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

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

APR 0 8 2003

TVA-WBN-TS-03-11

10 CFR 50.90
10 CFR 50.91(a)(6)

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 - PROPOSED EXIGENT LICENSE AMENDMENT REQUEST CHANGE NO. WBN-TS-03-11 - EMERGENCY CORE COOLING SYSTEM (ECCS) - VENTING HOT LEG INJECTION LINES

Pursuant to 10 CFR 50.90 and 10 CFR 50.91(a)(6) TVA requests an Exigent Technical Specification (TS) Change to license NPF-90 for WBN Unit 1. The proposed Exigent TS change will provide a one time change to a portion of Surveillance Requirement (SR) 3.5.2.3 to confirm ECCS safety injection hot leg injection lines are full of water to be extended to the next refueling outage in the Fall of 2003. SR 3.5.2.3 currently has a frequency of 31 days.

The need for the Exigent TS change is due to an emergent issue that occurred when recent ultrasonic testing (UT) of the safety injection system hot leg injection piping identified a quantity of gas at the piping high points. TVA could not have reasonably avoided this exigency. Until questions were raised on the basis for TVA's methodology for surveillance performance, TVA had no indication that the safety injection system hot leg injection lines had accumulated gas.

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The identified gas was vented during a plant outage. To perform this SR for the hot leg injection lines inside the WBN containment, presents an as-low-as-reasonably-achievable (ALARA) dose concern and/or a personnel safety concern under Mode 1 operating conditions. The adverse personnel safety consequences associated with future venting gave immediate rise to this exigent request.

Enclosure 1 to this letter provides the description and evaluation of the proposed change. Enclosure 2 contains copies of the appropriate TS pages marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages for Unit 1 which incorporates the proposed change. Enclosure 4 provides changes to the associated TS Bases.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Tennessee State Department of Public Health.

The TVA Nuclear Safety Review Board has reviewed this proposed change and determined that operation of WBN Unit 1 in accordance with the proposed change will not endanger the health and safety of the public.

As discussed in Enclosure 1, the next performance of the safety injection hot leg portion of SR 3.5.2.3 (including the 25 percent schedule allowance) is due by May 1, 2003. TVA's proposal is considered risk neutral from a core damage frequency as discussed further in the attachment. However, a quick review is desirable to provide a net decrease in industrial safety risk to plant personnel.

Accordingly, TVA requests approval of the TS change by that date and that the implementation of the revised TS be effective immediately.

Enclosure 5 provides the list of regulatory commitments in this letter.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on 7th day of April, 2003.

Sincerely,

William R. Lagergren

William R. Lagergren

Enclosures
1. TVA Evaluation of Proposed Change
2. Proposed Technical Specification Changes (mark-up)
3. Proposed Technical Specification Changes (re-typed)
4. Changes to Technical Specifications Bases pages
5. List of Regulatory Commitments

cc: (Enclosures):
NRC Resident Inspector
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

Mr. K. N. Jabbour, Senior Project Manager
U.S. Nuclear Regulatory Commission
MS 08G9
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

Mr. Lawrence E. Nanny, Director
Division of Radiological Health
3rd Floor
L & C Annex
401 Church Street
Nashville, Tennessee 37243

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1
DOCKET NO. 390

PROPOSED LICENSE AMENDMENT REQUEST WBN-TS-03-11

DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

1. DESCRIPTION OF THE PROPOSED CHANGE

This letter requests an exigent amendment to Operating License NPF-90 for WBN Unit 1.

The proposed change would revise the Operating License to change the Technical Specification (TS) Surveillance Requirement (SR) 3.5.2.3 frequency to extend the verification that the safety injection hot leg injection lines are full of water until the refueling outage in the Fall of 2003. SR 3.5.2.3 currently requires verification at a frequency of 31 days. TVA is requesting that the SR portion associated with the safety injection hot leg lines be extended to the refueling outage to avoid an unnecessary personnel safety risk.

2. PROPOSED CHANGE

TVA is requesting the following changes to TS 3.5.2, ECCS - Operating:

SR 3.5.2.3 FREQUENCY - Add: NOTE - Surveillance performance not required for ECCS safety injection hot leg injection lines until start up from Fall 2003 Refueling Outage.

Bases SR 3.5.2.3 - add a discussion for the note that would be added to SR 3.5.2.3.

References - Add the reference to this License Amendment request for the basis of the note.

In order to safely perform the surveillance requirement following the refueling outage, TVA has made a regulatory commitment to complete one of the following corrective actions: 1) verify that the changes to operating startup procedures and TVA's administrative program can provide reasonable assurance the lines will remain full of water, 2) implement a modification to allow the capability to perform on line venting in a lower dose area that does not represent a personnel safety hazard, or 3) process a permanent request to change the SR to verify accessible areas only during plant operations.

Bases For Exigent Change

The need for the Exigent TS change is due to an emerging issue that occurred when WBN Unit 1 was in a Mode 3 forced outage that began March 10, 2003. During the five day outage, WBN performed ultrasonic testing (UT) of sections of the emergency core cooling system (ECCS) hot leg injection piping. The UT identified three pockets of gas existing at piping high point vent locations. The specific hot leg piping line sections with identified gas pockets have subsequently been vented and determined to meet the SR.

