Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379-2000

R.J. Adney
Site Vice President
Sequoyah Nuclear Plant

December 16, 1996

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT (SQN) UNIT 1 - DOCKET NO. 50-327 - FACILITY OPERATING LICENSES DPR-77 - LICENSEE EVENT REPORT (LER) 50-327/96010

The enclosed report provides details concerning a manual reactor trip when a feedwater isolation occurred. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as a condition that resulted in a manual or automatic actuation of engineered safety features, including the reactor protection system.

Sincerely,

R. J. Adney

Enclosure
cc: See page 2

IE22

Enclosure
cc (Enclosure):

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Sequoyah Nuclear Plant (SQN) Unit 1	05000327	1 OF 7

TITLE (4)

Manual Reactor Trip, as a Result of an Unexpected Feedwater Heater Isolation and Loss of Feedwater

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 NAME	DOCKET NUMBER
									NA	05000
11	16	96	96	-- 010 --	00	12		96	FACILITY NAME: NA	DOCKET NUMBER: 05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	36	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	X 50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
J. W. Proffitt, Licensing Engineer	(423) 843-6651

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
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 16, 1996, at 0031 Eastern daylight time, with Unit 1 in power operation at approximately 36 percent, the reactor was manually tripped as a result of an automatic isolation of all three strings of intermediate pressure feedwater heaters because of high-high feedwater heater shell level. Before the unit was tripped, operators were performing a controlled unit shutdown for scheduled maintenance. After shutting down the No. 3 heater drain tank pumps, heater drain tank level abnormal alarms and heater abnormal level alarms were received in the main control room. An isolation of the feedwater heaters occurred resulting in a loss of feedwater to the main feedwater pumps. A decision was made to manually trip the reactor in anticipation of an automatic reactor trip on low steam generator level. This event occurred as a result of the No. 3 heater drain tank by-pass valve failing to respond to the increase in level in the No. 3 heater drain tank. The valve controller had not been properly set. The proportional controller on the valve was set at 50 percent in order to obtain a quicker response from the valve. Setting the proportional controller at 50 percent results in a decrease in the operational range of the controller. The setpoint (point at which the valve actuates) for the controller was set outside the operational range resulting in the failure of the valve to open when the No. 3 heater drain tank level had increased to a level above the setpoint. Appropriate procedures and the vendor manual will be revised to address the affects that changing the proportional band has on the operational range of the valve controller.

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I. PLANT CONDITIONS

Unit 1 was in power operation at approximately 36 percent with a unit shutdown in progress.

II. DESCRIPTION OF EVENT

On November 16, 1996, at 0031 Eastern daylight time (EDT), the reactor was manually tripped as a result of an automatic isolation of all three strings of intermediate pressure feedwater heaters (EIIS Code SJ)because of high-high heater shell level . Before the unit was tripped, operators were performing a controlled unit shutdown for scheduled maintenance. After shutting down the No. 3 heater drain tank pumps (EIIS Code SN), heater drain tank level abnormal alarms and heater abnormal level alarms were received in the main control room. An isolation of the feedwater heaters occurred resulting in a loss of feedwater to the main feedwater pumps. A decision was made to manually trip the reactor in anticipation of an automatic trip on steam generator level.

Level in the No. 3 heater drain tank is normally maintained within the proper range by modulating level control valves at the discharge of the No. 3 heater drain pumps. Level in excess of normal control range initiates opening of modulating bypass to condenser valves. These valves did not open as required. Indication that the bypass to condenser valve has left the fully closed position is given in the control room. Additional increase in level to a point above the range of the bypass valves annunciates a high level alarm.

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

None

C. Dates and Approximate Times of Major Occurrences:

September 17, 1993	The maintenance procedure for calibration and adjusting the No. 3 heater drain tank bypass valve was revised to set the proportional band near 50 percent.
November 15, 1996 at 1700 EDT	Main control room personnel began a controlled shutdown of Unit 2.

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C. **Dates and Approximate Times of Major Occurrences (continued):**

November 16, 1996 at 0015 EDT	The two operating No. 3 heater drain tank pumps were shutdown in accordance with plant procedures.
November 16, 1996 at 0019 EDT	The No. 3 heater drain tank level abnormal alarm was received. Operations personnel were dispatched to adjust the controller on the No. 3 heater drain tank by-pass valve in accordance with plant procedures.
November 16, 1996 at 0029 EDT	Feedwater heaters level abnormal alarms received. Operations personnel notified to investigate the feedwater heater alarms.
November 16, 1996 at 0031 EDT	Main feedwater pump 1B discharge flow low alarm received. (The No.2 feedwater heaters had isolated).
November 16, 1996 at 0031 EDT	Operations personnel manually tripped the reactor because of the loss of main feedwater resulting from the feedwater heater isolation.
November 16, 1996 at 0035 EDT	Operations personnel initiated manual control of the auxiliary feedwater pumps to control flow and limit the cooldown of the reactor coolant system (RCS).
November 16, 1996 at 0036 EDT	RCS temperature dropped to 540 degrees F, Operations personnel initiated emergency boration of the RCS.
November 16, 1996 at 0044 EDT	Operations personnel completed boration of the RCS. The minimum RCS temperature was 538 degrees F.
November 16, 1996 at 0058 EDT	Operations personnel stabilized the unit in mode 3.

