

March 10, 2005

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 MAIN STEAMLINER BREAK ACCIDENT LEAKAGE RATE
(TAC NO. MC0665)

Dear Mr. Singer:

The Commission has issued the enclosed Amendment No. 56 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant (WBN), Unit 1. This amendment is in response to your application dated September 8, 2003 (WBN-TS-03-14), as supplemented by letter dated September 11, 2003.

The amendment will revise the Updated Final Safety Analysis Report for WBN by modifying the design and licensing basis to increase the postulated primary-to-secondary leakage in the faulted steam generator following a main steamline break accident from 1 to 3 gallons per minute.

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/

Douglas V. Pickett, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 56 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

cc:

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 56
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 September 8, 2003, as supplemented by letter dated September 11, 2003, 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 to authorize revision of the Updated Final Safety Analysis Report (UFSAR) as set forth in the application for amendment by the licensee dated September 8, 2003, and supplemented by letter dated September 11, 2003. The licensee shall update the UFSAR by modifying the design and licensing basis to increase the postulated primary-to-secondary leakage in the faulted steam generator following a main steamline break accident from one gallon per minute to three gallons per minute.
3. This license amendment is effective as of the date of its issuance. Implementation of the amendment is the incorporation into the next UFSAR update made in accordance with 10 CFR 50.71(e), of the changes to the description of the facility as described in TVA's application dated September 8, 2003, as supplemented by letter dated September 11, 2003, and evaluated in the staff's Safety Evaluation attached to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Michael L. Marshall, Jr., Chief, Section 2
Project Directorate II
Division of Project Licensing Management
Office of Nuclear Reactor Regulation

Date of Issuance: March 10, 2005

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 56 TO FACILITY OPERATING LICENSE NO. NPF-90
TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 1
DOCKET NO. 50-390

1.0 INTRODUCTION

By letter dated September 8, 2003 (Agencywide Documents Access and Management Systems (ADAMS) Accession No. ML032550264), as supplemented by letter dated September 11, 2003 (ADAMS ML032590791), the Tennessee Valley Authority (TVA, the licensee), submitted a request for changes to the Watts Bar Nuclear Plant (WBN), Unit 1, Updated Final Safety Analysis Report (UFSAR). The requested changes would revise the UFSAR by modifying the design and licensing basis to increase the postulated primary-to-secondary leakage in the faulted steam generator following a main steamline break (MSLB) accident from 1 to 3 gallons per minute (gpm).

The supplemental letter dated September 11, 2003, revised the no significant hazards consideration included in the letter of September 8, 2003.

2.0 REGULATORY EVALUATION

Increasing the primary-to-secondary leakage in a faulted steam generator during a MSLB accident allows more steam generator tubes that exhibit axial oriented outside diameter stress corrosion cracking (ODSSC) at the tube support plate to remain in service. These affected tubes will be evaluated under the alternate repair criteria for axial ODSCC, as approved by the U.S. Nuclear Regulatory Commission (NRC) in License Amendment 38 issued on February 26, 2002 (ADAMS ML020590277), to determine if there is adequate structural and leakage integrity for the tubes to remain in service while maintaining the main control room and offsite radiological dose releases within the limits of Title 10 to the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 19, "Control room," and applicable fractions of the 10 CFR Part 100 dose limits as recommended by the guidance provided in NUREG-0800, Standard Review Plan (SRP).

TVA's request for the alternate repair criteria is consistent with Generic Letter (GL) 95-05, "Voltage-Based Criteria for Westinghouse Steam Generator Tubes Affected by Outside

Diameter Stress Corrosion Cracking,” dated August 3, 1995. Item 2.b.4, “Calculation of Offsite and Control Room Doses,” of the GL states:

Reduction of reactor coolant iodine activity is an acceptable means for accepting higher projected leakage rates and still meeting the applicable limits of Title 10 of the Code of Federal Regulations Part 100 and GDC 19 utilizing licensing basis assumptions.

