November 29, 2004

U.S. Nuclear Regulatory Commission 10 CFR 50.73
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO. 50-328 - FACILITY OPERATING LICENSE DPR-79 - LICENSEE EVENT REPORT (LER) 50-328/2004-001-00

The enclosed LER provides details concerning the failure to physically place a bistable in the trip position after the automatic generation of an electronic trip condition upon failure of a loop calculation processor within the reactor protection system. This event is being reported, in accordance with 10 CFR 50.73(a)(2)(i)(B), as any operation or condition which was prohibited by the plant's Technical Specification.

Sincerely,

Original signed by:

P. L. Pace
Manager, Site Licensing
and Industry Affairs

Enclosure
cc: See page 2

cc (Enclosure):
INPO Records Center
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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Sequoyah Nuclear Plant (SQN) Unit 2	05000 328	1 OF 6

4. TITLE

Failure of a Loop Calculation Processor (LCP) within the reactor protection system.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
10	01	2004	2004	- 001 -	00	11	29	2004	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
J. Bajraszewski	423-843-7749

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	JC	DCC	W120	No					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On October 01, 2004, at a NRC inspection exit, the inspector stated that a non-cited violation will be issued for failure to comply with Technical Specification (TS) 3.3.1. The violation was issued because following LCP failure, operator action was not taken to place the inoperable channel bistables, for functions served by the LCP, in Protection Set 4, Rack 13, in a tripped condition. The violation was documented in an inspection report issued on October 25, 2004.

On July 1, 2004, at 0109 EDT, the reactor Protection Set 4, Rack 13, LCP failed. Processor reset was attempted and found to be unsuccessful. The protection channel remained in the electronic trip condition until Maintenance was prepared to remove the LCP card for replacement. Before card replacement, the Rack was placed in the manual trip condition. The cause of the TS violation was the failure to understand NRC interpretation of the TS requirements. The appropriate procedure was revised to ensure the system is placed in manual trip upon any future failure of the LCP.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) **(17)**

I. PLANT CONDITION(S)

Unit 2 was in Power Operation (Mode 1) at approximately 100 percent power.

II. DESCRIPTION OF EVENT

A. Event:

On July 01, 2004, Protection Set 4, Rack 13, reactor protection system loop calculation processor (LCP) failed [EIIS Code JC]. Processor reset was attempted and found to be unsuccessful. The LCP is designed and tested so that lockup or failure of the processor turns off a transistor within the bistable circuit, thereby establishing an electronic trip of the protection rack. A manual trip also exists and is accomplished by plant personnel taking physical action. The manual trip is accomplished by an individual opening a manual trip switch to break the current path. This action turns off the same transistor that is in the electronic trip circuit and places the protection rack in the trip condition. The protection channel remained in the electronic trip condition until Maintenance was prepared to remove the LCP card for replacement. Before card replacement, the Rack was placed in the manual trip condition.

On October 01, 2004, at a NRC inspection exit, the inspector stated that a non-cited violation will be issued for failure to comply with Technical Specification 3.3.1. The violation was issued because following LCP failure, operator action was not taken to physically place the inoperable channel bistables for functions served by the LCP in Protection Set 4, Rack 13, in a tripped condition. The violation was documented in an inspection report issued on October 25, 2004.

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

None.

C. Dates and Approximate Times of Major Occurrences:

July 01, 2004 at 0109 EST	An LCP failure occurred within the reactor protection system in Protection Set 4, Rack 13.
July 01, 2004 at 1040 EST	The affected reactor protection system channel bistables were physically placed in trip to facilitate card replacement.
October 01, 2004	NRC inspector states that a non-cited violation will be issued for failure to comply with TS 3.3.1.

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D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

The failure of the LCP was annunciated by various alarms in the main control room.

The failure to comply with TS was identified by the NRC inspector stationed at SQN.

