January 6, 2006

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 — ISSUANCE OF AMENDMENT REGARDING TEMPORARY USE OF PENETRATIONS IN SHIELD BUILDING DOME DURING MODES 1-4 (TAC NO. MC6569)

Dear Mr. Singer:

The Commission has issued the enclosed Amendment No. 59 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated April 4, 2005 (WBN-TS-04-17), as supplemented by letters dated September 30 and November 8, 2005. The amendment supports the steam generator replacement project by temporarily allowing one of the shield building dome penetrations to be opened up to five hours a day, six days a week while in Modes 1-4 during Cycle 7 operation until entering Mode 5 at the start of the Cycle 7 refueling outage in Fall 2006.

A copy of the safety evaluation is also enclosed. Notice of issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA Margaret Chernoff for/

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 59 to NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

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Mr. Karl W. Singer
Tennessee Valley Authority

WATTS BAR NUCLEAR PLANT

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 59
License No. NPF-90

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated April 4, 2005, as supplemented by letters dated September 30 and November 8, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-90 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 59, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. TVA shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, and shall be implemented no later than 45 days from the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Michael L. Marshall, Jr., Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 6, 2006

ATTACHMENT TO AMENDMENT NO. 59

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.6-15	3.6-15
3.6-40	3.6-40

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 59 TO FACILITY OPERATING LICENSE NO. NPF-90

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By application dated April 4, 2005 (ML051030153), as supplemented by letters dated September 30 (ML052780332) and November 8, 2005 (ML053140136), the Tennessee Valley Authority (TVA, the licensee) requested a license amendment for Watts Bar Nuclear Plant (WBN), Unit 1. The proposed change supports the steam generator (SG) replacement project by temporarily allowing one of the shield building dome penetrations to be opened up to five hours a day, six days a week while in Modes 1-4 during Cycle 7 operation until entering Mode 5 at the start of the Cycle 7 refueling outage in Fall 2006.

The supplemental letters provided clarifying information that was within the scope of the initial notice and did not change the initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

The licensee has informed the Nuclear Regulatory Commission (NRC, the staff) of their intention to replace the four WBN steam generators during their Cycle 7 refueling outage scheduled for the Fall 2006. Removal of the old SGs and installation of the replacement SGs will require cutting holes in the SG compartment roof inside containment for each SG, and two separate holes in both the free-standing steel containment vessel dome and the concrete Shield Building dome. The four SGs will be accommodated by the two holes in the steel containment vessel and the concrete Shield Building.

Preparation for creation of the two holes in the steel containment vessel and the concrete Shield Building will require numerous activities, such as welding stiffeners to the steel containment vessel, installation of a water collection system for hydro-demolition of the Shield Building concrete, and installation of scaffolding and work platforms inside the annulus region between the steel containment vessel and the Shield Building. Rather than deferring this work to the Cycle 7 outage, the licensee plans to perform this work in advance of the outage while the facility is operating in Modes 1-4. Movement of material required to support these activities to the top of the annulus is currently only possible by hauling the material from the Auxiliary Building through the annulus and up the side of the steel containment vessel along the annulus ladder.

During the Cycle 6 refueling outage in Spring 2005, the licensee drilled two approximately 18-inch diameter penetrations in the concrete Shield Building dome and installed pre-fabricated, water-tight, Seismic Category 1 steel hatch assemblies over each. The purpose of the penetrations will be to assist in pre-staging equipment and begin construction activities for the SG replacement project. The licensee states that moving material from outside through the penetrations directly to the annulus as opposed to hand-carrying material through the Auxiliary Building and up through the annulus ladder will reduce time spent working inside the annulus, reduce personnel radiation exposure, and reduce the potential for damaging equipment during transport.

