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

Richard T. Purcell
Site Vice President, Watts Bar Nuclear Plant

JAN 2 9 1999

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/1999001

The enclosed report provides details regarding the entry into Limiting Condition for Operation (LCO) 3.0.3 due to both trains of the electric board room air conditioning unit chillers being out of service for about four hours. Submittal of this report is in accordance with 10 CFR 50.73(a)(2)(i)(B).

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

R. T. Purcell

Enclosure
cc: See page 2

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
Atlanta Federal Center
61 Forsyth St., Suite 23T85
Atlanta, Georgia 30303

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104 EXPIRES 08/30/2001

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 20603. In an information collection does not display a currently valid OMB control number, the NRC may no 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)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Watts Bar Nuclear Plant - Unit 1	05000390	1 OF 8

TITLE (4)

LCO 3.0.3 Entry Due to Both Trains of Electric Board Room Chillers Out of Service

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
										05000
01	02	99	1999	001	00	02	01	99	FACILITY NAME	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)	80	20.2201(b)	20.2203(a)(2)(v)	X 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)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below
		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	TELEPHONE NUMBER (Include Area Code)
Rebecca N. Mays, Senior Licensing Engineer	(423)-365-3855

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	VI	CLR	D270	Y						

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	NO X				

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

On January 2, 1999, at approximately 0829 EST, electric board room (EBR) air conditioning unit Train A chiller located in the Control Building tripped and automatically started Train B EBR air conditioning unit. During troubleshooting of Train A EBR air conditioning unit chiller, it was suspected initially that the EBR air conditioning unit tripped due to low water supply pressure to the temperature control valve (TCV) actuator which could increase the valve closing force and trip the chiller on high discharge pressure because of inadequate cooling. The water supply pressure to Train A EBR air conditioning unit TCV pressure was restored to normal. While Train B EBR air conditioning unit was in service, the unit exhibited control power circuit and load control instability. At 0937 hours EST, Train B EBR air conditioning unit was stopped to restore Train A EBR air conditioning unit to service. Train A EBR air conditioning unit failed to start. Operations declared both trains inoperable and entered into LCO 3.0.3. Train A EBR air conditioning unit was returned to service at approximately 1350 and LCO 3.0.3 was exited. This condition is being reported in accordance with 10 CFR 50.73 (a)(2)(i)(B).

The cause of this event was determined to be a loss of refrigerant inventory of the Train A EBR air conditioning unit chiller as the result of a leak in a capillary tube connecting to the pressure gauge. The failure occurred due to a combination of aging and high frequency fatigue cycling at a stress riser in the tubing. Corrective actions included returning the air conditioning unit to service within a short period of time.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
	05000	YEAR	SEQUENTIAL NUMBER	REVISION	2 OF 8
Watts Bar Nuclear Plant, Unit 1	05000390	1999	- 001	- 00	

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

I. PLANT CONDITIONS:

Watts Bar Nuclear Plant Unit 1 was in Mode 1 operating at approximately 80 percent reactor power when this event occurred. A down power to 65% of rated thermal power was in progress to repair a minor main condenser tube leak.

II. DESCRIPTION OF EVENT

A. Event

The Train A and B electric board room (EBR) air conditioning units supply cooling for the computer room and for the safety related Auxiliary Instrumentation Room which contains the reactor trip system (RTS) instrumentation.

On January 2, 1999, at approximately 0829 EST, EBR air conditioning unit Train A (Energy Industry Identification System (EIIS) Code CLR) located in the Control Building (CB) tripped and automatically started Train B EBR air conditioning unit. During troubleshooting of Train A EBR air conditioning unit, it was suspected initially that the EBR air conditioning unit tripped due to low water supply pressure to the temperature control valve (TCV) 0-TCV-67-1052 actuator which could increase the valve closing force and trip the EBR air conditioning unit chiller on high discharge pressure because of inadequate cooling. The water supply pressure to Train A EBR air conditioning unit TCV pressure was restored to normal.

