters are found to be acceptable, by visual inspection, to extend their service time to normal. The CVI was subsequently reset in accordance with System Operating Instruction (SOI)-88.1, "Containment Isolation System," and the RM was returned to service. At 0358 EST, the NRC duty officer was notified of this event.

At approximately 1545 EST, approximately 12 hours after the first CVI, 1-RM-90-106 again received a high radiation spike on its particulate and total gas channels and generated a high radiation CVI. The iodine channel again indicated a low flow condition and the iodine prefilters were clogged. The second CVI was also attributed to EMI from the low flow alarm chattering. The prefilter was replaced, the CVI was reset in accordance with SOI-88.1, and Chemistry was requested to increase the frequency of replacing the prefilters from every eight hours to every four hours. At 1705 EST, the NRC duty officer was notified of this event.

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

CAUSE OF EVENT

The cause of the CVIs has been attributed to spurious high radiation spikes that exceeded the RM trip criteria. The most probable cause of the high radiation spike has been determined to be electromagnetic interference (EMI) in the RM cables. Previous operating experience with the subject RMs has shown that high radiation spikes can be caused by electrical noise generated from low sample flow switch actuations. The sample low flow switch actuations have resulted from low flow conditions caused by clogged prefilters located in the supply sample line to the low flow switch. Prefilter clogging was occurring on an increased frequency due to suspended particulate in the air as a result of grinding and welding in the vicinity of the RM. EMI induced CVIs have been identified as a recurring problem at Sequoyah Nuclear Plant. As corrective action to preclude recurrence of the CVIs, a special task force had been established to further investigate the cause of CVIs occurring during the period from November 27 to December 21, 1987. The findings of this investigation follows.

The flow indicating switch, which measures airflow rates through the RM iodine channel on the order to 1 to 3 cubic feet per minute (CFM), incorporates a reed switch magnetically coupled to a rotometer shaft. Characteristic of rotometer devices, the weight of the rotometer disk is counter-balanced by the drag produced by the opposing airflow through the channel. When the flow rate drops to approximately 1 CFM, the equilibrium between the reed switch and the disk cannot be maintained, and the reed switch chatters (i.e., alternately energizing and deenergizing the low flow alarm circuit). Chatter of the reed switch, in combination with a relay coil in the low flow alarm circuit, produces EMI of duration and amplitude sufficient to cause CVIs.

It was also determined through testing, that all four alarm circuits on the RM (iodine and particulate low flow, high vacuum, pump trip and failed filter) have demonstrated the ability to produce some EMI. The testing also showed that the actuation of the local panel-mounted audible alarm exacerbated the EMI-induced spikes that were caused by the above RM alarm circuits. When the audible alarm was disabled, only the iodine and particulate low flow alarms actuations produced significant EMI-induced spikes. Moreover, only the iodine channel's low flow alarm produced EMI of duration and amplitude sufficient to cause CVIs. Thus, a contributing cause to this event was the actuation of the RMs local panel-mounted audible alarm.

ANALYSIS OF EVENT

This event is being submitted pursuant to the requirements of 10 CFR 50.73, paragraph a.2.iv, as an automatic engineered safety feature actuation.

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

The occurrence of this event has been determined to have no adverse affect on the health and safety of the public. The actuation of the CVI system was caused by an EMI induced spike in the electronics of the radiation monitor, not by an actual high radiation condition. If this event had occurred in a different operational mode or as a result of an actual high radiation condition, the associated equipment demonstrated that it would have performed its safety function as designed.

CORRECTIVE ACTION

As immediate corrective action for the 0243 EST CVI, Operations personnel determined that it was not a high radiation induced CVI and then reset the CVI and notified chemistry personnel to increase the prefilters change frequency from daily to once every eight hours. As immediate corrective action for the 1545 EST CVI, Operations personnel again determined that a high radiation condition had not occurred, reset the CVI, and increased the prefilter change frequency to once every four hours.

Previous improvements to the RM process electronics, such as incorporating a time delay trip relay, noise reduction techniques, the addition of upper and lower discriminators, and better training of personnel working on the monitors have significantly reduced the number of RM generated CVIs. In order to further reduce the number of spurious CVIs, Sequoyah Nuclear Plant has completed work on several of the special task group's recommendations.

Engineering Change Notices (ECN) 7343 (unit 1) and ECN 7344 (unit 2) were issued to provide the iodine and particulate low flow alarm circuits with a "seal in" feature so the low flow alarm will not cause relay chatter. These changes will thereby significantly reduce the EMI generated by the flow indicating switch and thereby reduce the recurrence of CVIs.

To eliminate another source of EMI, the audible alarms on the RM panel have been disconnected from the circuit. Low flow will still be indicated locally by a red light and annunciated in the main control room on panel O-M-12. Also, in order to ensure better grounding of the RM detector cables, the existing ground cables have been rerouted from the side panel of the monitors and secured to the frame on which the RMs are mounted. These ECNs were implemented via Work Plans (WP) 7343-02 for unit 1 RMs that provide CVI actuation signals and WP 7344-02 for the common and unit 2 RMs that provide CVI actuation signals. WP 7343-02 was field complete on March 11, 1988. WP 7344-02 was verified field complete on March 17, 1988.

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

ADDITIONAL INFORMATION

The RMs involved in CVI actuations produced by EMI are manufactured by General Atomic, Model Number RD-32, RD-35, and RD-36.

There have been 15 previously submitted reports of CVI occurrences caused by EMI - SQRO-50-327/84001, 84003, 84012, 84020, 84022, 84058, 86022, -328/84001, 84002, 84011, 86003, 86005, 86011, 87008, and 87009.

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TENNESSEE VALLEY AUTHORITY

Sequoyah Nuclear Plant
Post Office Box 2000
Soddy-Daisy, Tennessee 37379

March 25, 1988

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO.
50-327 - FACILITY OPERATING LICENSE DPR-77 - REPORTABLE OCCURRENCE REPORT
SQRO-50-327/88012

The enclosed licensee event report provides details concerning a containment ventilation isolation caused by electromagnetic interference in the lower containment radiation monitor circuits. This event is reported in accordance with 10 CFR 50.73, paragraph a.2.iv, as an automatic engineered safety feature actuation.

Very truly yours,

TENNESSEE VALLEY AUTHORITY


S. J. Smith
Plant Manager

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