TVA has reduced the iodine activity level from 1.0 micro curies per gram ($\mu\text{Ci/g}$) to 0.265 $\mu\text{Ci/g}$ by a request dated January 14, 2002 (ADAMS ML020170416). The NRC subsequently approved this request in License Amendment 41 dated November 18, 2002 (ADAMS ML023240361). Since the iodine activity of the reactor coolant system (RCS) has been lowered, a higher projected leakage rate (i.e., 1 gpm to 3 gpm) can be assumed.

3.0 TECHNICAL EVALUATION

Background

As discussed above, Amendment 38, Steam Generator Alternate Repair Criteria for Axial ODSCC and Amendment 41, RCS Specific Activity Level, incorporated the consequences of a MSLB accident with an accident-induced primary-to-secondary leak rate of 1 gpm. TVA’s letter dated September 8, 2003, proposed an increase to 3 gpm as the licensing basis value for primary-to-secondary leakage. The licensee’s letter indicated that no other changes were proposed to the assumptions or the methodology associated with the MSLB analysis.

Assessment of Radiological Consequences

The licensee assessed the radiological dose consequences of a MSLB accident with a primary-to-secondary leak rate of 3 gpm. Doses were calculated for individuals assumed to be located at the exclusion area boundary (EAB), the low population zone (LPZ) and in the control room. Doses were calculated for two cases. The first case assumed that the MSLB occurred following an iodine spike. This is referred to as the pre-existing spike case. For this case, the MSLB accident is assumed to occur with primary coolant activity at the Technical Specification (TS) value of 21 $\mu\text{Ci/g}$ of dose equivalent ^{131}I . The second case, referred to as the accident-initiated spike case, assumes that the MSLB accident induces an iodine spike. At the time of the accident, primary coolant is assumed to occur at the TS value of 0.265 $\mu\text{Ci/g}$ of dose equivalent ^{131}I . In both cases, the secondary coolant activity levels were assumed to be 0.1 $\mu\text{Ci/g}$ dose equivalent ^{131}I . The licensee’s calculations showed that the consequences of a MSLB accident would not result in doses which would exceed the acceptance criteria in Appendix A of SRP 15.1.5, “Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR [Pressurized-Water Reactor],” or GDC 19, “Control Room.”

Staff Assessment

The staff performed calculations to confirm the conclusions reached by the licensee. The parameters which were utilized in the staff’s assessment are presented in Table 1. The staff’s calculations showed that the thyroid doses would be within the regulatory guidelines established in SRP 15.1.5 for individuals located at the EAB and LPZ. The staff’s calculations also showed

that the control room operator thyroid dose would be less than the limits of SRP 6.4 of NUREG-0800. The results of the staff's calculations are presented in Table 2.

The staff noted that the licensee's calculations assumed a recirculation flow of 3600 cubic feet per minute (cfm). The recirculation flow should have been minimized to maximize the control room operators' thyroid dose. The appropriate recirculation flow should have been 2960 cfm consistent with Technical Specification Surveillance Requirement 3.7.10.4. At this flow, the control room operator's thyroid dose is maximized.

The staff also noted that the licensee's analysis did not account for the fact that the in-place testing criteria for the control room emergency filtration HEPA filter and charcoal adsorber are 1 percent. Therefore, the effectiveness of the filter and the adsorber must be reduced to account for the 1 percent. With this reduction, the effective filtration and adsorption efficiencies are those which are presented in Table 1.

As noted in Table 1, the staff's calculations included the control room emergency ventilation system's recirculation flow at 2960 cfm and accounted for reduced efficiencies for the control room's charcoal adsorber and HEPA filter. The staff's calculations confirmed that acceptable control room operator doses would be achieved with these changes to the analyses. All future licensee accident analyses need to account for a minimized control room emergency ventilation system's flow and reductions in charcoal adsorber and HEPA filter efficiencies when the in-place acceptance test criterion for these two components is greater than 0.05 percent. The latter are appropriate for all WBN engineered safety feature ventilation systems with an in-place acceptance criterion of greater than 0.05 percent.