TVA could not have reasonably avoided this exigency. Until an NRC inspector raised questions on the basis for TVA's methodology for surveillance performance, TVA had no indication that the hot leg safety injection lines had accumulated gas. Once the gas was identified, TVA's existing administrative methodology may not have provided sufficient assurance for those specific lines.

After reviewing several other similar plant technical specification and bases, TVA considered a Bases change to exclude the inaccessible piping inside of containment from the surveillance. During the development of the safety evaluation for that Bases change, TVA determined that a Bases change only would not be acceptable. Accordingly, TVA is now requesting an exigent technical specification change.

The frequency of the SR is 31 days. The next surveillance is due May 1, 2003. (This includes the 25 percent allowance by the technical specification.) TVA last performed the surveillance beginning on March 24, 2003. That surveillance took credit for the UT of the piping and the subsequent venting of the gas on March 15, 2003. WBN management has reviewed the March 24, 2003 surveillance performances. Although credit was taken for activities several days earlier during the outage, there was reasonable assurance at the time of performance that the subject lines meet the SR, i.e., "ECCS piping is full of water."

Based on the relatively small amount of gas found in the piping since the last refueling outage and the fact that the pipe is full of water from the venting of March 15, 2003, TVA considers there is reasonable assurance that a significant amount of gas would not accumulate in before the Fall 2003 outage.

To perform this SR for the hot leg safety injection lines in the current configuration, would present an as-low-as-reasonably-achievable (ALARA) radiological dose concern and/or a personnel industrial safety concern to perform this task five times in Mode 1 operating conditions during the remainder of the cycle. The locations of these high point vents are in the top of Fan Room Number 1 in lower containment.

NRC had previously noted the ALARA concern when venting as documented in Inspection Report 50-390/95-52. As a result of that concern, TVA developed an administrative program to verify that the piping was full of water.

In summary, the proposed changes to SR 3.5.2.3 and associated Bases are needed to extend the 31 day frequency for the safety injection hot leg injection portion of the ECCS lines until the Fall 2003 refueling outage.

3. BACKGROUND

The Updated Final Safety Analysis Report (UFSAR) describes the ECCS system in detail in Section 6.3. UFSAR Figure 6.3-1, Sheet 1 provides the flow diagram for the ECCS. (See attached simplified sketch).

Description of System

The ECCS is designed to cool the reactor core as well as to provide additional shutdown capability following initiation of the accident conditions listed below:

1. A loss of coolant accident (LOCA). (UFSAR 15.4.1)

2. A steam line break. (UFSAR 15.4.2)

3. A steam generator tube rupture. (UFSAR 15.4.3)

4. A control rod drive mechanism (CRDM) ejection. (UFSAR 15.4.6)

The ECCS consists of three separate subsystems: centrifugal charging (high head), safety injection (intermediate head), and residual heat removal (RHR) (low head). Each subsystem consists of two redundant, 100 percent capacity trains that are interconnected and redundant such that either train is capable of supplying 100 percent of the flow required to mitigate the accident consequences. This interconnecting and redundant subsystem design provides the operators with the ability to utilize components from opposite trains to achieve the required 100 percent flow to the core.

The primary function of the ECCS following a LOCA is to remove the stored and fission product decay heat from the reactor core such that fuel rod damage, to the extent that it would impair effective cooling of the core, is prevented. The ECCS provides shutdown capability for the accidents listed above by means of chemical poison (boron) injection.

There are three phases of ECCS operation: injection, cold leg recirculation, and hot leg recirculation. In the injection phase, water is taken from the refueling water storage tank (RWST) and injected into the reactor coolant system (RCS) through the cold legs. When sufficient water is removed from the RWST to ensure that enough boron has been added to maintain the reactor sub-critical and the containment sump has enough water to supply the required net positive suction head to the ECCS pumps, suction is switched to the containment sump for cold leg recirculation. After approximately nine hours (for the current operating cycle), the ECCS flow is shifted to the hot leg recirculation phase to provide a back flush, which would reduce the boiling in the top of the core and any resulting boron precipitation.

Venting Process and Personnel Safety

SR 3.5.2.3 requires that the ECCS piping be verified to be full of water every 31 days. A surveillance instruction for ECCS pump and discharge pipe venting fulfills this requirement in part for those high point hot leg lines that are physically located inside containment. There are two safety injection hot leg high point vents which are located inside containment but outside the crane wall and near the ceiling of Fan Room 1. For venting of these lines to take place, scaffolding is used in order to reach the valves used for venting. At 100 percent reactor power, this activity presents a challenge from both being an industrial safety concern due to high working area temperatures, adjacent hot components, and an ALARA radiological dose concern.

TVA has reviewed the industrial safety impacts of performing ECCS venting monthly during plant operation. For one of the two valve locations inside Fan Room 1 near the ceiling, the employees would be required to transverse over the main steam line near the top of Fan Room 1. The surface temperature of the insulated steam line is approximately 144 degrees F. Personnel could be exposed to burns from this hot piping. Other system piping in the area was verified to be above 120 degrees F. TVA workers would need to reach around the other piping to access the valve operator and would be exposed to potential burn hazards.

