

**WBN2Public Resource**

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**From:** Boyd, Desiree L [dlboyd@tva.gov]  
**Sent:** Friday, August 05, 2011 12:24 PM  
**To:** Epperson, Dan; Poole, Justin; Raghavan, Rags; Milano, Patrick; Campbell, Stephen  
**Cc:** Crouch, William D; Hamill, Carol L; Boyd, Desiree L  
**Subject:** TVA letter to NRC\_08-05-2011\_FSAR Ch 15.5 Dose Response  
**Attachments:** 08-05-2011\_FSAR Ch 15.5 Dose Response\_Final.pdf

*Please see attached TVA letter that was sent to the NRC today.*

*Thank You,*

~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*~\*

*Desiree L. Boyd*

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U.S. Nuclear Regulatory Commission  
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Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2  
NRC Docket No. 50-391

**Subject: Watts Bar Nuclear Plant (WBN) Unit 2 – Final Safety Analysis Report (FSAR) – Chapter 15.5 Design Basis Accident Dose Analysis**

References: 1. TVA letter to NRC dated June 27, 2011 “Watts Bar Nuclear Plant (WBN) Unit 2 – Final Safety Analysis Report (FSAR) – Response to Request for Additional Information (RAI) Regarding Accident Dose Analysis Basis”

This letter provides revised FSAR Design Basis Accident (DBA) dose analysis results. The submittal of these analyses was a TVA commitment to NRC described in Reference 1.

Enclosure 1 provides updated FSAR tables for each of the DBAs discussed in FSAR Section 15.5 with the exception of the Fuel Handling Accident. The updated tables will be included in a future FSAR Amendment. The results reflect the use of the most recent meteorology data for the 20 year period of 1991 to 2010 as opposed to the 1976 to 1993 data used for licensing Unit 1. The use of the more recent meteorological data resulted in minor changes to the results but no regulatory dose limits were exceeded and margins to the limits were virtually unchanged. A change in the main control room isolation time from 20.6 seconds to 40 seconds was included in the analyses. A revised Fuel Handling Accident will be provided in a separate correspondence by August 31, 2011. A list of new commitments is provided in Enclosure 2.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on the 5<sup>th</sup> day of August, 2011.

Respectfully,



David Stinson  
Watts Bar Unit 2 Vice President

Enclosures:

1. WBN Unit 2 Revised FSAR Section 15.5 Accident Dose Analysis Results Tables
2. Regulatory Commitments

cc (Enclosures):

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## Enclosure 1

### WBN Unit 2 Revised FSAR Section 15.5 Accident Dose Analysis Results Tables

The following revised FSAR Chapter 15.5 DBA Tables are provided in this enclosure:

Table 15.5.2	Doses from Loss of A/C Power
Table 15.5-5	Doses from Gas Decay Tank Rupture
Table 15.5-9	Doses from Loss-of-Coolant Accident
Table 15.5-13	Doses From Recirculation Loop Leakage Following A LOCA
Table 15.5-14	Atmospheric Dilution Factors At The Control Building
Table 15.5-17	Doses From Main Steam Line Break
Table 15.5-18	Parameters Used In Steam Generator Tube Rupture Analysis
Table 15.5-19	Doses From Steam Generator Tube Rupture
Table 15A-2	Accident Atmospheric Dilution Factors (sec/m <sup>3</sup> )

**Table 15.5-2 Doses From Loss Of A/C Power**

<b>Conservative Analysis (rem)</b>	<b>2HR EAB</b>	<b>30 DAY LPZ</b>	<b>CONTROL ROOM</b>	
Gamma	7.45E-04	4.18E-04	2.12E-04	
Beta	4.48E-04	2.52E-04	2.55E-03	
Thyroid - ICRP-30	4.57E-02	2.57E-02	2.11E-02	
<b>Realistic Analysis (rem)</b>	<b>2HR EAB</b>	<b>30 DAY LPZ</b>	<b>CONTROL ROOM</b>	
Gamma	1.80E-08	1.01E-08	5.11E-09	
Beta	1.66E-05	9.29E-06	1.81E-04	
Thyroid - ICRP-30	1.10E-06	6.18E-07	5.09E-07	

**Table 15.5-5 Doses From Gas Decay Tank Rupture**

<b>Regulatory Guide 1.24 Analysis (rem)</b>	<b>2HR EAB</b>	<b>30 DAY LPZ</b>	<b>CONTROL ROOM</b>
Gamma	5.96E-01	1.67E-01	8.43E-01
Beta	1.61E+00	4.51E-01	7.28E+00
Thyroid - ICRP-30	1.29E-02	3.60E-03	6.99E-03
<b>Realistic Analysis (rem)</b>	<b>2HR EAB</b>	<b>30 DAY LPZ</b>	<b>CONTROL ROOM</b>
Gamma	2.88E-02	8.05E-03	3.81E-02
Beta	1.10E-01	3.08E-02	5.01E-01
Thyroid - ICRP-30	1.21E-02	3.37E-03	6.50E-03



## WATTS BAR

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**Table 15.5-9 DOSES FROM LOSS-OF-COOLANT ACCIDENT**

<b>(rem)</b>	<b>2Hr EAB</b>	<b>30 Day LPZ</b>	<b>Control Room</b>
Gamma	2.12	2.18	1.05
Beta	1.25	2.61	9.10
Thyroid - ICRP - 30	40.4	14.33	3.75

**Breakdown of Control Room Personnel Dose**

<b>(rem)</b>	<b>Airborne</b>	<b>Shine</b>	<b>Ingress/Egress</b>	<b>Total</b>
Gamma	1.02	0.005	0.027	1.05
Beta	9.04	0.000	0.060	9.10
Thyroid - ICRP - 30	3.66	0.000	0.090	3.75

