



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

John A. Scalice
Site Vice President, Watts Bar Nuclear Plant

MAR 11 1997

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

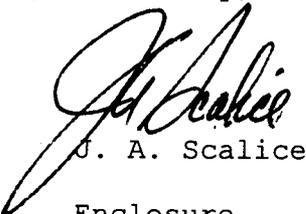
Gentlemen:

In the Matter of the)
Tennessee Valley Authority) Docket No. 50-390

WATTS BAR NUCLEAR PLANT (WBN) - FACILITY OPERATING LICENSE NPF-90 -
LICENSEE EVENT REPORT (LER) 50-390/96025 - SUPPLEMENTAL REPORT

The enclosed report provides supplemental details regarding the surveillance program for the oxygen and hydrogen limits within the Explosive Gas and Storage Tank Radioactivity Monitoring Program. LER 390/96025 was initially submitted January 10, 1997. Submittal of the report is in accordance with 10 CFR 50.73(a)(2)(i). This report also fulfills the reporting requirements discussed in the NRC's Supplemental Safety Evaluation Report 16, Section 11.3.1 (pages 11-16).

Sincerely,


J. A. Scalice

Enclosure
cc: See page 2

9703190014 970311
PDR ADOCK 05000390
S PDR

IE221



U.S. Nuclear Regulatory Commission
Page 2

MAR 11 1997

cc (Enclosure):

INPO Records Center
Institute of Nuclear Power Operations
700 Galleria Parkway
Atlanta, Georgia 30339-5957

NRC Resident Inspector
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

Mr. Robert E. Martin, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

LICENSEE EVENT REPORT (LER)

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

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 20565-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20603.

FACILITY NAME (1)

Tennessee Valley Authority, Watts Bar Nuclear Plant - Unit 1

DOCKET NUMBER (2)

05000390

PAGE (3)

1 OF 9

TITLE (4)

Failure to Adequately Implement Surveillance Program to Ensure Oxygen/Hydrogen Limits Were Being Maintained

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
12	11	96	96	025	01	03	11	97		05000
			--							05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
		20.2201(b)	20.2203(a)(2)(v)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)	50.73(a)(2)(viii)				
		20.2203(a)(1)	20.2203(a)(3)(ii)		50.73(a)(2)(ii)	50.73(a)(2)(x)				
		20.2203(a)(2)(i)	20.2203(a)(3)(iii)		50.73(a)(2)(iii)	73.71				
		20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)	OTHER				
		20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)	Specify in Abstract below				
POWER LEVEL (10)	100	20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)	or in NRC Form 366A				

LICENSEE CONTACT FOR THIS LER (12)

NAME

Rebecca N. Mays, Sr. Licensing Manager

TELEPHONE NUMBER (include Area Code)

(423) 365-3855

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)

YES NO

(If yes, complete EXPECTED SUBMISSION DATE).

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

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

On December 5, 1996, it was determined that the surveillance program to ensure that the oxygen limits were being maintained as discussed in Technical Specification (TS) Program 5.7.2.15, was inadequate. The sequential oxygen analyzer was not operated to automatically sequence between the seven tanks. The analyzer was normally aligned to the in-service waste gas decay tank. In addition, the TS Program as described in the WBN Final Safety Analysis Report (FSAR) 11.3.2, discusses operator actions to be taken on receipt of the automatic sequential oxygen analyzer alarms for 2 percent oxygen (high alarm) and 4 percent oxygen (high-high alarm) locally and in the main control room. It has now been determined that WBN failed to design and connect the 4 percent high-high oxygen alarm and failed to adequately address operator actions in the appropriate procedures. The root cause for the program deficiencies is due to the misunderstanding of the scope of the program approved by NRC and failing to verify the scope against the FSAR. The primary cause of the failure to ensure the 4 percent oxygen alarm was connected was due to insufficient degree of attention applied in preparation of the FSAR change. Corrective actions included revising procedures which implement the TS Program and connection of the 4 percent high-high oxygen alarm. During the calibration of the sequential oxygen analyzer and the continuous oxygen analyzer to ensure compliance with the TS Program, the continuous analyzer failed to meet the calibration tolerance and would not adjust to stay within tolerance. The analyzer was replaced, tested, and calibrated.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant, Unit 1	05000				2 OF 9
	05000390	96	025	01	

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

I. PLANT CONDITIONS:

On December 11, 1996, with Watts Bar Nuclear Plant Unit 1 in Mode 1 at 100 percent power, RCS temperature at 588°F, Watts Bar personnel determined that the "Explosive Gas and Storage Tank Radioactivity Monitoring Program" required by Technical Specification 5.7.2.15 was not sufficient to ensure the limits for hydrogen and oxygen were being maintained in accordance with commitments described in the FSAR.