The WBN accident analysis relies upon the Shield Building to remain fully intact during operating Modes 1-4. WBN Technical Specification (TS) 3.6.15, "Shield Building," requires that the annulus region remain at a pressure that is equal to or more negative than negative 5 inches water gauge with respect to the atmosphere during operating Modes 1-4. This requirement minimizes post-accident radiation dose to both plant personnel and members of the public. The emergency gas treatment system (EGTS) is used to establish and maintain a negative pressure within the annulus during normal operations. In addition, TS 3.6.4, "Containment Pressure," requires that Containment pressure remain within $ -0.1 and # +0.3 psid of the Shield Building negative pressure. Thus, the WBN TSs currently prohibit plant operation in operating Modes 1-4 with either of the Shield Building penetrations open

The licensee's proposal would modify TS 3.6.4 and 3.6.15 to permit temporary opening of either Shield Building penetration while at power to facilitate preparations for the scheduled steam generator replacements. Specifically, the proposed TS changes would allow either of the penetrations to be opened for up to 5 hours per day, six days per week while operating in Modes 1-4 during the current Cycle 7 operation until entering Mode 5 at the start of the fall 2006 Cycle 7 refueling outage. The proposed TS changes would not permit both Shield Building penetrations to be opened simultaneously. In addition, the proposed TS changes would prohibit opening a Shield Building penetration if the plant was in TS 3.6.9 Action A (one EGTS train inoperable) or TS 3.8.1 Action B (one diesel generator inoperable). These latter conditions would represent plant operation under greater risk conditions.

The licensee's justification to open a Shield Building penetration during operating Modes 1-4 is based upon operator actions to promptly close the penetration as necessary and revised post-accident dose analyses. Operator actions rely on a trained, dedicated individual stationed on the Auxiliary Building roof combined with a trained, dedicated operator in the control room to close the Shield Building penetration within 15 minutes of a reactor trip. The two individuals would have no other duties other than to close the penetration. They would be equipped with two forms of communication (i.e., two way radio and telephone) and they would confirm penetration closure. Based upon an open Shield Building penetration for 15 minutes following a design basis accident, the revised dose analyses would demonstrate that regulatory limits for control room operators and members of the public (i.e., offsite doses) would not be exceeded.

The Shield Building dome penetrations are currently locked closed with a security access only padlock and a metal strap welded across the face while in modes 1-4. The penetrations will remain in this locked configuration until the NRC approves of the proposed TS changes. Security personnel will monitor personnel and movement of material through an open penetration when the penetration is in use. The penetrations will be locked closed with a security access only padlock when not in use.

2.1 Technical Specification Changes

The licensee has proposed the following temporary modifications to TS 3.6.4 and 3.6.15 to permit opening one of the Shield Building penetrations during operating Modes 1-4.

TS 3.6.4, "Containment Pressure"

Limiting Condition for Operation (LCO) 3.6.4 states that containment pressure shall be $ -0.1 and # +0.3 psid relative to the annulus. Furthermore, Condition A states that when containment pressure is not within limits, actions must be taken to restore containment pressure within 1 hour.

The licensee proposed to add the following note to Condition A to permit opening one of the Shield building penetrations during operating Modes 1-4:

> "NOTE - When opening or closing Penetration 1-EQH-271-0010 or 1-EQH-271-0011 in the Shield Building Dome during Cycle 7 operation, time is allowed for Containment Annulus pressure equalization to occur."

TS 3.6.15, "Shield Building"

LCO 3.6.15 states that the Shield Building shall be Operable. Surveillance Requirement 3.6.15.1 states that the annulus negative pressure must be verified every 8 hours to be equal to or more negative than negative 5 inches water gauge with respect to the atmosphere. Condition B states that if the annulus pressure is not within limits, actions must be taken to restore annulus pressure within 8 hours.

Condition B currently has a note that allows limited activities when the annulus negative pressure requirement is not applicable. The note states:

> "Annulus pressure requirement is not applicable during venting operations, required annulus entries, or Auxiliary Building isolations not exceeding 1 hour in duration."

TS 3.6.15 would be modified by adding the following to the end of the above note:

> "... or while Penetration 1-EQH-271-0010 or 1-EQH-271-0011 in the Shield Building Dome is open until annulus pressure is restored.*
>
> *1. The combined opening time of Penetrations 1-EQH-271-0010 or 1-EQH-271-0011 is limited to a total time of five hours a day, six days a week during Cycle 7 operation.
>
> 2. Penetrations 1-EQH-271-0010 or 1-EQH-271-0011 in the Shield Building Dome may not be opened if in Action Conditions LCO 3.6.9a or 3.8.1B.
>
> 3. Upon opening Penetration 1-EQH-271-0010 or 1-EQH-271-0011 in the Shield Building Dome, both EGTS control loops shall be placed in the A-Auto Standby position and returned to normal position following closure of the penetrations."

