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JUL 03 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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10 CFR 50.73

Gentlemen:

**TENNESSEE VALLEY AUTHORITY - WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1 - DOCKET NO. 50-390 - FACILITY OPERATING LICENSE
NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/2002-002,
REVISION 1**

This submittal provides LER 2002-002, Revision 1. Revision 0 of this LER was provided previously on May 6, 2002. The intent of this submittal is to update NRC as to TVA's evaluation of the reported condition. This LER involved the identification of missing inspection covers associated with the auxiliary feedwater turbine-driven pump steam supply line encapsulation sleeve "guard pipe" needed to maintain equipment qualification. The enclosure provides the update with the differences from Revision 0 denoted by revision bars.

Based on a postulated break of the four inch steam line contained within the guard pipe in conjunction with the identified discrepancy, numerous components potentially required to mitigate the consequences of the event remain of "indeterminate" operability status prior to the correction of the deficiency. Accordingly, this event was reported in accordance with several of the 10 CFR 50.73 criteria. No 10 CFR 50.72 criteria were applicable since this condition was identified while the plant was shutdown.

JE22

U.S. Nuclear Regulatory Commission

Page 2

JUL 03 2002

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

Sincerely,



W. R. Lagergren

Enclosure

cc (Enclosure):

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LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME Watts Bar Nuclear Plant (WBN) UNIT 1		2. DOCKET NUMBER 05000 - 390	PAGE (3) 1 OF 8
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4. TITLE
MISSING AUXILIARY FEEDWATER GUARD PIPE INSPECTION COVERS

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	07	2002	2002	-- 002	-- 01	07	02	2002	NA	05000
									FACILITY NAME	DOCKET NUMBER
									NA	05000

9. OPERATING MODE 6	10. POWER LEVEL 0	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more)								
		20.2201(b)		20.2203(a)(3)(ii)	<input checked="" type="checkbox"/>	50.73(a)(2)(ii)(B)	<input checked="" type="checkbox"/>	50.73(a)(2)(ix)(A)		
		20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)		
		20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)		
		20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(A)		73.71(a)(5)		
		20.2203(a)(2)(ii)		50.36(c)(2)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)		OTHER		
		20.2203(a)(2)(iii)		50.46(a)(3)(ii)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A		
		20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)				
		20.2203(a)(2)(v)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)(B)		<input checked="" type="checkbox"/> 50.73(a)(2)(vii)				
		20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)				
		20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)				

12. LICENSEE CONTACT FOR THIS LER

NAME Rickey Stockton, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (423) 365-1818
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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

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE			
<input checked="" type="checkbox"/>	YES (If yes, complete EXPECTED SUBMISSION DATE). 9/9/2002	<input type="checkbox"/>	NO		MONTH	DAY	YEAR

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

On March 7, 2002, while the plant was in Mode 6, an on-shift senior reactor operator discovered two inspection covers missing from the guard pipe which encapsulates the unit 1 four inch Auxiliary Feedwater Pump Turbine (AFWPT) steam supply line where this line passes through the Unit 1 Auxiliary Building elevation 692.0 penetration room and enters into the AFWPT room. The guard pipe is used as a barrier to isolate a steam leak in case of a steam supply line rupture and vent steam into the AFWPT room where redundant temperature sensors will initiate isolation by closure of redundant valves located in the south main steam valve vault room. This guard pipe was installed primarily to prevent unacceptable damage to essential equipment located in the auxiliary building. The encapsulation serves to restrain the pipe thus preventing pipe whip and confines the steam jet. A postulated circumferential rupture at the 90° elbow (near the area where these inspection covers were found missing), could have resulted in potentially unacceptable impact on environmental qualification of safety related equipment needed to mitigate the event. Therefore, this condition was reported under a number of the reporting criteria listed above. In addition to the missing covers, a penetration seal was found to be inappropriately installed in the mechanical sleeve which connects the guard pipe to the AFWPT room which may have delayed automatic isolation of the postulated rupture of the steam supply line

The cause of the condition has not been identified. The condition appears to have existed since prior to initial fuel load in November of 1995. Corrective actions included fabrication and replacement of the pipe covers, removal of the penetration seal, and a confirmation review of similar configurations in the plant.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant (WBN) Unit 1	05000390	2002	--	002	2 OF 8
		--		01	

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

I. PLANT CONDITION(S)

At the time of discovery, Watts Bar Unit 1 was in Mode 6 at zero percent reactor power.

