



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

June 27, 2013

10 CFR 50.73

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 1  
Facility Operating License No. NPF-90  
NRC Docket Nos. 50-390

Subject: **Licensee Event Report 50-390/2013-002-00**

Enclosed please find Licensee Event Report (LER) 50-390/2013-002-00 that has been prepared and submitted pursuant to 10 CFR 50.73. This LER reports a condition that occurred in which both trains of the Emergency Gas Treatment System were inoperable. This condition is reported as an LER in accordance with 10 CFR 50.73(a)(2)(v)(C) and 10 CFR 50.73(a)(2)(v)(D).

There are no new regulatory commitments contained in this letter. Should you have questions regarding this report, please contact Donna Guinn, WBN Site Licensing Manager, at (423) 365-1589.

Respectfully,

A handwritten signature in black ink that reads 'Timothy P. Cleary'.

Timothy P. Cleary  
Site Vice President  
Watts Bar Nuclear Plant

Enclosure

cc (Enclosure):

NRC Regional Administrator - Region II

NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 1

**LICENSEE EVENT REPORT (LER)**

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.

<b>1. FACILITY NAME</b> Watts Bar Nuclear Plant (WBN) Unit 1		<b>2. DOCKET NUMBER</b> 05000390	<b>3. PAGE</b> 1 of 6
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**4. TITLE**  
Two Trains of Emergency Gas Treatment System Inoperable

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
05	03	2013	2013	- 002	- 00	06	27	2013	FACILITY NAME	DOCKET NUMBER

<b>9. OPERATING MODE</b>  1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> <i>(Check all that apply)</i>																																	
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.71(a)(4)	<input type="checkbox"/> 73.71(a)(5)
<b>10. POWER LEVEL</b>  100																					<small>Specify in Abstract below or in NRC Form 366A</small>													

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME	Julie Hough, Licensing Engineer	TELEPHONE NUMBER (Include Area Code)	423-365-8048
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	LE	TMR	P050	Y					

<b>14. SUPPLEMENTAL REPORT EXPECTED</b>					<b>15. EXPECTED SUBMISSION DATE</b>		
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO					MONTH	DAY	YEAR

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

On May 2, 2013 at 0845, B-train Emergency Gas Treatment System (EGTS) was removed from service for planned maintenance and Operations declared Technical Specification (TS) Limiting Condition for Operation (LCO) 3.6.9 not met and entered Condition A for one EGTS train inoperable. On May 3, 2013 at 0111, the Main Control Room was notified that the A-A Auxiliary Air Compressor Air Dryer was not purging due to failure of the Auxiliary Control Air System (ACAS) A-A dryer central timing unit. Operations declared A-train ACAS and supported Technical Specification systems inoperable, including A-train EGTS.

WBN operations entered LCO 3.0.3 due to the inoperability of two trains of EGTS and began preparations to initiate an orderly shutdown within one hour. Operations initiated actions to restore B-train EGTS to standby in accordance with System Operating Instruction (SOI)-65.02, Emergency Gas Treatment System. At 0155, B-train EGTS was declared operable and the actions of LCO 3.0.3 exited. No action was taken to reduce reactor power while in LCO 3.0.3.

The A-A Auxiliary Air Compressor Air Dryer central timing unit motor was replaced. The apparent cause of this event was that there were missed opportunities to identify the need for replacement preventive maintenance (PM) for the central timing unit. Change requests have been initiated for periodic replacement of the ACAS dryer central timing unit. Components in other systems which could be subject to the same failure mechanism will be reviewed and PM activities initiated as necessary.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Watts Bar Nuclear (WBN) Unit 1	05000390	2013	-- 002	-- 00	2 of 6

**NARRATIVE**

**I. PLANT OPERATING CONDITIONS BEFORE THE EVENT**

At the time of discovery, Watts Bar Nuclear Plant (WBN) Unit 1 was in Mode 1 at approximately 100 percent rated thermal power. Event times are reported relative to Eastern Daylight Savings Time.