The licensee proposed conforming changes to the discussion in TS Bases sections B 3.6.4,

B 3.6.9 and B 3.6.15 to provide explanation.

3.0 REGULATORY EVALUATION

The staff's review focused on (1) the adequacy of the proposed operator actions to close the Shield Building dome penetration in a timely manner as proposed by the licensee, and (2) the post-accident dose analyses to ensure that regulatory limits will not be exceeded.

3.1 Proposed Operator Actions

The staff's review criteria are based on an adaptation of existing NRC review guidance for human factors engineering as found in: NUREG-800, "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP, Rev.1, 2004); NUREG-0711, "Human Factors Engineering Program Review Model" (Rev.2, 2004); NUREG-0700, "Human-System Interface Design Review Guideline" (Rev.2, 2002); Information Notice (IN) 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times," (1997); NUREG-1764, "Guidance for the Review of Human Actions, Final Report" (2004); Regulatory Guide (RG) 1.174, "An Approach To Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes To The Licensing Basis" (1998); RG 1.177, "An Approach for Plant-Specific, Risk- Informed Decision Making: Technical Specifications" (1998); IN 91-18, "Information to Licensees Regarding Two Inspection Manual Sections On Resolution of Degraded and Non-Conforming Conditions and on Operability" (1991); and American National Standards Institute/American Nuclear Society (ANSI/ANS) 58.8 (1994/2001), "Time Response Design Criteria for Safety-Related Operator Actions." Also applicable to the review of human factors engineering aspects of operating nuclear power plants are 10 CFR 50, Appendix B, III., "Design Control" and 10 CFR Part 50.59, "Changes, Tests, and Experiments."

3.2 Revised Dose Analysis

This safety evaluation input addresses the impact of the proposed changes on previously analyzed design basis accident radiological consequences and the acceptability of the revised analysis results. The regulatory requirements for which the staff based its acceptance are the accident dose guidelines in Title 10 of the *Code of Federal Regulations* Part 100.11 (10 CFR Part 100.11), as supplemented by accident-specific criteria in NUREG-0800 SRP Section 15, and 10 CFR Part 50 Appendix A, General Design Criterion 19 (GDC-19), "Control Room," as supplemented by SRP Section 6.4. Except where the licensee proposed a suitable alternative, the staff utilized the regulatory guidance provided in the following documents in performing this review:

- Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss-of-Coolant Accident for Pressurized Water Reactors"
- SRP Section 6.4, "Control Room Habitability Systems"
- SRP Section 15.6.5, "Loss-of-Coolant Accidents Resulting from Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary," Appendix A and Appendix B

The staff also considered relevant information in the WBN Unit 1 updated final safety analysis

report (UFSAR) and technical specifications.

4.0 TECHNICAL EVALUATION

4.1 Acceptability of Proposed Operator Actions

The proposed changes to TS sections 3.6.4 and 3.6.15 will allow the use of two, approximately 18-inch diameter penetrations in the Shield Building dome during operating Modes 1-4 in preparation for the SG replacement project. The proposed changes will allow WBN to open one of the penetrations in the Shield Building dome at a time for combined periods up to five hours a day, six days a week while in operating Modes 1-4 during Cycle 7 and until entering Mode 5 at the start of the Cycle 7 refueling outage. The penetrations in the Shield Building will be used to pass material directly to the point of use. Upon completion of the SG replacement project, the TS will revert to the pre-amendment requirements prior to entering Mode 4 during startup from the Cycle 7 refueling outage.

The use of one of the Shield Building dome penetrations affects the integrity of the Shield Building and the ability of the EGTS to maintain the containment annulus at a negative pressure relative to the outside atmosphere such that the function in mitigating the radiological consequences of an accident is affected. TVA's evaluation documents the radiological consequences of a loss-of-coolant accident (LOCA) assuming the open penetration is closed within 15 minutes and the mission dose an individual may receive during ingress from the Auxiliary Building roof to the Shield Building dome, closure of the steel hatch assembly, and egress from the Shield Building dome. Modifications to TSs are intended to incorporate temporary changes to allow for these affects of the penetrations into the Shield Building dome. These changes address the pressurization effects created by the use of the penetrations.

