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William R Lagergren, Jr.
Site Vice President, Watts Bar Nuclear Plant

SEP 0 6 2002

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

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 2 - VOLUNTARY

This submittal provides LER 2002-002, Revision 2. Revision 0 and Revision 1 of this LER were provided previously on May 6, 2002 and July 3, 2002, respectively. The intent of this submittal is to provide NRC with TVA's final 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 1 denoted by revision bars.

TVA's initial evaluation of this condition, which was based on a postulated break of the four inch steam line contained within the guard pipe in conjunction with the identified discrepancy, revealed numerous components potentially required to mitigate the consequences of the event that would be of "indeterminate" operability status prior to the correction of the deficiency. Hence, 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. However, since that time, TVA

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effect on plant equipment and has determined that there is reasonable assurance that safety equipment needed to mitigate the postulated event would have performed its function. The detailed results of this evaluation are documented in the associated corrective action document and are available for review. Accordingly, TVA is withdrawing the initial reports of this condition and, in their place, submits the voluntary LER provided in the enclosure.

If you should have any questions, please call P. L. Pace at (423) 365-1824. There are no regulatory commitments in this report.

Sincerely,

W. R. Lagergren

Enclosure
cc (Enclosure):

SEP 0 6 2002

cc (Enclosures):
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NRC FORM 366 (7-2001)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO 3150-0104 EXPIRES 7/31/2004

Estimated burden per response to comply with this mandatory information collection request: 50 hrs Reported lessons learned are incorporated into the licensing process and fed back to industry Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U S Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc gov, and to 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 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

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	PAGE (3)
Watts Bar Nuclear Plant (WBN) UNIT 1	05000 - 390	1 OF 8

4 TITLE

MISSING AUXILIARY FEEDWATER GUARD PIPE INSPECTION COVERS - VOLUNTARY LER

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
									NA	05000
03	07	2002	2002	-- 002 --	02	09	09	2002	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)		50.73(a)(2)(ii)(B)		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)		50.73(a)(2)(v)(A)		73 71(a)(5)
	20 2203(a)(2)(ii)		50 36(c)(2)		50.73(a)(2)(v)(B)	X	OTHER (Voluntary)
	20 2203(a)(2)(iii)		50 46(a)(3)(ii)		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)		50 73(a)(2)(v)(D)		
	20 2203(a)(2)(v)		50 73(a)(2)(i)(B)		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	TELEPHONE NUMBER (Include Area Code)
Rickey Stockton, Licensing Engineer	(423) 365-1818

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

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. Upon initial evaluation, it was postulated that a 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. 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. However, since that time, TVA has performed an extensive evaluation and determined that equipment required to mitigate the event would perform required functions. This LER is being provided as a voluntary report.

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

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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 (EIIS) 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.

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 provided 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 by referencing that the penetration was sealed.

C. Contributing Factor:

There was no contributing factor for this event.

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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 (EIIS Code BA) contains separate 4 inch steam supply lines that branch off of the steam lines of steam generators (EIIS Code SG) 1 and 4 and come together in a common 4 inch header which supplies steam to the AFWPT pump (EIIS 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) (EIIS Code SB/ISV). Check valves (EIIS 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.

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As a result of the missing inspection covers, TVA has performed 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. Engineering judgement suggests that the realistic model is the more appropriate model to use for the assessment of this condition.

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)	14.8	158.1
692-A7	6	Chemical and Volume Control (CVC) System Components, ESF room coolers	60	211.5
713-A1 (U2 Side)	18	BAT Pumps	6.7	144.6
(Unit 1 Side)	31	Component Cooling System (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.

Concurrent with the above evaluation activity, TVA performed a review to identify essential equipment in the affected areas. Since the initiating event would seem to appear to the plant as a small Main Steam Line Break (MSLB), this review effort concentrated on equipment in the AFW, Component Cooling, and Chemical and Volume Control systems which would be needed for mitigation. Components which were not required to respond to this event, such as those associated with the TDAFWP, were eliminated and the remaining components were evaluated for operability using the above revised environmental data.

Consideration of EQ impacts due to this postulated event was not limited to temperature effects. WBN had previously addressed both short term and long term moisture intrusion effects due to postulated line breaks in other lines such as in the residual heat removal (RHR) system (EIIS Code BP). The methodology used for the RHR was applied to this event using environmental conditions determined from the aforementioned GOTHIC analysis. The scope of this review was limited to those rooms where worse environmental conditions resulted than were previously postulated. Credit was taken where possible for sealing of EQ devices due to breaks in other high energy lines. The scope of this review was further bounded by eliminating consideration of rooms/areas where the review revealed no equipment required for this event.

In addition to both temperature and humidity effects discussed above, Mechanical Environmental Qualification (MEQ) considerations were reviewed with regard to the soft (non-metallic) components of the CCS and AFW pumps. Flooding effects were also considered since the Gothic analysis provided estimated flood levels in the affected areas. These levels were calculated assuming that the floor drains were inoperable, therefore the calculated levels are conservative. These levels were compared with levels previously determined for flooding due to other postulated line breaks. In each case, the level due to this event was very similar to or lower than that previously analyzed. No additional impacts due to flooding were identified. The results of this review and those discussed above are documented with the associated corrective action document (02-003388-000). As a result of this extensive evaluation and review, TVA has concluded that, although some equipment may have been challenged had this event occurred, there is reasonable assurance that the affected equipment would have performed their intended functions as a result of the missing "guard pipe" covers and the misplaced penetration seal.

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.

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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

D. Safety System Functional Failure Consideration:

As discussed in the Section IV above, this event does not constitute a safety system functional failure 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.