While Train B EBR air conditioning unit was in service, the unit exhibited control power circuit and load control instability. At 0937 hours EST, Train B EBR air conditioning unit was stopped to restore Train A EBR air conditioning unit to service. Train A EBR air conditioning unit failed to start. Both trains of the EBR air conditioning units were subsequently declared inoperable. Operations personnel entered LCO 3.0.3 because there was not a technical specification which covered both trains of this support system being out of service. This action is considered to be conservative, as transient temperature analysis have shown that the abnormal maximum temperature limit of 104°F would not be reached until at least 4 hours under extreme heat conditions following a complete loss of cooling. Actions were initiated to return either of the EBR air conditioning units to operable condition. Since down powering the plant to 65% was already in progress to repair a main condenser tube leak, no further power reduction due to this condition had begun. Troubleshooting identified a refrigerant leak at a capillary tube to suction pressure gauge 0-IPI-31-502A-A. However, prior to any further power reduction, the Train A EBR air conditioning unit chiller capillary tube leak was isolated, additional refrigerant was added, and the unit was started at approximately 1329 hours. The Train A EBR air conditioning unit was declared operable at approximately 1350 hours EST and LCO 3.0.3 was exited.

Problem Evaluation Report (PER) 99-000009-000 was initiated to document this event in the TVA Corrective Action Program.

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

As stated above, Train A EBR air conditioning unit would not start due to low refrigerant suction pressure and Train B air conditioning unit exhibited control power circuit and load control instability while in service.

II. DESCRIPTION OF EVENT (continued)

C. Dates and Approximate Times of Major Occurrences

Time (EST)	Occurrences on January 2, 1999
0829	Train A EBR air conditioning unit tripped and automatically started Train B EBR air conditioning unit.
0850	Initially suspected high chiller discharge pressure as the cause of the trip. Valve 0-TCV-67-1052 was suspected as the possible cause of the chiller trip due to Train A EBR air conditioning unit return temperature exceeding 85°F as the supply pressure to the valve was 20 psig rather than 60 to 65 psig.
0904	Valve was adjusted to achieve 60 to 65 psig on Train A EBR chiller.
0920	Train B EBR air conditioning unit chiller was chattering during operation. The slide valve position was cycling between 80% and 0%. The trouble lights for low suction pressure, high discharge pressure, and high oil temperature trips were flickering. Recommendations were made to place the Train A EBR air conditioning unit in service and remove Train B EBR unit from service as a problem with the Train B air conditioning unit chiller control circuit was suspected.
0936	Operations placed handswitch 0-HS-31-31A in Normal to stop Train B EBR air conditioning unit and hand switch 0-HS-31-30A in Pull Standby to start Train A EBR air conditioning unit.
0937	Train A EBR air conditioning unit chiller failed to start due to low suction pressure as indicated by the low suction pressure light. No attempts were made to restart Train B air conditioning unit as Operations suspected the unit had tripped. However, the air conditioning unit was actually stopped by Operations placing handswitch 0-HS-31-31A to Normal. LCO 3.0.3 was entered for both trains of this support system, (EBR air conditioning units), being out of service.
1125	Attempted to start Train A EBR air conditioning unit chiller after operating thermal expansion valves to achieve satisfactory suction pressure to permit chiller start. Train A EBR air conditioning unit chiller tripped on low refrigerant suction pressure. A refrigerant leak was identified at the capillary tube to the suction pressure gauge. Closed the isolation valve to stop the leak.
1325	Completed installation of refrigerant to Train A EBR air conditioning unit chiller.
1329	Started Train A EBR air conditioning unit chiller and monitored performance.
1350	Declared Train A EBR air conditioning unit operable and exited LCO 3.0.3.

II. DESCRIPTION OF EVENT (continued)

D. Other Systems or Secondary Functions Affected

As stated above, Train B EBR air conditioning unit was exhibiting control power circuit and load control instability while in service.

E. Method of Discovery

The condition was found during troubleshooting Train A EBR air conditioning unit after the unit failed to start.

F. Operator Actions

Operations personnel entered LCO 3.0.3 when both EBR air conditioning units were considered inoperable. Actions were initiated to return the affected equipment back to service concurrent with actions to prepare for further load reduction as the plant was already down powering to repair the main condenser tube leak.

G. Automatic and manual safety system responses

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

III. CAUSE OF EVENT

The cause of this event was determined to be a result of a refrigerant leak from the capillary tube to the Train A EBR air conditioning unit chiller suction pressure gauge due to loss about 45% of it's refrigerant inventory after 5 days of operation.