II. DESCRIPTION OF EVENT

A. Event:

On March 7, 2002, while the plant was in Mode 6, an on-shift senior reactor operator discovered two inspection covers missing from the guard pipe which encapsulates the unit 1 four inch Auxiliary Feedwater Pump Turbine (AFWPT) (Energy Industry Identification System (EIS) Code BA/TRB) steam supply line where this line passes through the Unit 1 Auxiliary Building elevation 692.0 penetration room and enters into the AFWPT room. The guard pipe is used as a barrier to isolate a steam leak in case of a steam supply line rupture and vent steam into the AFWPT room where redundant temperature sensors will initiate isolation by closure of redundant valves located in the south main steam valve vault room. This guard pipe was installed primarily to prevent unacceptable damage to essential equipment located in the auxiliary building due to environmental effects. In addition the encapsulation serves to restrain the pipe thus eliminating the consequences of pipe whip and steam jet impingement. However, the function to prevent pipe whip was not adversely affected by the missing inspection covers. Any adverse impact on the function to prevent jet impingement is bounded by the significance of challenges to the function of limiting the environmental consequences of the postulated steam line rupture. Therefore, the function of the encapsulation to prevent pipe whip and steam jet impingement is not addressed further in this LER.

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

A penetration seal was inappropriately installed in the mechanical sleeve which connects the guard pipe to the AFWPT room. This seal should not have been installed since it potentially prevents the venting of steam from the guard pipe into the AFWPT room and thus delays automatic isolation of the postulated rupture of the steam supply line.

C. Dates and Approximate Times of Major Occurrences:

1995	Missing guard pipe inspection covers identified on area-construction turnover list
03/07/2002	Discovered two inspection covers were missing from the steam supply "guard" pipe.

D. Other Systems or Secondary Functions Affected:

See the Assessment of Safety Consequences section for a discussion of the impact on plant systems.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant (WBN) Unit 1	05000390	2002 --	002	-- 01	3 OF 8

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

E. Method of Discovery:

The open inspection ports were discovered by an on-shift senior reactor operator during a plant tour in the area while the unit was shutdown.

F. Operator Actions:

Once this condition was identified, a work order was generated to fabricate and install the inspection covers.

G. Safety System Responses:

Since the plant was in Mode 6 with no existing steam supply line break threat, no safety systems were required to respond. See Safety Significance section for impact on plant equipment.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of this condition was discovery that the inspection ports were open and the associated covers were missing. Engineering investigation determined the covers were required in order to support the plant Environmental Qualification (EQ) design basis.

B. Root Cause:

The root cause of the missing covers has not been determined. The covers either had been removed during initial plant construction to allow access for inspection or performance of work inside the guard pipe and were never reinstalled, or perhaps were never installed. A review of the documentation completed at the time of area turnover revealed that the covers were identified as being removed, but the item was erroneously dispositioned since the penetration was sealed.

C. Contributing Factor:

There was no contributing factor for this event.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant (WBN) Unit 1	05000390	2002	--	002	4 OF 8
		--		01	

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

IV. ASSESSMENT OF SAFETY CONSEQUENCES

Part of the configuration for the auxiliary feedwater system (EIS Code BA) contains separate 4 inch steam supply lines that branch off of the steam lines of steam generators (EIS Code SG) 1 and 4 and come together in a common 4 inch header which supplies steam to the AFWPT pump (EIS Code P). The supply line delivers the required steam flow at the throttle pressure necessary to drive the AFWPT throughout its operating range. The branch lines are taken off the main steam line just upstream of the Main Steam Isolation Valves (MSIVs) (EIS Code SB/ISV). Check valves (EIS Code V) are provided in both branch lines to prevent back flow from one Steam Generator (SG) to the other SG. Steam line isolation valves are also provided in these branch lines to provide for automatic selection of the SG that will be used to supply the AFWPT. Two additional isolation valves (FCVs 1-17 and 1-18) are provided in the common portion of the steam supply to the AFWPT to mitigate postulated downstream line breaks. These valves are motor operated and can be operated from either the Main Control Room (MCR) or their motor control centers. Either of these valves are designed to close whenever both of the temperature switches (located in the AFWPT room) associated with the affected valve indicates a higher than acceptable temperature in the AFWPT room. The set point for the temperature switches is 140°F and was selected such that it is conservatively above the maximum operating room temperature to prevent spurious TDAFW steam line isolation, but conservatively low enough for the temperature switches to perform their intended safety function.