II. DESCRIPTION OF EVENT

A. On December 5, 1996, a high oxygen alarm (AA) associated with the waste gas disposal system (WE) was received when aligned to sample the reactor coolant drain tank (RCDT) (AB)(TK). Operations was in the process of cycling the containment isolation valve (ISV) for the RCDT sample line when the alarm was received. The sequential oxygen analyzer (MON), which is part of the process sampling system (KN), was manually aligned to the RCDT at the time. During the investigation of this incident, it was determined that the surveillance program to ensure that the oxygen limits were being maintained as discussed in Technical Specification Program 5.7.2.15, was inadequate. Technical Specification 5.7.2.15 for explosive gas monitoring is implemented by Plant Administrative Instruction (PAI) 15.01, "Explosive Gas and Storage Tank Radioactivity Monitoring Program," and O-SI-77-3, "WDS Waste Gas Oxygen Determination." The sequential oxygen analyzer was not operated in the automatic mode of operation to determine the quantity of oxygen in the gas space of the volume control tank (CB), pressurizer relief tank (AB), holdup tanks (CB), waste gas decay tanks (WE), RCDT, and spent resin storage tank (WD). The sequential oxygen analyzer was normally aligned to the in-service waste gas decay tank and was manually sequenced to sample other tanks based on the nature of plant operations that could effect these tanks and the judgment of Chemistry personnel. In addition, the Technical Specification program, as described in the WBN FSAR Section 11.3.2, discusses operator actions to be taken on receipt of both alarms for the analyzers and discusses the automatic sequential oxygen analyzer providing a local and main control room alarm on 2 percent oxygen concentration (high alarm) and 4 percent oxygen (high-high alarm). It has now been determined that WBN failed to design and connect the 4 percent oxygen high-high alarm for the automatic sequential analyzer and failed to include the operator actions in the appropriate procedures.

To ensure compliance with the Technical Specification program, TVA calibrated both the sequential analyzer and the continuous oxygen analyzer which samples down stream of the operating waste gas compressor. On January 10, 1997, TVA found the continuous oxygen analyzer to be out of tolerance and could not be adjusted to meet tolerance requirements. TVA confirmed that the continuous waste gas compressor oxygen analyzer was preoperationally tested and found acceptable before fuel load. However, the status of the continuous oxygen analyzer was considered indeterminate for greater than 30 continuous days due to the analyzer being out of tolerance and failing to meet the vendor's requirements.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant, Unit 1	05000				3 OF 9
	05000390	96 -	025 -	01	

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

II. DESCRIPTION OF EVENT (continued)

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

The sequential oxygen analyzer was considered inoperable due to the improper lineup of the analyzer and due to the missing 4 percent oxygen alarm. It was also determined during the corrective action phase of the event that the continuous oxygen analyzer was out of tolerance and could not be calibrated to be within tolerance.

C. Dates and Approximate Times of Major Occurrences

Dates and times associated with failure to implement TS 5.7.2.15 Program

On August 6, 1993, TVA issued FSAR Amendment 77 which added a clarification that WBN has the second analyzer and stated that WBN would have one automatic sequential oxygen analyzer and a second oxygen monitor which continuously samples the discharge of the operating waste gas compressor.

On May 16, 1995, TVA issued FSAR Amendment 89 which inadvertently included a description of a 4 percent high-high oxygen alarm on the sequential gas analyzer.

On July 27, 1995, a teleconference call occurred between the NRC reviewer and TVA Chemistry department to discuss the location of the grab sample point for the inoperable analyzer.

On August 31, 1995, TVA issued FSAR Amendment 90 which added the statement that a main control room alarm is provided on the sequential oxygen analyzer for both high and high-high oxygen alarms. Operator actions to be taken for receipt of these alarms were also added in this amendment.

In September 1995, NRC issued Supplemental Safety Evaluation Report (SSER) 16 which agreed with the RAI responses and FSAR Section 11.3.

On October 16, 1995, Chemistry issued Plant Administrative Instruction (PAI) 15.01 and Surveillance Instruction (SI) 0-SI-77-3 implementing the monitoring program for explosive gas program as discussed in the Technical Specification 5.7.2.15. Operations issued the annunciator response instruction addressing the 2 percent and 4 percent oxygen alarm on the continuous oxygen analyzer.

Note: Chemistry and Operations did not implement the program as described in the FSAR Section 11.3 and commitments in the RAI responses. The program, which was implemented, was based on a misunderstanding of the operation of the analyzers as approved by the NRC.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant, Unit 1	05000				4 OF 9
	05000390	96 -	025 -	01	

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

II. DESCRIPTION OF EVENT (continued)

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

Dates and times associated with failure to implement TS 5.7.2.15 Program (continued)

On October 26, 1995, the preoperational test for the sequential oxygen analyzer was conducted as part of the preoperational program for the process sampling system. This test did not include the high-high oxygen alarm function on the sequential oxygen analyzer nor was the interface between the two systems tested.

