WBN2Public Resource

From: Boyd, Desiree L [dlboyd@tva.gov]
Sent: Friday, July 29, 2011 9:53 AM
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_07-28-11_Results from Cost Benefit Analysis
Attachments: 07-28-11_Results from Cost Benefit Analysis_Final.pdf

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

Thank You,

~*~*~*~*~*~*~*~*~*~*~*~*~

Désireé L. Boyd

WBN 2 Licensing Support
Sun Technical Services
dlboyd@tva.gov
423-365-8764

Hearing Identifier: Watts_Bar_2_Operating_LA_Public
Email Number: 488

Mail Envelope Properties (7AB41F650F76BD44B5BCAB7C0CCABFAF2159C37D)

Subject: TVA letter to NRC_07-28-11_Results from Cost Benefit Analysis
Sent Date: 7/29/2011 9:52:57 AM
Received Date: 7/29/2011 9:53:46 AM
From: Boyd, Desiree L

Created By: dlboyd@tva.gov

Recipients:
"Crouch, William D" <wdcrouch@tva.gov>
Tracking Status: None
"Hamill, Carol L" <clhamill@tva.gov>
Tracking Status: None
"Boyd, Desiree L" <dlboyd@tva.gov>
Tracking Status: None
"Epperson, Dan" <Dan.Epperson@nrc.gov>
Tracking Status: None
"Poole, Justin" <Justin.Poole@nrc.gov>
Tracking Status: None
"Raghavan, Rags" <Rags.Raghavan@nrc.gov>
Tracking Status: None
"Milano, Patrick" <Patrick.Milano@nrc.gov>
Tracking Status: None
"Campbell, Stephen" <Stephen.Campbell@nrc.gov>
Tracking Status: None

Post Office: TVANUCXVS2.main.tva.gov

Files	**Size**	**Date & Time**
MESSAGE	312	7/29/2011 9:53:46 AM
07-28-11_Results from Cost Benefit Analysis_Final.pdf	81636	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

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

July 28, 2011

10 CFR 50 Appendix I

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

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

Subject: Watts Bar Nuclear Plant (WBN) Unit 2 – Results from Cost-Benefit Analysis of Radwaste System Enhancements

References:
1. TVA letter to NRC dated May 20, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Response to Final Safety Analysis Report (FSAR) Chapter 11 and Final Supplemental Environmental Impact Statement (FSEIS) Request for Additional Information"
2. Code of Federal Regulations, Title 10: Part 50, Appendix I
3. Draft U.S. NRC Regulatory Guide 1.110, "Cost-Benefit Analysis for Radwaste System for Light-Water-Cooled Nuclear Power Plants," draft dated March 1976

The purpose of this letter is to provide a summary of the results of a cost-benefit study of enhancements to the WBN Unit 2 radwaste systems as committed to in Reference 1.

Reference 2 Section II.D requires the preparation of a cost-benefit analysis to determine if enhancements to a plant's radwaste system should be incorporated into the plant design as part of applying the as low as reasonably achievable philosophy to normal plant releases of radiation. The cost-benefit analysis was prepared in accordance with the regulatory positions in Reference 3.

The analysis concluded that none of the enhancements evaluated were cost-beneficial and should be added to the WBN Unit 2 design. The enclosure provides the details from the cost-benefit analysis.

There are no new commitments in this letter.

If you have any questions, please contact Bill Crouch at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of July, 2011.

Respectfully,

David Stinson
Watts Bar Unit 2 Vice President

Enclosure:

Summary of Cost-Benefit Analysis of WBN Unit 2 Radwaste Enhancements

cc (Enclosure):

U.S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

bcc (Enclosure):

Stephen Campbell
U.S. Nuclear Regulatory Commission
MS 08H4A
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

Charles Casto, Deputy Regional Administrator for Construction
U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

Enclosure
TVA Letter Dated July 28, 2011

Summary of Cost-Benefit Analysis of WBN Unit 2 Radwaste Enhancements

A cost-benefit analysis was performed of potential enhancements to the liquid and gaseous radwaste systems in accordance with the methodology presented in Draft Regulatory Guide 1.110 (Reference 3). The analysis considered potential dose to the anticipated population that will live within 50 miles of the plant in 2040 due to the design basis liquid and gaseous releases either to the whole body or the thyroid.

A liquid dose of 1.62 person-rem total body and 15.3 person-rem thyroid was calculated for WBN. The lowest cost liquid system enhancement is a 20 gallon per minute cartridge filter with a total annual cost of $18,380. Since the cost of the cartridge filter exceeds the $1,000/person-rem threshold for either the total body or the thyroid liquid dose, no further evaluation was required.