For both of these locations, the wet bulb globe temperature (WBGT) temperature reading for the area was 96 degrees F (dry bulb reading is 126 degrees F). The associated stay time with an environment of this temperature is 20 to 30 minutes. If the employees were dressed to protect them from the thermally hot piping to prevent burns, the stay time would need to be adjusted (shortened) to allow for additional clothing/equipment.

The estimated radiological dose, working area temperatures, and the estimated duration for each segment are provided below:

PIPE SEGEMENT NOMENCLATURE/ VENT VALVE #	LOCATION	ESTIMATED WORKING AREA DOSE RATE	EST WORKING AREA TEMPERATURE DEGREES (°)F	ESTIMATED DURATION
HOT LEG 2 & 4 SAFETY INJECTION LINE VENT / 1-VTV-63-649	INSIDE CONTAINMENT / ELEVATION 737 AZ 359 NO 1 FAN ROOM	~50-80 mrem/hr gamma 5-10 mrem/hr neutron	~110-130°F	~2.25 hours
HOT LEG 1 AND 3 SAFETY INJECTION PUMP 1A-A INJECTION LINE VENT / 1-VTV-63-689	INSIDE CONTAINMENT / ELEVATION 736 AZ 30 NO 1 FAN ROOM	600-800 mrem/hr gamma 20-40 mrem/hr neutron	~110-130°F	~2.25 hours

The actual venting process involves two maintenance craft removing a blind flange, attaching a vent hose and test flange (approximately 1 hour), an operator opening valves to ensure proper test alignment, unlocking and opening the vent valve, observing whether or not gas is present or venting until a steady stream of water is present, and then locking closed the valve after the steady stream of water is confirmed (approximately 15 minutes). Once this activity is completed, the maintenance craft removes the test equipment and tools and reinstalls the blind flange (approximately 1 hour).

Administrative Program in Lieu of Venting

A WBN Corrective Action Program document identified that ECCS hot leg injection lines inside containment were normally verified to be water-filled at the end of each refueling outage. WBN relies on an administrative program to fulfill the requirements of SR 3.5.2.3 during unit operation. As-found data is not taken at the beginning of the refueling outage. Such data could provide assurance of program adequacy. The administrative process was established due to ALARA concerns and is based on requirements defined in the system description. An excerpt from the administrative controls is provided below:

"...The administrative means required to accomplish the verification consists of a review of operating logs to assure that no system operating evolution has occurred having the potential to introduce gas into the piping inside containment. Examples of system operating evolutions which could introduce gas are inadvertent initiation of SI, inadvertent opening of FCV-63-25 or FCV-63-26 with flow, or equipment maintenance having the potential to introduce gas..."

This administrative program has been previously reviewed by NRC inspectors in Inspection Reports 390/96-09 for License Event Report (LER) 1996-19 which was subsequently closed by Inspection Report 50-390/97-02.

Evaluation of "As Found" Hot Leg Venting Results

To address the above corrective action document, TVA established an action to verify that the safety injection pump hot leg injection piping, RHR hot leg injection piping, and the cold leg injection piping from the centrifugal charging pumps were water-filled at the next forced or refueling outage. During a Mode 3 forced outage which began March 10, 2003, UT of the piping was performed and gas was identified at three of the system piping high points on the hot leg injection lines. Two of the safety injection hot leg injection lines which are the subject of this request, had approximately 1.2 ft^3 of gas and 2.2 ft^3 of gas, respectively. The third line (RHR injection piping to Hot Leg No. 1) had only about 7.3 in^3.

The accumulated gas was vented and the consequences of the gas that was vented during the forced outage have been qualitatively evaluated. That evaluation concluded that even with the amount of gas identified, the safety injection and RHR systems would perform their safety functions for core cooling and prevention of boron precipitation. The evaluation also determined that no significant water hammer event could occur. This evaluation is documented in TVA's Corrective Action Program.

The four most probable mechanisms of introducing gas into the hot leg injection piping are:

1. RCS leakage.

2. Test Header Valve Leakage

3. Inadequate filling and venting of hot leg injection piping at the end of Refueling Outage 4.

4. System Maintenance/Testing of Piping Outside Containment.

Subsequent to Refueling Outage 4 which ended March 21, 2002, there has been no maintenance or testing activities that affected components within or caused flow through the hot leg injection piping. The forced outage in May 2002 involved cooling down and depressurizing the RCS to Mode 5 conditions for approximately four days. These pressure and temperature changes would have affected the volume of any gas pocket that already existed in the hot leg injection piping, but would not have caused one to form without additional failures present.

TVA's detailed evaluation of the four possible mechanisms of introducing gas into the hot leg injection piping indicated that inadequate filling and venting of hot leg injection piping at the end of Refueling Outage 4 was the most likely source of the gas pockets which were discovered on March 15, 2003. Also indicated as the most likely contributor is the current venting process for ECCS piping may not be fully effective in removing gas from those portions of the safety injection system piping.

Operating Experience and Industry Precedents

TVA reviewed an industry events data base for similar hot leg venting issues, but no similar issues were identified. The majority of industry problems as identified in operating experience postings and NRC information notices have been associated with events that could result in gas accumulation that could damage ECCS pumps or in gas pockets that could damage piping through water hammer. These concerns have been evaluated for this surveillance extension request.