Contributing Cause:

Operations and the system engineer suspected that Train B EBR air conditioning unit chiller was tripped before Train A EBR air conditioning unit chiller had attempted to start and failed. This assumption was based on Panel 1-M-9 indicating light for Train B EBR air conditioning unit changing from red to green (on to off) about the same time Train A EBR air conditioning unit handswitch was placed to Pull Standby from Normal. The handswitch alignment was performed per System Operating Instruction (SOI) 31.01, Section 5.11, "Standby Alignment of EBR HVAC." This section is misleading as it does not clearly direct taking the handswitch for the in-service EBR air conditioning unit to Start before placing in Normal. Train B EBR air conditioning unit stopped as a result of placing the Train B EBR air conditionling unit's handswitch from Pull Standby to Normal at the panel.

III. CAUSE OF EVENT (continued)

Contributing Cause (continued):

There was no functional failure of Train B EBR air conditioning unit chiller, although there were several failed or deficient conditions which adversely affected indications and load controller operation. The temperature load controller load solenoid relay had failed, which caused the unload solenoid to chatter periodically during operation with the load solenoid continuously energized. The temperature load controller had been in service since 1979. The relay failure was due to aging which was aggravated by intermittent grounding at the hot gas solenoid or the unload start solenoid in combination with missing or poorly connected ground leads in the control circuit. The missing ground leads in combination with the intermittent solenoid grounds caused flickering indicating lights during operation and a dim power on light.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

The EBR air conditioning units are designed to maintain acceptable temperatures to the Control Building Elevations 692.0 and 708.0. The only safety-related equipment on these elevations is located in the Auxiliary Instrument Room which contains the reactor trip instrumentation. None of these components were impacted by this event and were available to perform their intended function. The potential impact would have been if the air conditioning units had stayed out of service for an extended period of time and if a design basis event had occurred coincident with that condition causing the temperature in the room to approach the abnormal maximum temperature limit of 104°F. The probability of a design basis loss-of-coolant accident (LOCA) occurring in the four hours that these units were not available is 2.97E-6. Transient temperature analysis performed for 10 CFR 50, Appendix R shutdown have confirmed that the abnormal maximum temperature limit will not be reached before 4 hours when starting at an initial room temperature of 85°F with worst case design basis heat loads. Since the total internally generated heat loads for this condition are the same as a LOCA and the effect of loads transmitted through concrete walls, floors, and ceiling is minimal during the initial phase of any transient, the existing transient analysis is considered to bound any complete loss of cooling event for the first several hours. The temperature in the Auxiliary Instrument Room at the beginning of the event was 77°F. Three hours after the event occurred the temperature had reach approximately 81°F which is well below the abnormal limit. The equipment in the room is operable in environments up to 104°F. Electrical equipment in general is not considered to be thermally stressed for any 100 day period until at least 120°F. Considering this fact, the abnormal temperature at 104°F is conservative. Therefore, considerable heatup would have to occur before any impact on the plant equipment would be manifested. In no time during the three hour and 53 minute event was there any impact or consequences to plant equipment or to the health and safety of the public.

IV. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

Operators initiated action to return one of the EBR air conditioning unit to service. A refrigeration leak at the suction pressure gauge sense line was identified on Train A air conditioning unit chiller. The leak was isolated and refrigerant was added. Train A EBR air conditioning unit was, subsequently, returned to service at 1350 hours on January 2, 1999.

The Train B EBR air conditioning unit chiller temperature load controller relay was replaced and the ground leads in the control circuits were repaired or replaced. Train B EBR air conditioning unit was declared operable on January 3, 1999.

B. Corrective Actions to Prevent Recurrence

TVA will perform an evaluation of the cause of the failure of Train A EBR air conditioning unit chiller suction pressure sense line tubing and will implement the recommended repairs.

SOI-31.01 will be revised to clarify hand switch operation to support swapping the operating and standby trains following automatic start of the standby train.

Train A EBR air conditioning unit chiller suction pressure gauge broken capillary sense line will be repaired.

Implementation of the above three corrective actions will be completed by July 16, 1999.