In its technical analysis, the licensee states that when either of the Shield Building dome penetrations are open, a dedicated, trained individual who is in constant communication with another dedicated individual in the Control Room and is able to close the penetration within 15 minutes to prevent unfiltered atmospheric releases in the case of a LOCA, will be stationed on the Auxiliary Building roof to close the penetrations. The individuals assigned these responsibilities will have no other duties or responsibilities. In the event of a reactor trip, primary and back up communications (two way radio and telephone, respectively) between the individual on the Auxiliary Building roof and the Control Room have been established. The back up communications system has been established to ensure the individual on the Auxiliary Building roof is notified of the need to close the equipment penetration in the event the primary communications method fails. Operability of the communication systems will be verified prior to each opening of a Shield Building dome penetration and hourly while the penetration is open.

The licensee indicated that it used guidance contained in NRC IN 97-78, “Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times”, and ANSI/ANS 58.8, “Time Response Design Criteria for Safety-Related Operator Actions,” to evaluate the acceptability of the proposed manual actions required to close the penetration hatches. The licensee indicated that a walkdown of the actions required of the dedicated individual under the expected conditions was performed to determine the time required to close the penetration. The walkdown was performed using personnel who were familiar with the installation of the penetrations, scaffolding, and ingress/egress pathways. The estimated times for the activities on the Shield Building dome (steps 3-5 below) have been

confirmed since the penetrations have already been installed by the licensee. The walkdown time assumed that the dedicated individual on the roof is dressed normally (i.e., no anti-contamination clothing or self-contained breathing apparatus), no special tools or equipment are needed other than the communication means between the individual and the Control Room. The walkdown assumed that during the first 15 minutes of the LOCA, releases to the annulus were released immediately to the outside atmosphere and were unfiltered.

The times to complete the actions required of the dedicated individual in the event of a LOCA, including closing the penetration and exiting the Auxiliary Building, were as follows:

1. notify dedicated individual pre-staged on Auxiliary Building roof to close penetration (10 minutes),

2. climb the Shield Building ladder to the dome (30 seconds),

3. walk towards the penetration from the east (30 seconds),

4. clear any object blocking the penetration and close the penetration (60 seconds),

5. walk off the Shield Building dome to the east (30 seconds),

6. climb down ladder to the Auxiliary Building roof and enter the Auxiliary Building (60 seconds),

7. walk through the Auxiliary Building to the airlock door and exit the Auxiliary Building (13 minutes, 10 seconds).

The time for the dedicated individual to close the penetration, from time of notification (steps 1-4), was 12 minutes.

Procedures for events requiring Shield Building integrity will not require revision to initiate closure of the open Shield Building dome penetration since the dedicated individual in the Control Room will direct the individual on the Auxiliary Building roof to initiate closure immediately following an announcement of a reactor trip over the PA system, regardless of the reason for the trip. In addition, the Control Room will be notified prior to opening a Shield Building dome penetration. Procedures will be revised as necessary to 1) place both EGTS control loops in the A-Auto Stand-by position when a Shield Building dome penetration is opened and 2) reset one EGTS control loop to A-Auto and one to A-Auto Stand-by once annulus pressure becomes more negative than -0.812 inches water gauge following closure of a penetration. Annulus pressure indication is provided in the Control Room. Training will be conducted for any procedure revisions, interim procedure revisions, and new procedures either through training classes, "hands-on" training, and/or required reading. The dedicated individual in the Control Room will be able to provide information to the dedicated operator on the Auxiliary Building roof as to whether manual operator action is required.

The manual actions necessary to be taken by the dedicated individual on the Auxiliary Building roof in the event of a LOCA have been shown to be completed within the 15 minutes allowed.

Further, the actions can be completed considering the guidance and criteria of IN 97-78 and ANSI/ANS 58.8.

The staff finds the specific operator actions described in the licensee's submittal acceptable given the type of environmental conditions anticipated when the temporary TS change will take place. Administrative controls will be put in place to require closure of the Shield Building dome penetration if the National Weather Service issues a tornado watch or warning.