The steam supply line, from the point where it exits the south steam valve vault room to the mechanical sleeve penetration through the auxiliary building U line wall into the AFWPT room, is contained within an encapsulation sleeve, or "guard pipe". Non-mechanistic breaks are postulated at intermediate fittings and terminal ends, as appropriate, in determining environmental effects. Civil Engineering Report (CEB 77-55) has previously determined that a rupture of this line could result in unacceptable environmental damage to essential equipment in the auxiliary building. To limit environmental damage, a seismically supported steel encapsulating pipe (guard pipe) is provided. By design, the encapsulation provides a flow path for steam to vent into the AFWPT room and also serves to restrain the pipe for the intermediate breaks that are postulated. The access ports where the inspection covers were missing are adjacent to the 90° elbow just upstream of the penetration through the U-line wall.

WBN's EQ design basis credits the encapsulation sleeve and only evaluated the consequences associated with the terminal end break inside the AFWPT room. The consequences of intermediate breaks were bounded by this break location assuming the encapsulation sleeve and associated inspection covers were in place. The consequences of the accident as originally evaluated, were limited since the blowdown is isolated within approximately 27 seconds by the temperature switches located in the AFWPT room.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
Watts Bar Nuclear Plant (WBN) Unit 1	05000390	YEAR	SEQUENTIAL NUMBER	REVISION	5 OF 8
		2002 --	002 --	01	

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

As a result of the missing inspection covers, TVA is performing a reanalysis to assess the environmental impacts on auxiliary building spaces from a break in the encapsulated 4 inch AFWPT steam supply line. The mass and energy release was modeled such that the break occurs within the elevation 692.0-A7 penetration room and a small flow rate of steam enters the adjacent AFWPT room via leakage through the penetration seal/insulation assembly associated with the steam supply line to the Terry Turbine. The leakage rate credited in the model was based on a test performed by TVA of the configuration found in the plant. A full scale mock-up of the AFWPT steam supply line penetration seal assembly was constructed and tested under simulated differential pressure and high humidity conditions in order to quantify the leakage rate into the AFWPT room from the postulated break location within the guard pipe. Results indicate that when steam was applied, leakage through the seal/insulation assembly was noted, however the capacity of the steam generator available for the test was found to be inadequate to obtain measurable back pressure. A 30 psi gauge was used which indicated no pressure change when steam was applied. Compressed air was then used to obtain the flow rate at the required pressure. Results indicate that air flow rate at 13 psig across the penetration assembly is approximately 53 cfm. A 20 second increase in pressure to greater than 30 psig (reflecting the approximate peak pressure within the guard pipe at the break location) resulted in no detected seal/insulation damage.

As a result of the above test, both design basis and realistic models have been developed. The realistic model credits the exhaust portion of the auxiliary building general ventilation system remaining operable throughout the event, which aids in drawing high humidity/high temperature air from the 692.0 A1 general floor area into the AFWPT room. This normal flow of air along with the leakage through the penetration are factors in determining the AFWPT room heat-up rate and associated time to reach the temperature switch setpoint values need to automatically isolate the blowdown. Since the air inlet grilles between the general floor area and AFWPT room are located near the floor and the four temperature switches are located at specific points in the AFWPT room, both volumes representing these area were subdivided horizontally and vertically to improve accuracy. The design basis case model predicts AFWPT steam supply isolation in approximately 1480 seconds, while the realistic model reaches isolation temperature in approximately 1100 seconds.