A search for license amendment precedence was conducted using a database of Technical Specification Task Force (TSTF) items and the NRC ADAMS Website. This search identified no outstanding or previously approved TSTFs for ECCS venting. The ADAMS search did identify three items. Two involved the Seabrook Station which had received NRC approval for two amendments (58 and 61) on June 24, 1998 and August 12, 1999, respectively. However, these Seabrook amendments appear to have transitioned Seabrook TSs from the older vintage TSs to be more in line with current TS standard wording. The third hit involved an amendment request dated January 14, 2003, by the V. C. Summer Nuclear Station which is still under staff review.

WBN's current request is consistent with pre-MERITS Westinghouse Standard TS (STS) used by a number of facilities regarding inaccessible high point vents. NUREG-0452, *Standard Technical Specifications for Westinghouse Pressurized Water Reactors,* Revision 5, SR 4.5.2.b.1 requires verification at least once per 31 days that ECCS piping is full of water by venting the ECCS pump casings and **accessible** discharge piping high points. Due to the inaccessibility of the subject hot leg high point vent connections at power, these ECCS lines could reasonably be excluded from the venting requirements of above STS. While the inaccessible wording is not in the current NUREG-1431, *Standard Technical Specification Westinghouse Plants,* Revision 2 dated June 2001, it was noted during TVA's research of other plant technical specification that some of the plants have carried over the inaccessible requirement during the transition to the NUREG 1431 standard technical specification.

Consistent with the requirements of SR 4.5.2.b.1 in NUREG-0452 for pump casing verification, the WBN safety injection and RHR system pump casings upstream of the hot leg injection lines would continue to be subject to WBN TS 3.5.2.3 for verification that ECCS piping is full of water.

4. TECHNICAL ANALYSIS

As discussed previously, WBN TS SR 3.5.2.3 requires verification that the ECCS piping is full of water every 31 days. In order to justify the requested one-time frequency extension for the safety injection system hot leg portion of SR 3.5.2.3, WBN evaluated the potential effects of gas accumulation in those hot leg injection lines. Because these lines had not been vented since the Spring 2002 refueling outage (approximately 11 months) the gas that accumulated as discussed previously would be expected to be conservative relative to the remaining period until the Fall 2003 refueling outage.

Effects of Injected Gas on Core Cooling

Westinghouse Electric Corporation, TVA's Nuclear Steam Supply System (NSSS) vendor for WBN, previously performed an evaluation of the effects of injecting the nitrogen gas contained in the four safety injection system accumulators into the RCS following a LOCA. This is documented in the NRC approved WCAP in Reference 1.

TVA's review of the WCAP determined that the mass of nitrogen injected into the RCS by the Westinghouse evaluation was significantly greater than the mass of gas that existed in the hot leg injection lines from the safety injection pumps. In addition, the nitrogen was assumed to be injected into the core during safety injection accumulator discharge which occurs during the initial phase of a LOCA event, whereas gas that could exist in the hot leg injection lines would be injected at a much later time after event initiation. Therefore, the injection of gas in the safety injection hot leg injection lines would have an insignificant effect on the cooldown of the RCS in the hot leg recirculation mode.

Effects of Injected Gas on Waterhammer

Another primary consideration is the potential for water hammer resulting from initiation of flow to the reactor core for mitigation of a design basis event. In the event of a large break LOCA (LBLOCA), the RCS will de-pressurize rapidly, ECCS injection from the RWST will occur, cold leg recirculation would follow, and then hot leg recirculation would occur. No flow will exist in the subject piping until hot leg recirculation is initiated. At this time the safety injection pump is stopped, the hot leg injection valve is opened within approximately five to eight seconds, and then the safety injection pump is restarted. During the realignment procedure the RHR pump would continue to supply suction pressure and a small quantity of flow through the safety injection pump via the open piggy-back cross-tie valve. When the safety injection pump is restarted, the flow increases to the design flow as the pump comes up to operating speed. Since the gas was distributed in a "layer" in a long horizontal run of piping, it is expected that the gas would mix with the flow upon initiation of system operation. Therefore the most probable flow scenario would be to sweep the gas toward the RCS as entrained bubbles. Compression of a confined gas pocket is considered unlikely. However for conservatism, the following evaluation will consider that the gas could collect into a single contiguous pocket. Since the RCS would be depressurized, the gas pocket would be pushed to the RCS hot legs and the compressible gas pocket would provide cushioning between the upstream and downstream water volumes. When the safety injection pump is started and begins to come up to speed, the water volumes in the piping upstream and downstream of the gas pocket would begin to travel to the RCS hot legs at nearly the same velocity such that they would not impact one another. This would prevent the sudden compression of the confined gas pocket which could allow the two separated water volumes to impact one another. The gas would become entrained in the water as flow proceeded to the core. No significant water hammer would occur.