The licensee also addressed the ability to recover from credible errors in performance of manual actions and the expected recovery time as relevant to the manual action to close an open Shield Building penetration. The steel hatch assembly over each Shield Building dome penetration performs the same function as the concrete it replaces. The hinges in the hatch assembly are spring loaded to assist the dedicated operator in closing the Shield Building penetration. Postulated failures of the penetrations are degradation/damage to the seal or damage to the hatch hinges. Like any other Shield Building failure, these postulated penetration failures result in a loss of Shield Building integrity and require that the failed component be repaired or replaced within a specified time-frame or that plant shutdown be initiated.

The licensee further states that an error of commission or omission by a dedicated individual to close an open Shield Building penetration when directed by the dedicated individual in the Control Room is considered unlikely. An error of commission or omission is unlikely because the individuals involved in performance of this task are dedicated to the task, diverse means of communication between the individuals are provided, and adequate communication exists in the Control Room to alert the dedicated individual in the Control Room of a reactor trip.

Based on a comparison of the licensee's safety analysis with the staff's review criteria, the staff concludes that the licensee has provided reasonable assurance that the operators will be able to successfully perform the required tasks. Therefore, the staff finds this proposed amendment request to be acceptable with respect to required human actions related to the use of penetrations equipped with hatch assemblies in the Shield Building dome during operating Modes 1-4 in preparation for the SG replacement project.

4.2 Acceptability of Revised Dose Analyses

The staff reviewed the regulatory and technical analyses, as related to the radiological consequences of design basis accidents (DBA), performed by TVA in support of its proposed license amendment. Information regarding these analyses was provided in Section 4 of the submittal and in supplementary letters dated September 30 and November 8, 2005. The staff reviewed the assumptions, inputs, and methods used by TVA to assess the impacts of the proposed license amendment. The staff performed independent calculations to confirm the conservatism of the licensee's analyses. The staff's findings are based on the descriptions of the licensee's analyses found in the above letters along with other supporting information previously docketed by TVA.

The accidents of interest for the use of a shield building dome penetration during operating Modes 1-4 are those that rely on the shield building boundary to limit the release of radioactive

material to the environment and those resulting from an external event such as a tornado. The DBA dose analyses in the WBN UFSAR assume that the shield building is intact and the annulus is at a negative pressure relative to the outside atmosphere at the start of the accident. The analyses also assume that the air cleanup subsystem of the EGTS keeps the annulus air volume below atmospheric pressure during an accident, and filters the annulus air before release from the shield building ventilation stack. The limiting DBA that assumes operation of the EGTS to mitigate the release from the containment is the large break LOCA.

If an accident would happen while WBN Unit 1 is in Modes 1-4 with a shield building dome penetration open, the integrity of the secondary containment shield building boundary and the ability to limit the release of radioactive material to the outside atmosphere would not be assured. With the shield building dome penetration 1-EQH-271-0010 or 1-EQH-271-0011 open at the time the accident occurs, the required pressure differential is not present to ensure processing of the shield building annulus atmosphere through the EGTS filters. However, at the beginning of an accident, the EGTS will begin to operate within 30 seconds of the onset of the LOCA. The EGTS will exhaust 4000 cubic feet per minute (cfm) $\pm$ 10 percent for one train of EGTS from the annulus, which will flow out of the shield building vent regardless if one shield building dome penetration is open or closed. TVA stated in the November 8, 2005, response to the staff's request for information that it is realistically expected that the direction of flow at the open shield building dome penetration would be into the annulus and not out of the annulus, considering the EGTS flow rates and the relatively small size (i.e., 18-inch diameter) of the opening.

The licensee has proposed compensatory manual operator actions to restore the integrity of the secondary containment shield building, if needed, to mitigate the consequences of an accident. When a shield building dome penetration is opened, the licensee would station a dedicated trained individual on the auxiliary building roof. This individual would have no other assigned duties other than to close the shield building dome penetration steel hatch, should an event requiring shield building integrity occur. TVA estimates that the time required to notify the dedicated individual on the auxiliary building roof, travel of the individual to the penetration, and closure of the penetration hatch is approximately 12 minutes. TVA also stated that they conservatively assumed that it takes approximately 2 minutes after the penetration is closed for the EGTS to depressurize the annulus. TVA states that the actual time calculated to depressurize the annulus to -0.25 inches water gauge is approximately 46 seconds, based on 250 cfm total expected inleakage and a minimum EGTS flow rate of 3600 cfm. For the purposes of dose calculations, the licensee has conservatively assumed that the shield building penetration remains open for 15 minutes following an accident.

