NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	1 OF 0 4

TITLE (4): An Inadvertent Main Steam Line Isolation Signal Caused By A High Steam Flow Signal From An Unknown Source

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)
										0 5 0 0 0
0 3 2 4	8 8	8 8	—	0 1 6	— 0 0	0 4	1 5	8 8		0 5 0 0 0

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 0 0	20.402(b)	20.405(c)	XX 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
K. W. Feng, Plant Operations Review Staff	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	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
XX YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 5	3 1	8 8

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

On March 24, 1988, at approximately 1021 EST with unit 1 in mode 5, inadvertent main steam line isolation signal occurred. This signal was generated when an inadvertent actuation of high steam flow bistable 1-FS-1-10B occurred. At the time of this event, another high steam flow bistable (1-FS-1-21A) was already in the tripped condition because of ongoing maintenance work. Also, the lo-lo Tavg (reactor coolant system (RCS) average temperature below 540 degrees F) and low steam line pressure (below 600 psig) signals were present because of the plant being in mode 5. Therefore, all the required logic was completed (high steam flow in two out of four loops coincident with lo-lo Tavg or low steam line pressure in two out of four loops) to give the engineered safety feature (ESF) actuation signal. The safety injection (SI) signal also generated from this logic was blocked as allowed by Technical Specification (TS) 3.3.2.1 below permissive P-12 (Tavg below 540 degrees F). Therefore, since the main steam isolation valves were already closed for mode 5 and the automatic SI circuitry was blocked as allowed by TS, no equipment was actuated.

An immediate investigation was initiated into the root cause of the inadvertent bistable actuation (1-FS-1-10B), but no root cause has been determined. An investigation is continuing into the root cause of this event. A supplemental report will be submitted by May 31, 1988, to provide details of this investigation and any necessary recurrence control actions. Since no equipment was actuated, no immediate recovery or reset actions were necessary. However, an investigation into the cause of the event was immediately initiated.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	8 8	-- 0 1 6	-- 0 0	0 2 OF 0 4

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

DESCRIPTION OF EVENT

On March 24, 1988, at 1021 EST while unit 1 was in mode 5 (0 percent power, 6 psig, 124 degrees F), an engineered safety feature (ESF) actuation (EIIS Code JE) signal (main steam line isolation signal) was generated on unit 1 by the reactor protection logic (EIIS Code JC).

Before this event, on March 3, 1988, the steam generator No. 3, channel 1, high steam flow bistable 1-FS-1-21A was placed in the tripped condition under Work Requests (WRs) B293684 and B293685 because of the flow transmitter 1-FT-1-21A and power supply 1-PX-1-21A being removed to use on unit 2. This condition still existed at the time of this event.

Then on March 12, 1988, operations authorized work to begin on WR B292542 to replace instrument flexible sense lines on the S/G No. 2, channel 2, steam flow transmitter 1-FT-1-10B. Operations closed the root valves 1-1-288A and 1-1-289A for each sense line on the flow transmitter in accordance with Hold Order 1-88-425. Then the sense line replacement was performed which required a portion of the sense line to be cut out and a partial draining of the transmitter sense lines. The new sense lines had already been replaced, and the root valves isolating the process were still closed when the inadvertent signal occurred. This was approximately one hour after the welding was complete on the new sense lines. The 1-FS-1-10B high steam flow bistable status light illuminated, and annunciator XA-55-6B-9 (S/G loop 2 high steam line flow) was received. This actuation also completed the required logic for the main steam line isolation signal which is any two out of four high steam flow signals from the four loops coincident with either lo-lo Tavg (RCS average temperature below 540 degrees F) or low steam line pressure (any two out of four loops below 600 psig).

Because of the unit being in mode 5, the low steam line pressure and the lo-lo Tavg portions of the logic were already present. One of the required two high steam flow signals was present because of the 1-FS-1-21A being placed in the tripped condition for maintenance on March 3, 1988. Then when the inadvertent high steam flow signal was received from 1-FS-1-10B, all the required logic was present for the steam line isolation signal. The main steam isolation valves did not actuate because the valves were already closed for mode 5. Immediately after the inadvertent signal was received, Operations began an investigation into possible causes but found no work ongoing that would have affected this channel other than the work on the transmitter sense lines which had already been completed an hour before. The steam flow indicator for this channel (1-FI-1-10B) was checked with the high steam flow status light for 1-FS-1-10B still illuminated and was indicating zero steam flow. This indicated that the inadvertent signal was generated from a problem in the bistable and not elsewhere in the instrument loop. WR B267481 was initiated to investigate a problem with 1-FS-1-10B.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah, Unit 1	0 5 0 0 0 3 2 8	8 8	— 0 1 6	— 0 0	0 3 OF 0 4

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

ANALYSIS OF EVENT

This event is being reported under 10 CFR 50.73, paragraph a.2.iv, as an event that resulted in a signal for automatic actuation of an ESF.