F. Operator Actions:

Following failure of the LCP, the control room operators took action as prescribed by procedures which recognized the automatic electronic trip function of the LCP. LCP reset was attempted and found unsuccessful. The affected rack was subsequently physically placed in trip to facilitate maintenance repair.

G. Safety System Responses:

Plant equipment responded to the condition as designed. Upon failure of the LCP, the reactor protection system immediately generated an electronic trip. The electronic trip circuit placed the protection rack in the tripped condition and maintained the applicable safety functions in their conservative position. The system maintained the electronic trip signal until physical action was taken to place the rack in trip.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the condition was the failure of the LCP within the reactor protection system.

B. Root Cause:

The root cause for TSs noncompliance was the failure to understand that NRC does not provide credit for the electronic trip signal in their interpretation of TS 3.3.1, Action 9, and TS 3.3.2, Action 36, which state:

"With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in the tripped condition within 6 hours."

The Inspection Report states:

"The inspectors reviewed logs and procedures, compared TS requirements to the actions taken, and interviewed licensee operations and engineering staff members. The inspectors also reviewed the licensee's written position on LCP failure and discussed it with the NRC Office of Nuclear Reactor Regulation. From this, the inspectors determined that operator action to trip the channel bistables 9 1/2 hours after the failure occurred did not comply with TS 3.3.1, Action 9, and TS 3.3.2, Action 36, which required the inoperable channel to be placed in the tripped condition within six hours."

C. Contributing Factor:

Site personnel detailed understanding of the designed LCP features contributed to the failure to understand NRC interpretation of TSs. Site personnel incorrectly believed that the LCP design, which immediately initiated an electronic trip condition upon LCP failure, provided TS compliance.

IV. ANALYSIS OF THE EVENT

SQN uses the Westinghouse Eagle-21 and solid state reactor protection system. This system takes binary inputs (voltage/no voltage) from the Eagle-21 protection and nuclear instrument channels corresponding to conditions (normal/abnormal) of plant parameters. The system combines these signals in the required logic combination and generates a trip signal to the under voltage and shunt trip coils of the reactor trip circuit breakers when the necessary combination of signals occur. The Eagle-21 protection channel independence is maintained by use of four individual channels. Redundant process equipment is separated by locating electronics in different protection rack sets.

Within the Eagle-21 process protection system, a loop processor subsystem computes the algorithms and comparisons for the protective functions. As part of this subsystem, the LCP performs calculations for protection channel functions, data comparison to set point values, and initiation of trip signals based on data received.

The LCP is designed and tested so that lockup or failure of the processor turns off a transistor within the bistable circuit, thereby establishing an electronic trip of the protection rack. A manual trip also exists and is accomplished by plant personnel taking physical action. The manual trip is accomplished by an individual opening a manual trip switch to break the current path. This action turns off the same transistor that is in the electronic trip circuit. The manual trip also places the protection rack in the trip condition.

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In the event described by this LER, the protection rack was in the tripped condition by way of the electronic trip circuit. This placed and maintained the applicable safety functions in their conservative position.

V. ASSESSMENT OF SAFETY CONSEQUENCES

Based on the above Analysis of The Event, this event did not adversely affect the health and safety of plant personnel or the general public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

Before replacing the failed LCP card, the affected rack bistables were manually placed in the trip condition.

B. Corrective Actions to Prevent Recurrence:

The applicable procedure was revised to direct placement of affected bistables in the hard trip state (manually place the rack in the trip state) if resetting of the LCP is unsuccessful.

VII. ADDITIONAL INFORMATION

A. Failed Components:

The LCP failed to function. The LCP is manufactured by Intel for Westinghouse. The card Model Number is iSBC286.

B. Previous LERs on Similar Events:

A review of previous reportable events for the past three years did not identify any previous reportable events.

C. Additional Information:

None.

D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with 10 CFR 50.73(a)(2)(v).

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E. Loss of Normal Heat Removal Consideration:

Not applicable to this event.

VIII. COMMITMENTS

None.