The staff asked TVA to provide additional information on the impact of delayed closure of the open shield building dome penetration beyond the assumed 15 minutes. TVA's analyses concluded that a shield building penetration could remain open for more than 50 minutes following an accident before the offsite (10 CFR 100) and control room (GDC-19) dose limits would be exceeded. This translates to the penetration being open for 48 minutes with 2 additional minutes for annulus drawdown. The staff performed independent analyses and found the licensee's assertion to be reasonable.

TVA evaluated the feasibility of closure of the shield building dome penetration hatch assembly

against the calculated maximum annulus positive pressure of 2 inches water gauge for the LOCA. The annulus positive pressure could exert an upward force of approximately 41 pounds (lbs) on the hatch. The shield building dome penetration hatch weighs more than 100 lbs, and the weight of the hatch alone is sufficient to overcome the positive pressure in the annulus and allow closure of the hatch following a LOCA.

In the offsite and control room design basis LOCA dose analysis, TVA assumed that the shield building dome penetration hatch remained open for 15 minutes following an accident. TVA calculated the expected annulus pressure response during a design basis LOCA, analyzed the accident pressure curve, and EGTS exhaust rates for the condition when the annulus starts at atmospheric pressure (zero differential pressure). This calculation used the same methodology and gave similar results to the EGTS flow rates used in the current licensing basis analysis. The 15-minute closure time was modeled by taking the above base case and adding 15 minutes to all times following the time when the annulus reaches its maximum post-accident pressure. The calculation used TVA computer codes Source Transport Program (STP), FENCDOSE, and COROD. The STP output is used as input to COROD, which determines control room operator dose, and FENCDOSE, which is used to determine 30-day low population zone (LPZ) and 2-hour exclusion area boundary (EAB) offsite dose. The calculation incorporates new atmospheric dispersion coefficients (χ/Q) values as determined by ARCON96. These codes are described in TVA's letter dated May 21, 2002 (ML021440139), and have previously been used by TVA to support other TVA license amendment requests approved by the staff, such as the Tritium Production Core associated with Watts Bar License Amendment No. 40 dated September 23, 2002 (ML022540925)

The current WBN LOCA dose calculation was used as a basis for the reanalyzed dose, with the exception of the adjusted EGTS exhaust and recirculation flow rates. For times less than 15 minutes, all flow was assumed to be directed from the annulus to the environment. This flow would be unfiltered. This is a conservative assumption because, as previously stated, the licensee believes that with a shield building penetration open and the EGTS operating, flow will be directed from the environment into the annulus. Furthermore, air flow in the annulus will be directed to safety-related filters that are 99 percent efficient. All other LOCA dose analysis assumptions and inputs are the same as in the current licensing basis, and remain acceptable. The staff finds the revised assumptions for the EGTS flow rates and the release from the annulus to be acceptable, based on the licensee's analysis and description of the annulus pressure post-LOCA, and compensatory measures to close the open shield building dome penetration hatch within 15 minutes after the accident.

TVA used control room EAB and LPZ χ/Q values that were previously generated for the dose assessment associated with Watts Bar Amendment No. 40 when reevaluating the radiological consequences of the LOCA dose assessment. These χ/Q values were calculated for a release from the shield building vent and did not assume an open penetration in the shield building dome. However, since the shield building vent and dome penetrations are on the same building and close to each other relative to the EAB and LPZ distances, the release scenario with respect to the χ/Q values for this amendment request is similar to that approved by Amendment No. 40. Therefore, the staff finds the χ/Q values acceptable.

Based on the review described above, the NRC staff has concluded that the control room, EAB

and LPZ χ/Q values as presented in Table 1 are acceptable for use in the design basis accident assessments performed in support of this license amendment request. However, acceptance of the control room χ/Q value applied to the first 15 minutes of the LOCA as described above is case-specific and applies only to Watts Bar Unit 1 Modes 1-4 during fuel cycle 7. It does not represent approval of a permanent change to the plant licensing basis.