**II. DESCRIPTION OF EVENTS**

**A. Event**

On May 2, 2013 at 0845, Operations declared Technical Specification (TS) Limiting Condition for Operation (LCO) 3.6.9 not met and entered Condition A of LCO 3.6.9 for one Emergency Gas Treatment System (EGTS) (Energy Industry Identification System (EIS): BH) train inoperable due to planned EGTS B-train maintenance. On May 3, 2013 at 0111, an Auxiliary Unit Operator (AUO) notified the Main Control Room that the A-A Auxiliary Air Compressor Air Dryer (EIS: DRY) was not purging. The A-train Auxiliary Control Air System (ACAS) (EIS: LE) is designed to provide 100 percent of the required air flow to all safety-related components and systems which require instrument air to perform an active safety function. Supported TS systems were declared inoperable, including A-train EGTS.

At 0111 on May 3, 2013, WBN Operations entered LCO 3.0.3 due to the inoperability of two trains of EGTS and began preparations to initiate action to place the unit in Mode 3 within 7 hours, Mode 4 within 13 hours, and Mode 5 within 37 hours.

B-train EGTS was restored to standby in accordance with System Operating Instruction (SOI)-65.02, Emergency Gas Treatment System. At 0155, B-train EGTS was declared operable and LCO 3.0.3 was declared met and the associated actions exited. Because of the prompt restoration of B-train EGTS, no action was taken while in LCO 3.0.3 to reduce reactor power (i.e., no negative reactivity was added.)

**B. Status of Structures, Components, or Systems that were Inoperable at the start of the event and that contributed to the event**

B-train EGTS was inoperable due to ongoing maintenance.

**C. Dates and Approximate Times of Occurrences**

Date	Time (EDT)	Event
May 2, 2013	0845	TS LCO 3.6.9, EGTS, declared not met due maintenance on B-train EGTS and Condition A entered.
May 3, 2013	0111	Main Control Room received report that A-A Air Compressor Air Dryer cam timer was not cycling. Declared A-train EGTS inoperable and entered the required actions of LCO 3.0.3.
May 3, 2013	0155	B-Train EGTS returned to standby and declared operable. Actions of LCO 3.0.3 exited.
May 3, 2013	1839	A-A Air Compressor Air Dryer central timing unit motor replaced and returned to service. A-train EGTS declared operable.

**D. Manufacturer and Model Number (or other identification) of each component that failed during the event**

ACAS Dryer, Eagle Signal Model MP5A617 central timing unit (EIS: TMR).

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Watts Bar Nuclear (WBN) Unit 1	05000390	2013	-- 002	-- 00	3 of 6

**NARRATIVE**

**E. Other Systems or Secondary Functions Affected**

The following TS LCOs were also declared not met due to the inability of A-train ACAS to perform its support function.

TS LCO 3.7.4, Atmospheric Dump Valves

TS LCO 3.7.5, Auxiliary Feedwater

TS LCO 3.7.10, Control Room Emergency Ventilation System

TS LCO 3.7.11, Control Room Emergency Air Temperature Control System

TS LCO 3.7.12, Auxiliary Building Gas Treatment System

The following Fire Protection Report (FPR) Fire Protection Systems and Features Operating Requirements (ORs) were declared not met due to the inability of A-train ACAS to perform its support function.

FPR OR-14.10, Fire Safe Shutdown Equipment

**F. Method of Discovery of Each Component or System Failure or Procedural Error**

The failure of the A-A Air Compressor Air Dryer cam timer to cycle was identified by operations personnel during conduct of AUO rounds.

**G. The Failure Mode, Mechanism, and Effect of Each Failed Component**

The ACAS dryer Eagle Signal Model MP5A617 central timing unit was observed stalling. The failure mechanism was age related deterioration that allowed the timing unit motor to stall during operation. The effect was that the A-train ACAS air dryer would not purge as designed.