The annual total body dose to the same population from the gaseous releases was 6.68 person-rem. The lowest threshold value from Reference 3 for gaseous enhancements was 6.32 person-rem; thus, consideration of system enhancements was required. The lowest cost enhancement was the addition of a steam generator blowdown flash tank vent to the main condenser. The addition of this vent would impact the turbine building vent dose release. The total body dose from the turbine building vent is 0.033 person-rem. This is much less than the threshold value, so the enhancement is not cost-beneficial. The next lowest cost enhancement is the addition of a 600 ft^3 gas decay tank. The value of this enhancement is 7.46 person-rem. This is higher than the total body dose, so it was determined that this enhancement was not cost-beneficial, and no additional total body dose reductions needed to be considered.

The annual thyroid dose from gaseous releases was 13.0 person-rem. The following enhancements were evaluated relative to the thyroid dose in order of cost from lowest to highest:

1) Routing the steam generator blowdown flash tank vent to the main condenser,
2) The addition of a 600 ft^3 waste gas decay tank,
3) A charcoal/high efficiency particulate (HEPA) filter to the main condenser vacuum exhaust,
4) A 3-ton charcoal adsorber to the shield building vent,
5) An air ejector charcoal/HEPA filtration unit,
6) 15,000 cubic foot per minute (cfm) HEPA filtration system for the turbine building, and
7) 15,000 cfm HEPA filtration system for the auxiliary building.

The first enhancement considered was routing the vent from the flash tank to the main condenser. The thyroid dose from the turbine building vent is 0.354 person-rem. The threshold value for the flash tank vent is 6.32 person-rem; thus, this enhancement is not cost-beneficial.

The next enhancement considered was the addition of a 600 ft^3 gas decay tank. The threshold value for this enhancement is 7.46 person-rem. WBN already has nine 600 ft^3 gas decay tanks. There is sufficient capacity to store gaseous waste to a minimum of 60 days prior to release. The decayed gases discharge through a charcoal adsorber/HEPA filter and a radiation monitor before being released through the shield building stack. This enhancement has already been incorporated in the plant design. Adding a tenth gas decay tank will not reduce the dose. The threshold value was found to be in excess of the potential dose reduction.

Summary of Cost-Benefit Analysis of WBN Unit 2 Radwaste Enhancements

The addition of a 1,000 cfm charcoal/HEPA filter to the auxiliary building ventilation system was also evaluated. The iodine and particulate dose that could be removed by charcoal/HEPA filters was 6.57 person-rem. This was less than the threshold value of 7.58 person-rem for this enhancement. This enhancement was not cost beneficial on the basis of a single 1000 cfm filter unit. The total thyroid dose release from auxiliary building vent was 9.15 person-rem. The auxiliary building vent air flow rate is 84,000 cfm. Treating only 1,000 cfm of the total release would impact less than 2% of the release. Thus, in reality the threshold value for the auxiliary building would be many times the 7.58 value since many 1,000 cfm filter packages would be needed to filter the applicable release. The thyroid dose from any other building vent paths was less than the threshold value for this enhancement. Therefore, this enhancement would not be cost-beneficial.

The fourth enhancement considered was the addition of a charcoal and HEPA filter on the condenser vacuum pump exhaust. The threshold value for this modification was 7.69 person-rem. This exceeds the thyroid dose release from the turbine building. This enhancement would not be cost-beneficial.

The fifth enhancement evaluated was the addition of a 3-ton charcoal adsorber. Draft Regulatory Guide 1.110 assumes that this enhancement would be located in the turbine building and appended to the waste gas decay system. The threshold value for this enhancement is 8.77 person-rem. The WBN waste gas decay system is located in the auxiliary building and is vented through the shield building stack. The total annual cost of placing the filter in the auxiliary building would be higher than the turbine building placement assumed in the draft Regulatory Guide. Notwithstanding that fact, the thyroid population dose from the reactor building, which is the location of the shield building stack is 3.48 person-rem. The threshold value is greater than the potential dose reduction and is therefore not cost-beneficial.

The next enhancement evaluated was the addition of a PWR Air Ejector Filtration Unit. The threshold value for this modification is 9.14 person-rem. WBN Unit 2 does not have air ejectors but uses condenser vacuum pumps. The addition of filters on the vacuum pump discharge was already evaluated and shown not to be of value. This enhancement has a higher cost and was eliminated from further consideration.

The last enhancement considered was the addition of a 15,000 cfm charcoal and HEPA filter to either the turbine building or auxiliary building ventilation system. The threshold value for a single filter unit was 16.9 person-rem. This exceeded the thyroid dose release from either building. In addition, as noted above the auxiliary building exhaust flow rate was 84,000 cfm and the turbine building exhaust flow rate was in excess of 300,000 cfm. Multiple 15,000 cfm filter units would be required, meaning the threshold value used was substantially lower than would be required to actually filter the building releases. The threshold value for this enhancement exceeds the total thyroid population dose for Unit 2. Therefore, no further enhancements are required to be considered.