**Table 15.5-13 Doses From Recirculation Loop Leakage Following A LOCA**

<b>(rem)</b>	<b>2HR EAB</b>	<b>30 Day LPZ</b>	<b>Control Room</b>
Gamma	4.14E-03	2.28E-02	1.51E-03
Beta	1.36E-03	8.54E-02	1.62E-02
Thyroid - ICRP - 30	1.40E-03	1.53E-01	3.69E-02

**Table 15.5-14 Atmospheric Dilution Factors At The Control Building**

<b>DILUTION FACTOR (sec/m<sup>3</sup>)</b>				
<b>Time Period (hr)</b>	<b>LOCA/FHA</b>	<b>SGTR/MSLB</b>	<b>LOSS OF A/C POWER</b>	<b>WGDT</b>
0-2	1.09E-03	3.85E-03	2.61E-03	2.56E-03
2-8	9.44E-04	3.22E-03	2.15E-03	1.17E-03
8-24	1.56E-04	N/A	N/A	7.26E-04
24-96	1.16E-04	N/A	N/A	5.21E-04
96-720	9.59E-05	N/A	N/A	4.30E-04

**GENERAL CONTROL ROOM PARAMETERS**

Volume	257,198 cu ft
Makeup/pressurization flow	711 cfm
Recirculation flow	2889 cfm
Unfiltered intake	51 cfm
Filter efficiency	95% first pass 70% second pass 0% for noble gases, Tritium
Isolation time, T	40 seconds
Occupancy factors:	
0-24 hr	100%
1-4 days	60%
4-30 days	40%

**Table 15.5-17 Doses From Main Steam Line Break**

1 gpm Primary-to-Secondary Leakage (ARCON-96 x/Q)	Control Room Operator (rem)	SRP Guidance for GDC 19 Limits (rem)	30-Day LPZ (rem)	2-Hour EAB (Site boundary (rem)	SRP Guidance for 10CFR100 Limits (rem)
Accident Initiated Iodine Spike Case (0.265 $\mu$ Ci/gm steady state)					
Gamma:	8.10E-03	5	1.25E-01	1.04E-01	2.5
Beta:	6.52E-02	30	3.02E-02	2.54E-02	30
Inhalation (ICRP-30):	10.4E+00	30	4.78E+00	3.09E+00	30
Pre-Accident Iodine Spike Case (14 $\mu$ Ci/gm max peak)					
Gamma:	4.36E-03	5	1.11E-02	2.74E-02	25
Beta:	4.00E-02	30	4.20E-03	8.80E-03	300
Inhalation (ICRP-30):	7.44E+00	30	1.21E+00	2.41E+00	300

**Table 15.5-18 Parameters Used In Steam Generator Tube Rupture Analysis**

Primary Side Activity	Technical Specification Limit
Secondary Side Activity	ANSI/ANS-18.1-1984 (Expected levels, 150 gpd/SG)
Iodine Spiking Factor	Case 1: Accident initiated spike of 500 times equilibrium iodine concentration  Case 2: Pre-accident spike of 14 $\mu\text{Ci/gm}$ I-131 dose equivalent
Iodine Partition Factor	100
Secondary Side Mass Release (Ruptured Steam Generator)	
0 - 2 hours	103,300 lbm
2 - 8 hours	32,800 lbm
Secondary Side Mass Release (Intact Steam Generator)	
0 - 2 hours	492,100 lbm
2 - 8 hours	900,200 lbm
Primary Coolant Mass Release (Total)	
0 - 2 hours	191,400 lbm
Primary Coolant Mass Release (Flashed)	
0 - 2 hours	10,077.2 lbm
Atmospheric diffusion coefficients for control room Operator doses	$2.61 \times 10^{-3}$ - (0 - 2 hrs) $2.15 \times 10^{-3}$ - (2 - 8 hrs)

**Table 15.5-19 Doses From Steam Generator Tube Rupture**

<b>Pre-Accident Initiated Spike Case (14 <math>\mu</math>Ci/gm maximum peak)</b>			
<b>(rem)</b>	<b>2 HR EAB</b>	<b>30 DAY LPZ</b>	<b>CONTROL ROOM</b>
Gamma	3.78E-01	1.11E-01	6.28E-02
Beta	2.26E-01	6.92E-02	7.07E-01
Thyroid - ICRP-30	1.39E+01	3.79E+00	1.24E+01
<b>Accident Initiated Iodine Spike Case (0.265 <math>\mu</math>Ci/gm steady state)</b>			
<b>(rem)</b>	<b>2 HR EAB</b>	<b>30 DAY LPZ</b>	<b>CONTROL ROOM</b>
Gamma	5.46E-01	1.60E-01	5.76E-02
Beta	2.51E-01	7.73E-02	6.70E-01
Thyroid - ICRP-30	7.19E+00	2.12E+00	2.03E+00

**Table 15A-2 Accident Atmospheric Dilution Factors (sec/m<sup>3</sup>)**

<b>Conservative And Regulatory Guide Analyses</b>		
<b>Time Period (hours)</b>	<b>Exclusion Area Boundary*</b>	<b>Low Population Zone (4828 meters)</b>
0-2	6.382E-04	1.784E-04
2-8		8.835E-05
8-24		6.217E-05
24-96		2.900E-05
96-720		9.811E-06

\* The dilution factors were calculated for a travel distance of 1100 meters, the distance from the 100 meter radius release zone to the 1200 meter radius exclusion boundary (See Section 2.3.4).

## **Enclosure 2**

### **Regulatory Commitments**

1. Submit the revised FSAR Section 15.5 Tables in a future amendment of the FSAR.
2. Submit a letter with a revised Fuel Handling Accident by 08/31/2011