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 REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Browns Ferry Unit 2	05000260	1 OF 5

Automatic reactor scram due to a turbine trip

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	
05	15	1999	1999	003	00	06	14	1999	NA	

OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)	100	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)	

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
A. T. Rogers, Senior Licensing Project Manager	(256) 729-2977

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 May 15, 1999, at 1456 CDT, Unit 2 received an automatic scram from 100 percent reactor power due to a turbine trip that occurred during routine turbine overspeed testing. The reactor scram caused reactor water level to go below the low level setpoint (level 3) which generated a redundant scram signal and initiated the Primary Containment Isolation System, as expected. The low reactor water level signal also initiated the Standby Gas Treatment and Control Room Emergency Ventilation Systems. All systems responded as expected and all control rods fully inserted.

The cause was of the turbine trip was failure of the mechanical trip cylinder to latch when hydraulically reset.

TVA is reporting this event in accordance with 10 CFR 50.73 (a)(2)(iv) as an event that resulted in an automatic actuation of an engineered safety feature, including the reactor protection system.

This report was initially submitted on June 14, 1999, as 50-260/1999001. The number has been corrected and this report is being re-submitted as 50-260/1999003.

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

I. PLANT CONDITIONS

At the time of the event, Unit 2 and Unit 3 were at 100 percent power. Unit 1 was shutdown and defueled.

II. DESCRIPTION OF EVENT

A. Event:

On May 15, 1999, at 1456 CDT, Unit 2 received an automatic scram from 100 percent reactor power due to a turbine trip that occurred during routine overspeed testing. The reactor scram caused reactor water level to go below the low level setpoint (level 3) which generated a redundant scram signal and initiated the Primary Containment Isolation System (PCIS), as expected. The low reactor water level signal also initiated the Standby Gas Treatment (SGT) [BH] and Control Room Emergency Ventilation (CREV) [VI] Systems. All systems responded as expected and all control rods fully inserted. At 1528 CDT, Operations reset the scram and PCIS isolations and secured SGT and CREV.

The scram resulted in the expected automatic actuation or isolation of the following PCIS [JE] systems and components:

- PCIS group 2, Shutdown cooling mode of Residual Heat Removal (RHR) [BO] system; drywell floor drain isolation valves; drywell equipment drain isolation valves [WP].
- PCIS group 3, Reactor Water Cleanup (RWCU) system [CE].
- PCIS group 6, primary containment purge and ventilation [JM], Unit 2 reactor zone ventilation [VB]; refuel zone ventilation [VA]; Standby Gas Treatment system; Control Room Emergency Ventilation system.
- PCIS group 8, Traversing Incore Probe (TIP) [IG].

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv), as an event that resulted in an automatic actuation of an engineered safety feature, including the reactor protection system.

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

None.

C. Dates and Approximate Times of Major Occurrences:

May 15, 1999, at 1456 hours CDT	Operations received a turbine trip and reactor scram while performing routine turbine overspeed testing.
May 15, 1999, at 1528 hours CDT	Operations reset the scram and PCIS isolations and secured SGT and CREV.
May 15, 1999, at 1825 hours CDT	A four-hour non-emergency report is made to the NRC pursuant to 10 CFR 50.72 (b) (2) (ii).

D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

Operators received alarms and indications of the turbine trip and subsequent reactor scram.

F. Operator Actions:

Operations personnel responded to the event in accordance with applicable plant procedures.

G. Safety System Response:

All required safety systems operated as designed.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of this event was a turbine trip while performing routine overspeed testing.

B. Root Cause:

The cause of the of the turbine trip was systematically evaluated to determine the cause of the failure. All possible causes were evaluated using a failure modes and effects analysis and all but one failure cause was eliminated. As a result of this evaluation, the most probable cause was determined to be failure of the mechanical trip mechanism to relatch. The latching mechanism was inspected to the extent possible prior to restart and tested repeatedly without failure.

C. Contributing Factors:

None.

IV. ANALYSIS OF THE EVENT

The scram was the result of a turbine trip and was initiated by the closure of the Main Steam Turbine Stop/Control Valves which occurred during routine overspeed testing. The overspeed test is a routine functional test of the overspeed trip device and the mechanical trip valve. The test does not actually overspeed the turbine and is performed while the turbine is at rated speed and should not cause an actual turbine trip. However, the turbine tripped and resulted in closure of the turbine valves and a pressure transient within the Main Steam piping. The transient was mitigated by the automatic opening of nine Main Steam Turbine Bypass Valves and five Main Steam Safety Relief Valves. Equipment performance data was collected from the Plant Engineering Display System and from the Transient Recorder Analysis feature of the Integrated Computer System. This data was analyzed and reviewed for appropriate equipment response.

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IV. ANALYSIS OF THE EVENT (continued)

Each possible failure mode which could have caused the turbine trip has been evaluated. Through personnel interviews, extensive troubleshooting, and physical inspections, the cause of the turbine trip has been determined to be failure of the trip cylinder to latch when hydraulically reset. All other potential causes, including improper procedure performance, low Electro-Hydraulic Control Nitrogen accumulator pressure, a stuck relay contact, solenoid valve failure, throw-out disk sticking, improper linkage tolerances, and incorrect mechanical trip valve settings were systematically evaluated during the investigation. An evaluation of the trip cylinder revealed that if it was hydraulically returned to the reset position, but not mechanically latched, the turbine would trip when the reset was released and the lockout dropped out which appears to be what happened to initiate this event. The trip cylinder is mechanically latched by resting on a 125 mil landing on the trip arm. A failure of this type would not necessarily be repeatable, which accounts for the fact that troubleshooting activities tripped and reset the turbine numerous times with no failures noted. Therefore, based upon the intermittent nature of this failure mechanism and the elimination of the other possible causes as delineated above, this failure mode is considered the most likely cause of the event. Preliminary discussions with the vendor indicate the possible need for a PM to inspect the overspeed trip mechanism on a routine basis.

V. ASSESSMENT OF SAFETY CONSEQUENCES

The evaluation of plant system and component responses to the event concluded that responses were as designed and within the time-frames expected. Personnel performance was also evaluated and found to be timely, appropriate, and met expectations for performance during an event of this type.

The overspeed test is a functional test of the overspeed trip device and mechanical trip valve. The test does not actually cause the turbine to overspeed but exercises the trip linkage and mechanical trip valve by simulating an overspeed condition. Therefore, there was no actual malfunction of the turbine control system. There were no equipment failures during or following the scram that complicated recovery. In addition, there were no radioactive material released and no actual or potential safety consequences as a result of this event. Therefore, this event did not adversely affect the safety of plant personnel or the public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

The Operations crew stabilized the reactor following the scram using the appropriate operating instructions.

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B. Corrective Action to Prevent Recurrence:

Work orders were issued to perform an inspection of the mechanical trip mechanism during the next available refueling outage on Unit 2 and Unit 3. [1]

Maintenance and Engineering will determine if a periodic inspection of the trip latch mechanism is appropriate. [1]

Existing testing methods will be reviewed to determine if alternate techniques are available to reduce or eliminate the risk of turbine trip. [1]

VII. ADDITIONAL INFORMATION

A. Failed Components:

None.

B. Previous Similar Events:

None.

C. Additional Information:

None.

D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with NEI 99-02.

VIII. COMMITMENTS

None.

[1] TVA does not consider this corrective action a regulatory commitment. The completion of this item will be tracked in TVA's Corrective Action Program.