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Robert A. Fenech
Vice President, Sequoyah Nuclear Plant

March 5, 1993

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO. 50-327 - FACILITY OPERATING LICENSE DPR-77 - LICENSEE EVENT REPORT (LER) 50-327/93002

The enclosed LER provides details concerning a manual reactor trip. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as a manual actuation of the reactor protection system.

Sincerely,

Robert A. Fenech

Enclosure
cc: See page 2

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IE22
1/1

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NRC Form 366 (6-89) | U.S. NUCLEAR REGULATORY COMMISSION | Approved OMB No. 3150-0104 Expires 4/30/92

LICENSEE EVENT REPORT (LER)

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

TITLE (4) Manual Reactor Trip as a Result of a Lock-up of the Rod Control System

EVENT DAY (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 2	0 5	9 3	9 3	0 0 2	0 0	0 3	0 5	9 3		0 5 0 0 0

OPERATING MODE (9)	2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)(11)			
POWER LEVEL (10)	0 0 1	20.402(b)	20.405(c)	X 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. E. Meade, Compliance Licensing	6 1 5 8 4 3 - 7 7 6 6

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	A A	A M P	W 1 1 2 0	No					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On February 5, 1993, at 0615 Eastern standard time, during a controlled shutdown with Unit 1 in Mode 2 operating at less than one percent power, the unit was manually tripped. Before the reactor trip, a rod urgent alarm annunciated in the main control room. This prevented the rod control system from allowing movement of the control rods in either manual or automatic modes. Based on procedural guidance, the control rods were maintained in manual during maintenance evaluation of the alarm. It was subsequently determined that the reactor would soon enter Mode 3 because of the negative reactivity insertion resulting from increasing Xenon concentration with the control rods in an abnormal withdrawn position. The decision was made to manually trip the reactor. The cause of the rod control system rod urgent alarm was determined to be in the rod control system timing circuitry. A glitch in the timing circuitry could cause the multiplexing cards to operate out of sequence and cause the rod urgent alarm to annunciate. Although no hardware problems were identified, it was concluded that the most likely component to have caused the rod control system problem was the input/output alternating current amplifier board. This board was replaced with a new board.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah Nuclear Plant, Unit 1	0 5 0 0 0 3 2 7	9 3	-- 0 0 2	-- 0 0	0 2 OF 0 5

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

I. PLANT CONDITIONS

Unit 1 was operating in Mode 2 at less than one percent rated thermal power.

II. DESCRIPTION OF EVENT

A. Event

On February 5, 1993, at 0615 Eastern standard time (EST), during a controlled shutdown, the unit was manually tripped. A controlled shutdown of the Unit 1 reactor had been initiated on the evening of February 4, 1993, to facilitate repair of a secondary-side steam leak. At approximately one percent power, a rod urgent alarm (EIIS Code AA) annunciated in the main control room. By design, this prevented the rod control system (EIIS Code AA) from moving the control rods in either manual or automatic modes. The control rods had been inserted to 11 1/2 steps on Control Bank D and 139 1/2 steps on Control Bank C (Control Banks A and B, as well as all the shutdown banks, were fully withdrawn from the reactor core). Based on the potential to drop rods on system reset, the shift operations supervisor (SOS) decided to maintain the control rods in manual during maintenance evaluation of the alarm. The control rods were declared inoperable, and Technical Specification (TS) 3.1.3.1.b was entered. Xenon concentration had been increasing in the reactor as a result of the power decrease. It was determined that the reactor would soon enter Mode 3 as a result of the negative reactivity insertion of Xenon with rods in an abnormal withdrawn position for that operating mode. Based on reactor conditions and prudent reactivity management considerations, it was decided to manually trip the reactor. The operating crew entered and implemented the appropriate procedures for shutdown from minimum load to hot standby. At 0639 EST, the SOS conservatively declared and exited a notification of unusual event (NOUE) emergency classification.