D. **Other Systems or Secondary Functions Affected:**

None.

After shutting down the No. 3 heater drain tank pumps, heater drain tank level abnormal alarms and heater abnormal level alarms were received in the main control room.

F. **Operator Actions:**

Control room personnel observed various alarms associated with feedwater levels and subsequent isolation of the main feedwater flow. Operations personnel were dispatched to investigate and take appropriate action to recover the No.3 heater drain tank levels and the feedwater heater levels. Control room personnel manually tripped the reactor and took actions necessary to stabilize the unit in the hot standby condition (Mode 3).

G. **Safety System Responses:**

The equipment associated with the event responded as designed. As the transient progressed RCS T_{avg} trended below 542 degrees F and in accordance with plant procedures the operators initiated manual control of auxiliary feedwater to limit the cooldown. When RCS T_{avg} reached 540 degrees F emergency boration was initiated. RCS T_{avg} reached approximately 538 degrees F.

III. CAUSE OF THE EVENT

A. **Immediate Cause:**

The immediate cause of the event (engineered safety feature and reactor protection system actuations) was the manual tripping of the reactor by the operator at the controls. This action was taken because of the loss of feedwater caused by the feedwater heater string isolation. The feedwater heater string isolation occurred as a result of the No. 3 heater drain tank by-pass valve failing to open in response to a high heater drain tank level.

B. Root Cause:

This event occurred as a result of the No. 3 heater drain tank by-pass valve failing to respond to the increase in level in the No. 3 heater drain tank. The valve controller had not been properly set. The proportional controller on the valve was set at 50 percent in order to obtain a quicker response from the valve. Setting the proportional controller at 50 percent results in a decrease in the operational range of the controller. The setpoint (point at which the valve actuates) for the controller was set outside the operational range resulting in the failure of the valve to open when the No. 3 heater drain tank level had increased to a level above the setpoint.

A recommendation, by Engineering, to set the proportional band at 50 percent was implemented to optimize the performance of the controller. The effects this recommendation would have on the operation of the valve was not known and, therefore, was not communicated to plant personnel.

The root cause of this event was determined to be a failure to properly evaluate and understand the effects of changing the proportional band on the No. 3 heater drain tank bypass valve level controller.

C. Contributing Factors

A contributing factor to this event was a lack of information at SQN with respect to the operation of this type of controller when the proportional band was changed. The vendor manual and training material do not address the effect on the operational range of the controller when the proportional band was changed.

IV. ANALYSIS OF THE EVENT

During the event, the RCS temperature decreased below 540 degrees F. Operations personnel initiated emergency boration of the RCS and took manual control of auxiliary feedwater to limit the cooldown, in accordance with plant procedures. A minimum RCS temperature of 538 degrees F occurred during the event. The unit was stabilized in Mode 3. The other safety systems responses during and after the unit trip were consistent responses as described in the final safety analysis report and, accordingly, the event did not adversely affect the health and safety of the public.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

Control room personnel promptly diagnosed the plant condition and took actions necessary to stabilize the unit in the hot standby condition (Mode 3).

Appropriate Operations and Maintenance personnel have been informed of the effects of changing the proportional band on the operating range of associated valve controllers.

Appropriate Operations and Maintenance procedures were revised to ensure that personnel do not place the control setpoint for the No. 3 heater drain tank pump bypass valve controllers outside the operational range based on the proportional band setting.

A walkdown of the Unit 2 by-pass controller was performed. It was determined that the Unit 2 by-pass controller was set in the proper operational control range.

A review of plant configurations did not identify any other safety related or trip sensitive controllers that are susceptible to this phenomena.

B. Corrective Actions to Prevent Recurrence:

The appropriate training material will be revised to address the effects of changing the proportional band on the operating range of associated valve controllers.

The vendor manual will be revised to address the effects of changing the proportional band on the operating range of associated valve controllers.

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

VI. ADDITIONAL INFORMATION

A. Failed Components:

None.

B. Previous LERs on Similar Events:

A review of previous reportable events did not identify any events where the No. 3 heater drain tank by-pass valve did not function as a result of being improperly adjusted.

VII. COMMITMENTS

1) The appropriate training material will be revised to address the effects of changing the proportional band on the operating range of associated valve controllers. This action will be completed by January 27,1997.

2) The vendor manual will be revised to address the effects of changing the proportional band on the operating range of associated valve controllers. This action will be completed by January 27,. 997.