4.0 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.

5.0 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 [68 FR 54745]. 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.

6.0 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.

Principal Contributor: J. Hayes

Dated: March 10, 2005

TABLE 1
INPUT PARAMETERS FOR WATTS BAR UNIT 1 EVALUATION OF MSLB

1. Primary coolant concentration @ 21 $\mu\text{Ci/g}$ of dose equivalent ^{131}I .

Pre-existing Spike Value ($\mu\text{Ci/g}$)

^{131}I = 8.01
 ^{132}I = 37.4
 ^{133}I = 24.9
 ^{134}I = 60.5
 ^{135}I = 46.3

2. Primary coolant concentration @ 0.265 $\mu\text{Ci/g}$ of dose equivalent ^{131}I .

Pre-existing Spike Value ($\mu\text{Ci/g}$)

^{131}I = 0.101
 ^{132}I = 0.472
 ^{133}I = 0.315
 ^{134}I = 0.764
 ^{135}I = 0.584

3. Mass of primary coolant and secondary coolant.

Mass of Primary Coolant (lb)	540,000
Mass of Secondary Coolant (lb)	348,000

4. TS limits for DE ^{131}I in the primary and secondary coolant.

Primary Coolant DE ^{131}I concentration steady state ($\mu\text{Ci/g}$)	0.265
Primary Coolant DE ^{131}I concentration 48 hour value ($\mu\text{Ci/g}$)	21.0
Secondary Coolant DE ^{131}I concentration ($\mu\text{Ci/g}$)	0.1

5. TS value for the primary to secondary leak rate.

Primary to secondary leak rate, any SG (gpd)	150
Primary to secondary leak rate, total all SGs (gpd)	600

6. Maximum primary to secondary leak rate to the faulted and intact SGs.

Faulted SG (gpm)	3
Intact SGs (gpd/SG)	150

7. Iodine partition factor

Faulted SG	1
Intact SG	0.1

8. Steam released to the environment

Faulted SG (lbs)	150,000	(0 - 0.5 hr)
	1,000	(0.5 - 8 hrs)
Intact SGs (lbs)	480,000	(0 - 2 hrs)
	871,000	(2 - 8 hrs)

9. Letdown flow rate (gpm) 124.4

10. Release rate for 0.265 $\mu\text{Ci/g}$ of dose equivalent ^{131}I

	<u>Ci/hr</u>
^{131}I	= 3.2
^{132}I	= 49.7
^{133}I	= 12.2
^{134}I	= 170
^{135}I	= 32.7

11. Atmospheric dispersion factors

EAB (0-2 hrs)	6.07×10^{-4}
LPZ (0-2 hrs)	1.41×10^{-4}
LPZ (2-8 hrs)	6.68×10^{-4}
Control Room (0-2 hrs)	4.43×10^{-3}
Control Room (2-8 hrs)	3.35×10^{-3}

12. Control room

Volume (ft ³)	257,198
Normal Makeup Flow (cfm)	3,200
Emergency Makeup Flow (cfm)	711
Makeup Filter Efficiency (%)	94.05
Unfiltered Inleakage (cfm)	51
Recirculation Filter Flow Rate (cfm)	2,889
Recirculation Filter Efficiency (%)	69.3

TABLE 2
MAIN STEAMLINE BREAK THYROID DOSE FOR WATTS BAR UNIT 1

Pre-existing Spike

	<u>EAB</u>	<u>LPZ</u>	<u>Control Room</u>
Calculated doses (rem)	4.7	2.4	6.9
Regulatory Guidelines (rem)	30	30	30

Accident Initiated Spike

	<u>EAB</u>	<u>LPZ</u>	<u>Control Room</u>
Calculated doses (rem)	4.3	10.7	29.5
Regulatory Guidelines (rem)	30	30	30