The requirement of 10 CFR 50.73 (b)(3), "Assessment of Safety Consequences," states in part that the safety assessment must include, "The availability of systems or components that could have performed the same function as the components and systems that failed during the event." Given this guidance, engineering judgement suggests that the realistic model is the more appropriate model to use for the assessment of this condition.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant (WBN) Unit 1	05000390	2002	-- 002	-- 01	6 OF 8

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

The following table provides the peak temperatures for selected realistic model rooms/volumes and durations above the upper boundary temperature for mild environments related to equipment qualification (140 degrees F).

Auxiliary Building Room Number or Name	GOTHIC Model Volume Number	Major Component(s) in Room	Realistic Model	
			Duration above 140°F (min.)	Peak Temp (°F)
676-A1	16	cabling, valves instruments, etc.	8.2	202.3
676-A6	23		10.9	210.6
676-A7	22		14.3	211
Unit 1 Pipe Chase (all elevations)	3	cabling, valves instruments, etc	23.6	211
692-A1 (U2 Side)	27	cabling, valves instruments, etc	16.4	157.2
(Unit 1 Side)	28	cabling, valves instruments, etc	19.7	178.1
ERCW Pipe Tunnel	34	cabling, valves instruments, etc	14.2	152.6
692-A6	9	AFWPT(See Note)	14.2	158.1
692-A7	6	CVCS Components, ESF room coolers	60	211.5
713-A1 (U2 Side)	18	BAT Pumps	6.7	144.6
(Unit 1 Side)	31	CCS Pumps, MDAFW Pumps	11.2	148.9

Note: The turbine driven auxiliary feedwater pump not required due to initiating event, i.e., loss of steam supply line.

To date, approximately 166 safety related components in the auxiliary feedwater and the component cooling systems have been identified in the areas where temperatures due to the break were predicted to exceed those listed on the Environmental Data Drawings. Fifty-seven of these components have been evaluated and would have been able to perform their required safety function at the accident temperatures specified. The remaining components are still being evaluation to determine if they also would have performed their safety function at the elevated temperature.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant (WBN) Unit 1	05000390				7 OF 8
		2002 --	002 --	01	

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

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

A plant work order, 02-003622-000, was issued to fabricate and install the missing covers. This action was completed prior to restart from the outage.

A plant work order, 02-005409-000, was issued to remove the inappropriately installed penetration seal at the mechanical sleeve leading into the AFWPT room. This action has been completed.

B. Corrective Actions to Prevent Recurrence:

A review for other conditions of a similar nature has been performed. Many of the pipes that penetrate containment have guard pipes that surround the process pipe from the connection to the containment liner through either the containment shield wall or the crane wall. However, these guard pipes do not incorporate inspection covers. The Residual Heat Removal (RHR) pump suction piping from the containment sump to the RHR sump valve room is also surrounded by a guard pipe, but it also does not incorporate inspection covers. The pipe configuration of this LER is unique in that the only other configuration that exists is the same pipe on Unit 2. Since Unit 2 is not licensed the steam supply to the Unit 2 AFWPT is not operational, and thus, no action is required for this pipe. No other energized steam supply headers enter the Auxiliary Building.

VI. ADDITIONAL INFORMATION

A. Failed Components:

There were no failed components involved in this LER.

B. Previous LERs on Similar Events:

A search of the previous WBN LERs for the word "covers" revealed two previous LERs. The first was LER 390/97014 which involved a RCP oil cooler cover which had been found to be missing. The second LER was 390/1993-003 involving missing fire covering wrap at an electrical penetration. Neither of these LERs were examples of items that had been identified prior to area turnover nor remained uncorrected prior to initial plant operation. Therefore, no further action is considered necessary.

C. Additional Information:

None

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Watts Bar Nuclear Plant (WBN) Unit 1	05000390	2002	002	01	8 OF 8
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

D. Safety System Functional Failure Consideration:

As discussed in the Section IV above, no definitive determination could be made as to whether this event constituted a safety system function functional failure. Ongoing reanalysis, when completed, will support a final determination on this matter in accordance with NEI 99-02.

E. Loss Of Normal Heat Removal Consideration:

Because the event does not involve a reactor trip, it is not considered a scram with loss of normal heat removal in accordance with NEI 99-02.

VII. COMMITMENTS

None.