Note: Preoperational test for the process sampling system, which included the waste gas oxygen analyzers, is discussed in FSAR Section 9.3.2. This test was written and approved in March 1994. The change to add the 2 percent/4 percent alarms was issued in the FSAR Section 11.3 for waste gas decay system in Amendment 89 on May 16, 1995. The test program required current drawings and referenced FSAR sections be reviewed for changes. The drawings had not changed since a design change notice had not been issued to connect the 4 percent oxygen alarm.

December 5, 1996, 1605 hours (EST) - An alarm was received for >2 percent oxygen in the RCDT.

December 11, 1996 - During the investigation of the high oxygen alarm, it was determined that the sequential waste gas oxygen analyzer was not being appropriately operated in accordance with the Technical Specification 5.7.2.15, to ensure the limits for concentration of hydrogen and oxygen are maintained.

January 10, 1997 - The continuous oxygen analyzer failed to meet the calibration tolerance requirements and could not be adjusted to stay within those tolerances.

D. Other Systems or Secondary Functions Affected

No other systems or secondary functions were affected by this event.

E. Method of Discovery

During the investigation of the high oxygen alarm on the RCDT, it was determined that the sequential oxygen analyzer was not being appropriately operated to fulfill the Technical Specification program requirements for explosive gas monitoring and that the high-high oxygen alarm for the sequential monitor as discussed in FSAR Section 11.3 had not been designed and connected. Also during this review, it was determined that the frequency of the calibration and testing procedures were not in accordance with the design criteria.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION		OF	
Watts Bar Nuclear Plant, Unit 1	05000				5	OF	9
	05000390	96	025	01			

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

II. DESCRIPTION OF EVENT (continued)

E. Method of Discovery

During the process of calibrating both the sequential oxygen analyzer and the continuous oxygen analyzers (MON) to ensure complete compliance with the Technical Specification program, the continuous oxygen analyzer was found to be out of tolerance.

F. Operator Actions

There were no operator actions required as this is a program deficiency.

G. Automatic and manual safety system responses

There were no automatic or manual safety system responses and none were necessary.

III. CAUSE OF EVENT

A. Immediate Cause

The immediate cause of this event was a failure to ensure limits were being maintained as discussed in Technical Specification 5.7.2.15 for the volume control tank, pressurizer relief tank, holdup tanks, gas decay tanks, RCDT, and spent resin storage tank as described in FSAR Section 11.3. The FSAR section describes the sequential oxygen analyzer as an automatic gas analyzer which determines the quantity of oxygen in the gas space of those tanks and provides a local and main control room alarm on 2 percent oxygen concentration and 4 percent oxygen concentration. The FSAR section also discusses the operator actions taken on receipt of each alarm.

B. Root Cause

The primary cause of this program deficiency was the failure to implement commitments described in TVA letters to NRC and FSAR Section 11.3 to ensure that explosive gas limits were being maintained in accordance with the Technical Specification. The Chemistry personnel involved in issuing the procedure to implement the explosive gas program misunderstood the scope of the explosive gas program as approved by NRC. The misunderstanding was concerned with the intended mode of operating the sequential oxygen analyzer which was preconceived to be consistent with the operation of similar analyzers at other plants. The differences in the mode of operating the sequential oxygen analyzer and the text of the FSAR were not resolved as Chemistry personnel erred in assuming that the FSAR description of the sequential analyzer was that of an available feature not an operational requirement. Design recommended maintenance frequencies and operator actions were not included because the plant procedure for the explosive gas program did not adequately address the FSAR commitments or design requirements.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION		
Watts Bar Nuclear Plant, Unit 1	05000				6	OF 9
	05000390	96	025	01		

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

III. CAUSE OF EVENT (continued)

B. Root Cause (continued)

The primary cause of the failure to verify that a 4 percent high-high oxygen alarm was connected, was due to an insufficient degree of attention applied in preparation of the FSAR change package. The draft response for that letter was initially prepared by Nuclear Engineering. This draft response was accepted by the Engineering supervisors and managers associated with the preparation of that change package without adequate self-checking to ensure the draft response was correct. Subsequent letters concerning this issue and FSAR changes were based on this initial response without verifying previously documented correspondence or by obtaining an interdiscipline review of the response and FSAR changes.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

There were no failures that rendered a train or a safety system inoperable. The sequential oxygen analyzer was aligned to the RCDT at the time the high oxygen alarm was received because Operations was cycling the isolation valve to the tank. The analyzer was capable of operating in the automatic sequential mode. However, Chemistry normally aligned the analyzer to the in-service waste gas decay tank. As noted above, the high oxygen alarm was operating. Based on the facts that the more conservative alarm was operating, that operator actions were required to isolate the affected tank upon receipt of a high oxygen alarm, and that several of the supply tanks pump to the in-service waste gas decay tank, the safety implications of the event were limited to the pressurizer relief tank, volume control tank and spent resin storage tank which are normally isolated from the vent header, but which were normally covered with a gas.