C. Other actions Being Tracked Under the Corrective Action Program Which Are Not Considered Regulatory Commitments

A previously issued PER, WBPER980175, similar to this event will be revised to include the January 2, 1999 failure of Train A EBR air conditioning unit chiller suction pressure sense line as a repetitive functional failure. The root cause analysis will be revised and additional corrective actions and monitoring requirements will be added, as necessary.

Proper installation of ground leads in the control circuits will be verified for Train A EBR air conditioning unit chiller and the similar chillers from the same manufacturer which are the Main Control Room chillers Train A and B.

TVA will inspect the EBR and Main Control Room air conditioning unit chiller solenoid valve leads for damaged insulation and potential ground paths at junction box covers and flex conduit connections. Damaged components will be repaired or replaced. Grommets, silicone sealant, or other insulating material will be installed as necessary to protect field wires at interference points.

Recommended repairs will be implemented from the failure evaluation of the Train A EBR air conditioning unit chiller suction, discharge, and oil discharge pressure capillary tubing for Train B EBR air conditioning unit chiller and the Main Control Room Train A and B chillers, if required.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
	05000	YEAR	SEQUENTIAL NUMBER	REVISION	7 OF 8
Watts Bar Nuclear Plant, Unit 1	05000390	1999	- 001	- 00	

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

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

The cause of LER 390/1999-001 was due to a refrigerant leak at the suction pressure gauge sense line on Train A EBR air conditioning unit.

2. Component/System Failure Information

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

The condition was found after a failure to start during troubleshooting.

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

The cause of this event was determined to be a result of a refrigerant leak from the capillary tube to the Train A EBR air conditioning unit chiller suction pressure gauge. The failure occurred after 5 days of operation and did not occur until the chiller lost about 45% of it's refrigerant inventory. This failure mode is being addressed further within the WBN corrective action program.

There was no functional failure of Train B EBR chiller, although there were several failed or deficient conditions which adversely affected indications and load controller operation.

c. Root Cause of Failure:

The failure occurred due to a combination of aging and high frequency fatigue cycling at a stress riser in the tubing. Stress was induced by the mass of the coiled tubing below the stress riser that was subject to vibration at the chiller structural frequency. The failed tubing was supplied by the vendor as part of the chiller package and has been in service for approximately 20 years.

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

This unit's function is to provide cooling to Control Building Elevations 692.0 and 708.0 which include the 24V, 48V, and 250V battery and associated board rooms, battery room exhaust fan room, communication room, secondary alarm station, computer room, auxiliary instrument rooms, and mechanical equipment rooms. No other systems or secondary functions were affected.

VI. ADDITIONAL INFORMATION (continued)

A. Failed Components (continued)

e. Manufacturer and Model Number of Each Failed Component:

Dunham Bush Chiller, Model IPCZX230

B. Previous Similar Events

A review of the previous WBN LERs reveals that LER 390/96-021 submitted August 5, 1996, and LER 390/98-003 submitted September 24, 1998, involved both trains of Control Room Emergency Air Temperature Control Systems (CREATCS) being out of service for a short period of time. However, the root cause of these LERs were determined to be of a procedural nature rather than being an equipment failure.

LER 390/1998-005 submitted December 2, 1998, involved the 480V board room air conditioning units being out of service for approximately 2 hours. The root cause of that LER was determined to be an equipment failure as one of the units threw a belt while the other unit was out of service for a preventative maintenance activity.

In addition, a similar failure occurred on Train B EBR air conditioning unit chiller February 13, 1998. The suction pressure gauge sense line broke. This failure was detected during startup of Train B EBR chiller, not after the unit had been in operation for several days. The failure is documented as a Level A PER, WBPER980175 in TVA's Corrective Action Program and was classified as a preventable functional failure under the Maintenance Rule as it was the third failure of this type within a month. The root cause of that failure was described as a design analysis deficiency because the chillers will not start with ambient or condenser temperatures below 57°F without tripping on low suction pressure during the starting sequence. Low temperature was caused by temperature control valve seat leakage cooling the condenser below 57°F. The loss of refrigerant inventory was considered a contributing cause. This PER remains open to monitor corrective actions. Monitoring requirements are no chiller failures due to temperature control valve leakage or minor refrigerant leaks.

VII. COMMITMENTS

The actions committed to be implemented in response to this event are tabulated in Section V.B, Corrective Actions - Recurrence Control.