B. Inoperable Structures, Components, or Systems That Contributed to the Event

The rod control system was inoperable because of the rod urgent alarm. This condition rendered the control rods incapable of movement in either manual or automatic mode.

C. Dates and Approximate Times of Major Occurrences

February 4, 1993	A controlled shutdown of the Unit 1 reactor was initiated to facilitate repair of a secondary-side steam leak.
February 5, 1993 at 0502 EST	A rod urgent alarm annunciated. This prevented the control rods from moving in either manual or automatic mode.

February 5, 1993 at 0507 EST	Because of the control rod system alarm, Limiting Condition for Operation (LCO) 3.1.3.1.b was entered. Maintenance evaluation of the alarm condition was initiated.
February 5, 1993 at 0615 EST	The Unit 1 reactor was manually tripped, and the appropriate procedures were entered for shutdown from minimum load to hot standby.
February 5, 1993 at 0616 EST	Mode 3 was entered with all rods fully inserted in the core. LCO 3.1.3.1.b was exited.
February 5, 1993 at 0639 EST	The SOS conservatively declared and exited a NOUE.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

The rod urgent alarm annunciated in the main control room, identifying a problem with the rod control system during controlled shutdown of the unit.

F. Operator Action

Operations personnel immediately entered the appropriate procedures upon annunciation of the rod urgent alarm. Following preliminary maintenance evaluation of the alarm and review of reactor conditions, Operations personnel manually tripped the reactor.

G. Safety System Response

Safety systems functioned as required upon initiation of the manual reactor trip.

III. CAUSE OF EVENT

A. Immediate Cause

The cause of the manual reactor trip was a problem in the rod control system circuitry. This problem caused the rod urgent alarm to annunciate in the main control room and rendered the control rods incapable of movement in either manual or automatic mode.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah Nuclear Plant, Unit 1	0 5 0 0 0 3 2 7	9 3	-- 0 0 2	-- 0 0	0 4 OF 0 5

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

B. Root Cause

The cause of the rod control system problem was investigated thoroughly. However, no hardware problems were identified. Following review with the rod control system vendor, it was determined that a glitch probably occurred in the rod control system timing circuitry, which would cause the multiplexing cards in the rod control system to operate out of sequence and, thus, produce a rod urgent alarm. The rod control system vendor reported that similar events have occurred at other utilities.

C. Contributing Factors

None.

IV. ANALYSIS OF EVENT

The safety-related design of the rod control system is to unlatch the control rods and allow full insertion of the rods into the reactor core upon receipt of a reactor trip signal. This design function was not affected by the rod urgent alarm. The rod urgent alarm prevents the control rods from individual step movement in manual or automatic modes of operation, but will not prevent the control rods from fully inserting into the reactor core upon receipt of a reactor trip signal. Thus, the rod urgent alarm had no adverse effect on the safety-related design function of the control rods.

Plant response during and after the trip was consistent with responses described in the final safety analysis report and, accordingly, the event did not adversely affect the health and safety of the public.

V. CORRECTIVE ACTION

A. Immediate Corrective Action

Although no hardware failures were identified, through discussions with the vendor, it was concluded that the most likely component to have caused the rod control system problem was the input/output (I/O) alternating current (AC) amplifier board. The I/O AC amplifier board is located in the logic cabinet of the rod control system. It is used to communicate between the logic cabinet and the power cabinet. A glitch on this board could cause a rod urgent alarm to annunciate. Based on this information, a new I/O AC amplifier board was tested and installed.

B. Corrective Action to Prevent Recurrence

None.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Sequoyah Nuclear Plant, Unit 1	0 5 0 0 0 3 2 7	9 3	-- 0 0 2	-- 0 0	0 5 OF 0 5

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

VI. ADDITIONAL INFORMATION

A. Failed Components

None identified.

B. Previous Similar Events

A review of previous reportable events did not identify any similar to the one described by this LER. The rod control system timing circuitry glitch is a first-time occurrence at SQN.

VII. COMMITMENTS

None.