There were no safety implications associated with the continuous waste gas compressor oxygen analyzer being found out of tolerance during calibration of the instrument. The operating compressor feeds the in-service waste gas decay tank. The continuous oxygen analyzer was read daily and a grab sample was taken for comparison at least once per week. A redundant sample to the continuous oxygen analyzer is provided with the sequential oxygen analyzer (whether aligned to the in-service waste gas decay tank only or periodically aligned to the in-service waste gas decay tank). Therefore, a high oxygen content would have been detected with either the grab samples or by the sequential oxygen analyzer.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant, Unit 1	05000				7 OF 9
	05000390	96 -	025 -	01	

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

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

1. Upon determination that the sequential oxygen analyzer was inoperable, manual sampling was initiated every 4 hours.
2. Upon discovery that the sequential oxygen analyzer was not operated in the automatic mode, actions were taken to realign the analyzer to operate in the automatic sequential mode in lieu of being aligned to the in-service waste gas decay tank.
3. When it was discovered that the high-high oxygen alarm (4 percent alarm) was not connected, a design change request was issued to connect and test the alarm. This connection has been completed.
4. Personnel involved in the original errors have been individually counseled on verification and adequacy of licensing documents.
5. The continuous oxygen analyzer has been replaced with an improved model, tested, and successfully calibrated.

B. Corrective Actions to Prevent Recurrence

1. The Chemistry procedures and surveillances which implement the Technical Specification 5.7.2.15 program have been revised to implement the documented commitments in letters to NRC and FSAR Section 11.3.
2. The Operations procedures have been revised to align the waste gas program with the Technical Specification 5.7.2.15 program as described in the FSAR. This includes implementation of the 4 percent high-high oxygen alarm and operator actions for both the 2 percent and 4 percent oxygen alarms on the sequential gas oxygen analyzer.
3. A memorandum has been issued to Engineering employees delineating the need for greater attention to detail with additional self-checking of facts and requiring a cross discipline review of FSAR change packages.
4. A memorandum has been issued to Chemistry employees delineating the details of the problem and ways that it could be prevented such that the Chemistry technical reviewers are aware of lessons learned.
5. The Chemistry group has reviewed the Technical Specification programs and corresponding FSAR sections that are the responsibility of the Chemistry group to ensure appropriate compliance. Discrepancies are being dispositioned through the WBN Corrective Action Program.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant, Unit 1	05000				8 OF 9
	05000390	96 -	025 -	01	

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

B. Corrective Actions to Prevent Recurrence (continued)

- 6. Maintenance has revised the frequency of the analyzer testing procedures to comply with the revised PAI-15.01.

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

There were no failures that rendered a train or a safety system inoperable.

2. Component/System Failure Information

a. Method of Discovery of Each Component or System Failure:

There were no component failures involved.

b. Failure Mode, Mechanism, and Effect of Each Failed Component:

There were no component failures involved.

c. Root Cause of Failure:

There were no component failures involved.

d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

There were no component failures involved.

e. Manufacturer and Model Number of Each Failed Component:

There were no component failures involved.

B. Previous Similar Events

There were no previous similar events identified.

VII. COMMITMENTS

None.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
Watts Bar Nuclear Plant, Unit 1	05000	YEAR	SEQUENTIAL NUMBER	REVISION	9 OF 9
	05000390	96	- 025	- 01	

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

ADDITIONAL INFORMATION FOR SPECIAL REPORT

The sequential oxygen analyzer was considered inoperable for greater than 30 continuous days due to the improper lineup of the analyzer and due to the missing 4 percent oxygen alarm. The 4 percent oxygen alarm has been connected on the sequential oxygen analyzer. However, the analyzer was considered to be inoperable until the program procedures discussed above were revised to be consistent with commitments and the FSAR statements. Management decided to withhold an "operable" declaration until confirmation was received that the calibration of the continuous waste gas compressor monitor was complete.

These program procedures have been revised. As noted in TVA's response to Notice of Violation 50-390/96-13-06 dated February 18, 1997, TVA performed a follow up review to ensure compliance with the Technical Specification program. The continuous oxygen analyzer, down stream of the operating waste gas compressor, was being calibrated and found to be out of tolerance. After several unsuccessful attempts to complete the calibration and discussions with the vendor, the analyzer was replaced, tested, and calibrated. However, the status of the continuous waste gas compressor oxygen analyzer was considered indeterminate for greater than 30 continuous days due to the analyzer being out of tolerance and failing to meet the vendor's requirements. TVA now considers the Explosive Gas Program in Technical Specification 5.7.2.15 to be fully implemented as described in FSAR 11.3.