**H. Operator Actions**

Operators declared TS equipment supported by A-train ACAS inoperable, which resulted in two trains of EGTS being inoperable. As required by TS LCO 3.0.3, action was initiated to prepare for an orderly shutdown. B-train EGTS was restored to standby in accordance with SOI 65.02 and declared operable. Upon restoration of B-train EGTS, Operations exited TS LCO 3.0.3.

**I. Automatically and Manually Initiated Safety System Responses**

There were no safety system responses.

**III. CAUSE OF THE EVENT**

**A. The cause of each component or system failure or personnel error, if known:**

The direct cause of this event was the central cam timer motor stalling. The motor was aged and performance had deteriorated which allowed the timing unit to stall during operation. New cam timer limit switches were installed on the existing (1975 model) timing unit on April 29, 2013, as part of a maintenance activity. The new limit switches increased the load on the already aged motor, causing it to stall during operation.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Watts Bar Nuclear (WBN) Unit 1	05000390	2013	-- 002	-- 00	4 of 6

NARRATIVE

B. The cause(s) and circumstances for each human performance related cause:

The apparent cause of this event was that there were missed opportunities to identify the need for a replacement preventive maintenance (PM) task for the central timing unit. Three missed opportunities to identify the need for a central timing replacement PM were identified: 1) a 2006 event where the B-train central timing unit failed; 2) a contractor-assisted PM optimization review process, and 3) the initial PM classification review for the central timing units.

A contributing cause was identified that a complete spare central timing unit was not available at the time the central cam time limit switches were replaced on April 29, 2013. A full replacement would have prevented the failure of the central cam timer motor on May 3, 2013, following replacement of the limit switches.

IV. ANALYSIS OF THE EVENT

EGTS is provided for ventilation control and cleanup of the atmosphere inside the annulus between the Shield Building and the Primary Containment Building. This is accomplished with the use of two subsystems; the Annulus Vacuum Control Subsystem (AVCS) and the Air Cleanup (ACU) Subsystem. The AVCS is used during normal operation to maintain a negative pressure in the annulus relative to the Shield Building. The ACU subsystem is a redundant, shared airflow network having the capability to perform two functions for the affected reactor secondary containment during a loss-of-coolant accident. One of these functions is to keep the secondary containment annulus air volume below atmospheric pressure. The second function is to remove airborne particulates and vapors that may contain radioactive nuclides from air drawn from the annulus. Both of these functions are performed by processing and controlling a stream of air taken from the reactor unit secondary containment annulus.

ACAS provides oil-free, clean, dry compressed air to valves and instrumentation that are required to perform a safety function during postulated design-basis events, including EGTS isolation and flow control dampers and valves. ACAS is separated into two independent 100 percent capacity trains, each containing its own compressor, receiver, dryer, filter, and piping systems. The ACAS piping is arranged so that the auxiliary receivers are charged from the non-qualified station control air system during normal operation. The auxiliary air system is automatically isolated from the station air system upon loss of air from the station system.

Although A-train ACAS was declared inoperable during this event due to the failure of the A-A dryer central timing unit, A-train ACAS would have likely been able to perform its safety function of providing air to A-train EGTS for four to eight hours following the failure, depending on when in the cycle the failure occurred. The function of the ACAS A-A air dryer central timing unit is to signal when the dryer actuators start moving. The dryer actuators control where and when the inlet switching and purge exhaust valves start and stop based on limit switches on each valve. Based on this, it is reasonable to assume that if the central timer motor fails, the only effect would be that the dryer actuators would not receive a signal to actuate, and it is unreasonable to assume that the central timer could cause the valve to stop in an intermediate position in which the dryer would allow header pressure to be lost. Additionally, the actuators and the central timing unit limit switches were replaced on April 29, 2013 and satisfactorily completed all required testing. For this event, the motor failing by itself could not cause a loss of header pressure. It would require a combination of specific sub-component failures to cause a loss of air header pressure. Therefore, if the dryer central timing unit would have stopped completely, the only adverse affect would have been a lack of desiccant regeneration. The dryer (A-train ACAS) could have functioned for four to eight hours without desiccant regeneration.