Table 1

Watts Bar Control Room Atmospheric Dispersion Factors (sec/m^3)
Loss of Coolant Accident

Time Interval (hrs)	EAB	LPZ	Control Room
0 - 2	6.07×10^{-4}	1.41×10^{-4}	1.12×10^{-3}
2 - 8		6.68×10^{-5}	9.78×10^{-4}
8 - 24		4.59×10^{-5}	1.21×10^{-4}
24 - 96		2.04×10^{-5}	9.36×10^{-5}
96 - 720		6.35×10^{-6}	7.77×10^{-5}

TVA calculated the offsite and control room doses for a LOCA with the annulus open for 15 minutes. The licensee's analysis shows that the dose criteria of 10 CFR Part 100 and 10 CFR Part 50, Appendix A, GDC-19 are met for the LOCA with an open shield building dome penetration for the first 15 minutes of the accident. The licensee's dose analysis results are given in Table 2, along with the dose criteria and the current LOCA licensing basis results. The staff performed independent analysis and confirmed the licensee's dose results.

Table 2

Licensee Calculated LOCA Doses

Open Annulus for 15 Minutes					
	2 Hour EAB	30 Day LPZ	*10 CFR 100 Limit*	Control Room	*GDC-19 Limit*
Whole Body (rem)	3.507	1.746	*25*	0.8245	*5*
Skin (rem)	1.761	1.782	*n/a*	7.033	*30*
Thyroid (rem)	134.3	33.27	*300*	11.46	*30*
Baseline Doses (Closed Annulus) - Current Licensing Basis					
	2 Hour EAB	30 Day LPZ	*10 CFR 100 Limit*	Control Room	*GDC-19 Limit*
Whole Body (rem)	1.66	1.328	*25*	0.796	*5*
Skin (rem)	0.955	1.605	*n/a*	6.769	*30*
Thyroid (rem)	19.34	6.563	*300*	2.076	*30*

Finally, the licensee addressed the dose that would be absorbed by the dedicated individual responsible for closing the Shield Building penetration. The source term used for TVA's mission dose analysis consisted of the gap release in the fuel for the first 13.5 minutes following the accident. After 13.5 minutes, fuel melt is assumed to occur, adding that component to the source term. New χ/Q factors for receptors at the Shield Building penetration, edge of the Shield Building dome, and Auxiliary Building roof staging area were calculated by the licensee using ARCON96 methodology. Use of this methodology was reviewed for the LOCA analysis by the NRC in Watts Bar Amendment No. 40. The licensee's mission dose analysis concludes that the dose received by the dedicated worker will not exceed regulatory limits. The staff has reviewed the licensee's mission dose analysis and finds it acceptable because it is within regulatory limits.

4.3 Summary

The licensee has requested a temporary TS change that would permit opening an approximately 18-inch diameter penetration on the Shield Building dome during operating Modes 1-4 up to five hours per day, six days per week during Cycle 7 operation at Watts Bar Nuclear Plant, Unit 1. Only one penetration would be opened at a time. The purpose is to prestage equipment and initiate activities associated with the SG replacement program. The temporary TS will only be effective during the current Cycle 7 operation which is scheduled to run through the Fall 2006.

Allowing one of the Shield Building dome penetrations to be open is based on dedicated provisions and trained individuals being in place to close it within 15 minutes of initiation of an event requiring Shield Building integrity. TSs will prohibit opening a Shield Building dome penetration if a diesel generator is inoperable or a train of the EGTS is inoperable. In addition, administrative controls will be put in place to require closure of a Shield Building dome penetration under a National Weather Service issued tornado watch or warning.

The frequency of a loss-of-coolant accident (LOCA) and, thus, the need to close the Shield Building dome penetration is small. The licensee has presented the following initiating events and their frequency of occurrence:

Excessive LOCA	2.67E-07
Large LOCA	2.67E-06
Small LOCA	2.67E-05

The staff reviewed the assumptions, inputs, and methods used by TVA to assess the proposed operator actions and radiological impacts of a design basis accident while in operating Modes 1-4 with an open Shield Building dome penetration. The staff finds that TVA used analysis methods and assumptions consistent with regulatory requirements and guidance documents. The staff finds, with reasonable assurance, that the licensee's proposed operator actions and estimates of the EAB, LPZ, and control room doses will continue to comply with these criteria. Therefore, the proposed temporary opening of one shield building dome penetration while in Modes 1-4 during Cycle 7 operation is acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no

significant hazards consideration, and there has been no public comment on such finding [70 FR 41446]. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (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.

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