For the design basis small break LOCA (SBLOCA) (4-inch pipe size break), RCS depressurization is depicted in UFSAR Figure 15.3-3. This figure shows that within 15 minutes, RCS pressure is reduced to less than 500 pounds per square inch absolute (psia). The hot leg swap over procedure is the same for the SBLOCA scenario as for the LBLOCA discussed above. Since the safety injection pumps have a developed head capability of approximately 1500 pounds per square inch gauge (psig), the gas pocket would be pushed toward the RCS hot legs in the same manner as described previously for the LBLOCA case upon restart of the safety injection pump. No significant water hammer would occur. In addition, for the design basis SBLOCA and the SBLOCA that is smaller than the design basis 4-inch pipe size break, but larger than the capability of one centrifugal charging pump to make up the lost flow, the pressure could possibly remain above the discharge pressure capability of a safety injection pump. However, in this case hot leg swapover would occur no sooner than nine hours into the event for the current operating cycle. Nine hours after a SBLOCA event, the RCS would be cooled down and depressurized. If RCS pressure is greater than 150 psig after a LOCA, existing emergency operating procedures direct the operators to initiate RCS cooldown to cold shutdown. The resulting RCS cooldown and depressurization would result in a flow situation similar to the LBLOCA scenario. Therefore, no significant water hammer would occur for this SBLOCA scenario.

Entrained gas conditions were also documented in a previous Watts Bar corrective action document. Although these gas pockets were in the ECCS lines to the RCS Cold Legs, the conditions are somewhat similar to the conditions described in this submittal for the safety injection hot legs. This is due to the initial conditions in the piping systems. The gas pocket addressed by the previous corrective action document existed in a piping system in which the pumps are not operating and the piping is normally pressurized only by the static head of the water elevation in the RWST. After the ECCS pumps start, the lines are pressurized and the forward flow of water into the RCS begins when the RCS pressure drops low enough for the pumps in the respective systems to provide forward flow.

The previous corrective action document described a larger gas pocket in the ECCS piping to the RCS cold legs which is supplied by the RHR pumps. This condition was evaluated as a water column collapse water hammer event since the RCS pressure is above the RHR pump maximum discharge pressure at the time the pumps start operating and there would not be any forward flow into the RCS cold leg at this time. The gas pocket resulted in cushioning the pressure wave resulting from the water column collapse. The gas in the safety injection system hot leg injection piping did not form a complete gas pocket; therefore, a column closure event would not occur as the gas would be entrained in the water.

The ECCS piping system conditions in the RHR portion of the system supplying the RCS Cold Leg #1 was evaluated for the potential effects of a column closure event involving the gas pocket that existed in the six-inch ECCS piping to RCS Cold Leg #1. For this condition, the pressure wave resulting from the column closure event was determined to be very low in the "Not Severe" category, based on the criteria provided in Reference 2. An evaluation of the effect of the pressure wave on the piping system confirmed that the design of the system piping was acceptable for this potential water hammer event.

Based on the "Not Severe" category for the RHR piping column closure condition, and industry experience involving water hammer events, it was concluded that the ability of the ECCS system to perform its design basis functions was not affected. Since the safety injection pump hot leg high points addressed in this submittal involve conditions in which forward flow to the RCS hot legs would occur, and the gas pocket and the water downstream of the gas pocket would be pushed into the RCS hot legs as the line pressure increased, a water column closure event would not occur. Therefore, the gas that has been identified in the safety injection hot leg injection high points is a less significant condition than the water column closure event discussed above for the six-inch ECCS piping to RCS Cold Leg #1.

Risk Considerations

The safety injection hot leg injection lines are not modeled in the WBN Probabilistic Safety Analysis (PSA). The PSA assumes that for Large and Medium LOCA events, the RCS will be depressurized at the time of swapover to hot leg recirculation and the RHR hot leg piping will be used. For SBLOCA events it is assumed that RCS temperature and pressure will be reduced before swapover to hot leg recirculation which is required at nine hours for the current cycle. Therefore the risk of surveillance extension can be considered neutral.

Interim Actions

During the interim period until the refueling outage, TVA will vent the two safety injection hot leg injection lines at each opportunity that radiological and personnel safety conditions allow before the Fall 2003 refueling outage. In addition, the WBN management team will review in advance any proposed maintenance or testing activities that could likely result in significant amounts of gas being introduced into the safety injection hot leg injection lines.

5. REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

In order to minimize radiation dose and/or personnel safety impacts, TVA is requesting to postpone a portion of a surveillance requirement (SR) to confirm safety injection system hot leg recirculation injection lines are full of water. TVA proposes to extend the 31 day frequency to performance during the next refueling outage in Fall 2003.

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendments(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The design function of the emergency core cooling system (ECCS) is to provide core cooling and reactivity control for various design bases accidents. With gas potentially entrained in the safety injection system hot leg injection piping, the primary considerations would be maintenance of adequate core cooling and prevention of water hammer resulting from initiation of flow to the reactor core for mitigation of a design basis event. In the event of a postulated large break loss of coolant accident (LBLOCA), the reactor coolant system (RCS) will depressurize rapidly, ECCS injection from the refueling water storage tank (RWST) will occur, followed by cold leg recirculation, and then hot leg recirculation. No flow will exist in the hot leg injection piping until hot leg recirculation is initiated.