The main steam isolation signal generated in the event is not considered to have an adverse affect on the health and safety of the public. The signal generated for the closure of the main steam isolation valves was not required to isolate a main steam line break during this event but was a result of conditions symptomatic of a main steam line break. The design function of the main steam isolation signal is to close the main steam isolation valves on a main steam line break. By design, the ESF actuation system senses this condition by a high steam line flow and a lo-lo RCS average loop temperature or a low steam line pressure. The main steam line isolation logic requires high inputs from one of the two steam flow sensors in two of the four loop steam line flows (measured flow greater than program setpoint) coincident with two of the four loop steam line pressures low (less than 600 psig) or a lo-lo RCS average temperature (less than 540 degrees F). Since the plant temperature at the time was 124 degrees F, half of the required logic was satisfied. The remaining half of the logic required for signal generation was two of the four high steam lines with a high steam flow input. One of these high steam flow inputs was already present from loop 3 because the 1-FS-1-21A protection bistable was tripped during the removal of the transmitter for its placement in unit 2. When the 1-FS-1-10B protection bistable tripped, the ESF actuation system received a high steam flow input from loop 2, and thus, the logic was satisfied to produce a main steam line actuation signal. Closure of the main steam isolation valve did not occur from the ESF actuation system because they were closed before receiving the actuation signal. The safety injection (SI) signal which is also initiated from a steam line isolation signal was blocked as allowed by TS 3.3.2.1 in modes 3-6. This blocking feature is accomplished during normal shutdown, cooldown, and depressurization of the plant by the control room operator using handswitches HS-63-125A (train A) and HS-63-125B (train B) when permissive P-12 is satisfied (RCS average temperature below 540 degrees F). This feature is required to prevent ESF actuation that would result from low plant pressures and temperatures caused by controlled plant evolutions. During this event, automatic SI actuation was also blocked via an installed jumper cable in the Solid State Protection System (SSPS) (EIIS Code JC) logic. The jumper cable is installed to block automatic actuation during extended outages as stipulated in General Operating Instruction (GOI)-3, "Plant Shutdown from Minimum Load to Cold shutdown," and Special Maintenance Instruction (SMI)-0-99-2, "Reactor Protection System Temporary Alteration to Clear Annunciation," when going from hot standby to cold shutdown. Removal of this jumper cable is required by GOI-1, "Plant Startup from Cold Shutdown to Hot Standby," before entering hot shutdown (mode 4). Since the jumper is removed before entering mode 4 and since an operator induced manual block is

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
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Sequoyah, Unit 1	0 5 0 0 0 3 2 7	8 8	— 0 1 6	— 0 0	0 4 OF 0 14

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automatically unblocked when RCS temperature exceeds the P-12 setpoint, a block of the automatic actuation of engineered safety equipment would not have occurred at RCS temperatures greater than 540 degrees F. The main steam line signal generated during this event indicated that the ESF actuation system would have correctly diagnosed an actual main steam line break and provided the necessary signals to isolate the break, trip the reactor, and start the required ESF equipment if the unit was operating.

CAUSE OF EVENT

The immediate cause of this event (inadvertent steam line isolation signal) was the inadvertent actuation of high steam flow bistable 1-FS-1-10B concurrent with 1-FS-1-21A already being tripped for maintenance work. This condition of the two high steam flow signals being present coincident with the already existing lo-lo Tavg and low steam line pressure signals completed the necessary logic. The root cause of the 1-FS-1-10B inadvertent actuation is still under investigation.

CORRECTIVE ACTION

Immediate corrective action was to initiate an investigation into the cause of the inadvertent high steam flow signal from 1-FS-1-10B. Since no equipment actuated, no recovery or reset actions were required immediately.

Corrective actions to prevent recurrence are indeterminate until a root cause of the inadvertent signal can be found. Further investigation will continue, and a supplemental report will be submitted by May 31, 1988.

ADDITIONAL INFORMATION

The NRC duty officer was notified of this event at 1220 EST on March 24, 1988.

There have been no previous occurrences of an inadvertent main steam line isolation signal with the main steam isolation valves already closed and the automatic SI logic blocked.

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

April 15, 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-50-327/88016

The enclosed licensee event report provides details concerning an inadvertent main steam line isolation signal caused by a high steam flow signal from an unknown source. 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

Enclosure
cc (Enclosure):

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IE22
1/1