During this event, B-train EGTS was restored to operability in 44 minutes. If a design basis event were to have occurred during this time period, operators would have entered procedure 1-E-0, Reactor Trip or Safety Injection. Operator actions required by 1-E-0 include monitoring EGTS operation. Based on the procedural requirement in 1-E-0 to monitor EGTS operation, and the actual time to restore B-train EGTS operability (44 minutes), B-train

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Watts Bar Nuclear (WBN) Unit 1	05000390	2013	-- 002	-- 00	5 of 6

**NARRATIVE**

**IV. ANALYSIS OF THE EVENT (continued)**

EGTS operability could have been restored within four hours during a design basis event. Considering the ability of A-train ACAS to supply A-train EGTS for four to eight hours and the ability to restore B-train EGTS within four hours, one train of EGTS would have been available to perform its safety function at all times. Therefore, there is a minimal potential safety consequence resulting from this event.

As a design basis event did not occur during the 44 minute period when both trains of EGTS were inoperable, there was no actual safety consequence resulting from this event.

**V. ASSESSMENT OF SAFETY CONSEQUENCES**

**A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event:**

The ACAS piping is arranged so that the ACAS receivers are normally charged from the non-qualified, non-safety related Control Air Subsystem (CAS) during normal operation. The ACAS compressors are maintained in automatic, but are normally idle (standby) during both normal and emergency operation when adequate pressure supply is maintain by the Control and Service Air compressors. ACAS automatically isolates from the CAS on low CAS pressure. CAS was available during this event.

**B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident:**

Not applicable.

**C. For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from discovery of the failure until the train was returned to service:**

A-train EGTS was declared inoperable at 0111 on May 3, 2013 due to failure of the A-train ACAS dryer central timing unit. Operability of A-train EGTS was restored on May 3, 2013 at 1839. B-train EGTS was declared inoperable at 0845 on May 2, 2013 due to scheduled maintenance. Operability of B-train EGTS was restored at May 3, 2013 at 0155. Both trains of EGTS were concurrently inoperable for 44 minutes on May 3, 2013.

**VI. CORRECTIVE ACTIONS - Corrective actions are being managed by TVA's corrective action program under Problem Evaluation Report 721151.**

**A. Immediate Corrective Actions**

B-train EGTS was returned to standby in accordance with SOI-65.02 and declared operable. The A-A Auxiliary Air Compressor Air Dryer central timing unit motor was replaced.

**B. Corrective Actions to Prevent Recurrence or to reduce probability of similar events occurring in the future**

PM change requests have been initiated for periodic replacement of the central timing unit on the ACAS dryers on a 15 year frequency based on Electric Power Research Institute templates, vendor recommendations, and component history. Components in other systems which could be subject to the same failure mechanism will be reviewed and PM activities initiated as necessary. A complete spare central timing unit for the ACAS dryers will be obtained to prevent the need to replace individual components.

LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Watts Bar Nuclear (WBN) Unit 1	05000390	2013	-- 002	-- 00	6 of 6

**NARRATIVE**

VI. CORRECTIVE ACTIONS (continued)

B. Corrective Actions to Prevent Recurrence or to reduce probability of similar events occurring in the future (continued)

Individuals involved with approval of the contractor-assisted PM optimization review process will be coached on the use of technical rigor, questioning attitude, and proper oversight as they pertain to this LER and future PM reviews.

VII. ADDITIONAL INFORMATION

A. Previous Similar Events at the Same Plant

A historical maintenance review of the ACAS dryer central timing units was performed. The "B" train central timing was replaced in April 2006 due to limit switch failure.

A review of LERs was conducted and no LERs were identified with the same underlying concern or reason as this event within the last three years.

B. Additional Information

None.

C. Safety System Functional Failure Consideration

In accordance with Nuclear Energy Institute (NEI) 99-02, this condition is considered a safety system functional failure.

D. Scram With Complications Consideration

This event did not include a scram.

VIII. COMMITMENTS

There are no commitments.