TVA reviewed the Nuclear Steam Supply System (NSSS) vendor's previous bounding evaluation performed on the effects of injecting the nitrogen gas contained in the four safety injection system accumulators into the RCS following a LOCA. The mass of nitrogen for the accumulators assumed to be injected into the RCS is significantly greater than the mass of gas that could reasonably be expected to exist in the safety injection hot leg injection lines. Therefore, the injection of the postulated gas in the hot leg injection lines would have an insignificant effect on the cooldown of the RCS in the hot leg recirculation mode.

If a layer of gas existed, it would flow to the core by mixing with the water in the line. If a solid bubble were conservatively assumed with the RCS depressurized, the pressure from the pump would push any entrained gas to the RCS hot legs as the hot leg injection valves opened and the safety injection pump came up to operating speed. The two separated water volumes would travel to the RCS hot legs at near the same velocity and would not impact one another. No significant water hammer would occur.

For the design basis small break LOCA (SBLOCA) and the SBLOCA that is smaller than the design basis 4-inch pipe size break, the hot leg swapover is the same, although delayed, for the SBLOCA scenario as for the LBLOCA. No significant water hammer would occur.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

   Response: No.

   The proposed change to the WBN TS and its associated bases do not introduce any new accident initiator mechanisms. The exclusion of hot leg injection piping from the ECCS water inventory surveillance does not cause the initiation of any accident nor create any new credible limiting single failure. Further, the change does not result in any event previously deemed incredible being made credible since, as discussed above, there are no new adverse impacts associated with the introduction of gas into the reactor core from those previously evaluated. Further, there is no adverse impact created by a potential water hammer situation.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Does the proposed change involve a significant reduction in a margin of safety.**

   Response: No.

   The exclusion of safety injection system hot leg injection piping from the ECCS water inventory surveillance does not result in a condition where the design, material, and construction standards that were acceptable prior to this change are altered. The potential to introduce gas from the hot leg injection piping into the reactor core during postulated large and small break LOCA accidents does not adversely affect design assumptions for emergency core cooling or reactivity control. Since adverse water hammer events are not postulated, the proposed changes to TS and its associated Bases will have no affect on the availability, operability, or performance of the WBN ECCS systems. Therefore, the subject change does not involve a significant reduction in margin of safety

Based on the above, TVA concludes that the proposed amendment(s) present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50.46 "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," Paragraph (b)(5) "Long-term cooling," requires the licensee to be able to maintain core temperature at an acceptable low value and decay heat removal for an extended period of time. The only portion of 10 CFR 50 Appendix K that would be relevant is Paragraph D, "Post-Blowdown Phenomena; Heat Removal by the ECCS." The licensee's evaluation indicates there is no adverse affect on long term core cooling and therefore this regulation is met.

Section 6.3, "ECCS," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," includes the following:

"B. General Design Criterion 4 as related to dynamic effects associated with flow instabilities and loads (e.g., water hammer)…"

Accordingly, the effect of water hammer on the ECCS is assessed under the scope of the reviews performed for compliance with General Design Criteria (GDC) 4, "Environmental and dynamic effects design bases."

For WBN, the conformance with GDC-4 is discussed in Section 3.1.2, "WBNP Conformance with GDCs," of the Updated Final Safety Analysis Report (UFSAR). The staff's review of WBN's conformance with the GDC states the following and is documented in Section 3.1.1, "Conformance with General Design Criteria," of NUREG-0847, Safety Evaluation Report (SER) related to the operations of Watts Bar Nuclear Plant Units 1 and 2 dated June 1982.

> "… The staff reviewed the final design and the design criteria and concludes, subject to the applicant's adoption of the additional requirements imposed by the staff and the exemptions granted as discussed in this report, that the facility has been designed to meet the requirements of the GDC."

The principal sections of the WBN UFSAR that address the ECCS and unit operation in the hot leg injection mode are as follows:

- Section 6.3, "ECCS."
- Section 15.4.1, "Major Reactor Coolant System Pipe Ruptures (Loss of Coolant Accident)."
- Section 15.4.3, "Steam Generator Tube Rupture."

The proposed amendment does not significantly impact these UFSAR sections.

NRC's assessment of the ECCS and operation of the unit in the hot leg injection mode is documented in the following sections of the SER and Supplemental SER (SSER):

SER:

- Section 6.3, *ECCS*
- Section 15.2.3, *Change in Coolant Inventory Transients*
- Section 15.3.1, *Loss-of-Coolant Accident*

SSER 5 - November 1990:

- Section 6.3, *ECCS.*

SSER 15 - June 1995:

- Section 15.3.1, *Loss-of-Coolant Accident.*

No exceptions to the requirements of GDC-4 for the ECCS are discussed in either the UFSAR or the SER and supplements. In addition, no issues or special considerations were documented with the hot leg injection portion of the ECCS in the SERs listed above.

In order to safely perform the surveillance requirement following the refueling outage, TVA has made a regulatory commitment to complete one of the following corrective actions: 1) verify that the changes to operating startup procedures and TVA's administrative program can provide reasonable assurance the lines will remain full of water, 2) implement a modification to allow the capability to perform on line venting in a lower dose area that does not represent a personnel safety hazard, or 3) process a permanent request to change the SR to verify accessible areas only during plant operations.

As interim actions up to the refueling outage, the WBN management team will review in advance any proposed maintenance or testing activities that could likely result in significant amounts of gas being introduced into the safety injection hot leg injection lines and TVA will vent the two safety injection hot leg injection lines at each opportunity that radiological and personnel safety conditions allow before the Fall 2003 refueling outage.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

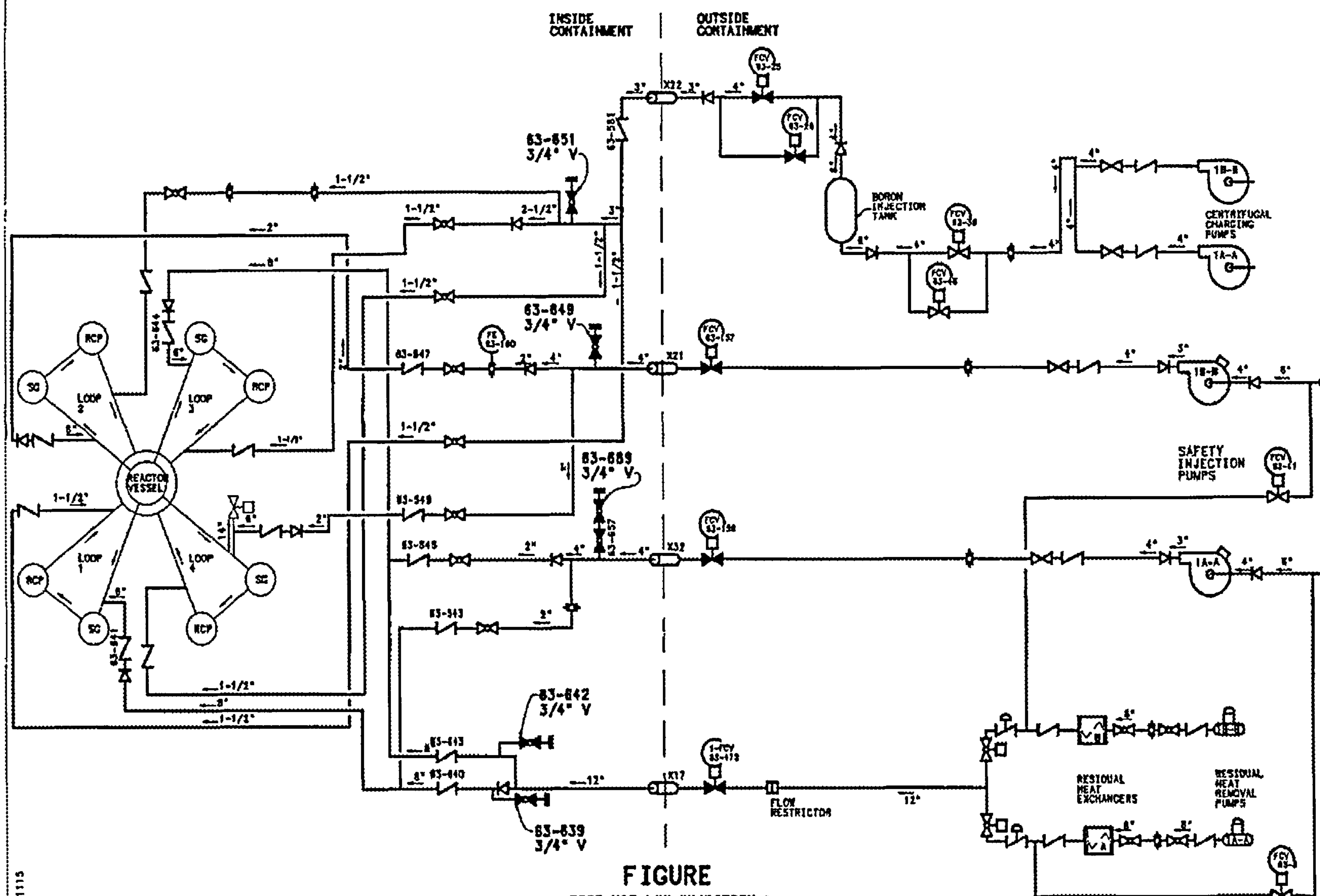
6.0. ENVIRONMENTAL IMPACT CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. WCAP-8471-P-A, *The Westinghouse ECCS Evaluation Model: Supplementary Information*, dated April 1975.

2. Electrical Power Research Institute (EPRI) Technical Report No. 01032-TR-01 Revision 0, "*Screening Methodology for Waterhammer in Power Piping Systems.*"



FIGURE

ECCS HOT LEG INJECTION &
CCP COLD LEG INJECTION VENTING

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1

PROPOSED LICENSE AMENDMENT CHANGE WBN-TS-03-11

I. **AFFECTED PAGE LIST**

Technical Specification

3.5-5

II. **MARKED PAGES**

See attached.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify the following valves are in the listed position with power to the valve operator removed. Number / Position / Function FCV-63-1 / Open / RHR Supply FCV-63-22 / Open / SIS Discharge	12 hours
SR 3.5.2.2	Verify each ECCS manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.5.2.3	Verify ECCS piping is full of water. INSERT →	31 days **NOTE: Surveillance performance not required for safety injection hot leg injection lines until start up from the Fall 2003 refueling outage.**
SR 3.5.2.4	Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program
SR 3.5.2.5	Verify each ECCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.5.2.6	Verify each ECCS pump starts automatically on an actual or simulated actuation signal.	18 months

(continued)

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1

PROPOSED LICENSE AMENDMENT CHANGE WBN-TS-03-11

I. AFFECTED PAGE LIST

3.5-5

II. AMENDED PAGES

See attached.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify the following valves are in the listed position with power to the valve operator removed. <u>Number</u> / <u>Position</u> / <u>Function</u> FCV-63-1 / Open / RHR Supply FCV-63-22 / Open / SIS Discharge	12 hours
SR 3.5.2.2	Verify each ECCS manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.5.2.3	Verify ECCS piping is full of water.	31 days **NOTE:** Surveillance performance not required for safety injection hot leg injection lines until start up from the Fall 2003 refueling outage.
SR 3.5.2.4	Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program
SR 3.5.2.5	Verify each ECCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	18 months
SR 3.5.2.6	Verify each ECCS pump starts automatically on an actual or simulated actuation signal.	18 months

(continued)

ENCLOSURE 4

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1

PROPOSED LICENSE AMENDMENT CHANGE WBN-TS-03-11

PROPOSED TECHNICAL SPECIFICATION BASES PAGES

I. AFFECTED PAGE LIST

B 3.5-18
B 3.5-19

II. MARKED PAGES

See attached.

SURVEILLANCE REQUIREMENTS

SR 3.5.2.3 (continued)

ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will also prevent water hammer, pump cavitation, and pumping of noncondensible gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an SI signal or during shutdown cooling. The 31 day Frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the procedural controls governing system operation. **A note is added to the FREQUENCY that surveillance performance is not required for safety injection hot leg injection lines until startup from the Fall 2003 Refueling Outage. (Ref. 7)**

ADD

SR 3.5.2.4

Periodic surveillance testing of ECCS pumps to detect gross degradation caused by impeller structural damage or other hydraulic component problems is required by Section XI of the ASME Code. This type of testing may be accomplished by measuring the pump developed head at only one point of the pump characteristic curve. This verifies both that the measured performance is within an acceptable tolerance of the original pump baseline performance and that the performance at the test flow is greater than or equal to the performance assumed in the plant safety analysis. SRs are specified in the Inservice Testing Program, which encompasses Section XI of the ASME Code. Section XI of the ASME Code provides the activities and Frequencies necessary to satisfy the requirements.

SR 3.5.2.5 and SR 3.5.2.6

These Surveillances demonstrate that each automatic ECCS valve actuates to the required position on an actual or simulated SI signal and that each ECCS pump starts on receipt of an actual or simulated SI signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative control. The 18 month Frequency is based on the need to perform these Surveillances under the conditions that apply during a plant outage and the potential for unplanned plant transients if the Surveillances were performed with the reactor at power. The 18 month Frequency is also acceptable based on consideration of the design reliability (and confirming operating experience) of the equipment. The actuation logic is tested as part of ESF

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.5 and 3.5.2.6 (continued)

Actuation System testing, and equipment performance is monitored as part of the Inservice Testing Program.

SR 3.5.2.7

Realignment of valves in the flow path on an SI signal is necessary for proper ECCS performance. These valves are secured in a throttled position for restricted flow to a ruptured cold leg, ensuring that the other cold legs receive at least the required minimum flow. The 18 month Frequency is based on the same reasons as those stated in SR 3.5.2.5 and SR 3.5.2.6.

SR 3.5.2.8

Periodic inspections of the containment sump suction inlet ensure that it is unrestricted and stays in proper operating condition. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, on the need to have access to the location, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation and is confirmed by operating experience.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 35, "Emergency Core Cooling System."

2. Title 10, Code of Federal Regulations, Part 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Plant."

3. Watts Bar FSAR, Section 6.3, "Emergency Core Cooling System."

4. FSAR Bar FSAR, Section 15.0, "Accident Analysis."

5. NRC Memorandum to V. Stello, Jr., from R.L. Baer, "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.

6. IE Information Notice No. 87-01, "RHR Valve Misalignment Causes Degradation of ECCS in PWRs," January 6, 1987.

ADD →

7. WBN License Amendment Request WBN-TS-03-11 dated April 8, 2003.

ENCLOSURE 5

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-
LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by TVA in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to P. L. Pace at (423) 365-1824.

	REGULATORY COMMITMENT	DUE DATE
1.	In order to safely perform the surveillance requirement following the refueling outage, TVA has made a regulatory commitment to complete one of the following corrective actions 1) verify that the changes to operating startup procedures can provide reasonable assurance these specific lines will remain full of water, 2) implement a modification to allow the capability to perform on line venting in a lower dose area that does not represent a personnel safety hazard, or 3) process a permanent request to change the SR to verify accessible areas only during plant operations.	November 1, 2003
2.	As interim actions up to the refueling outage, 1) the WBN management team will review in advance any proposed maintenance or testing activities that could likely result in significant amounts of gas being introduced into the safety injection hot leg injection lines, and 2) TVA will vent the two safety injection hot leg injection lines at each opportunity that radiological and personnel safety conditions allow before the Fall 2003 refueling outage.	April 8, 2003