



Tennessee Valley Authority, 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801

February 8, 2010

10 CFR 52.79

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

In the Matter of)
Tennessee Valley Authority)

Docket No. 52-014 and 52-015

**BELLEFONTE UNITS 3 AND 4, COMBINED LICENSE APPLICATION - RESPONSE TO
REQUEST FOR ADDITIONAL INFORMATION - HYDROLOGY PROBABLE MAXIMUM
FLOOD LEVEL CALCULATIONS**

- References: (1) Letter from Joseph Sebrosky (NRC) to Andrea Sterdis (TVA), Request for Additional Information Letter No. 158 Related to SRP Section 2.4.3 for the Bellefonte Units 3 and 4 Combined License Application, dated May 12, 2009.
- (2) Letter from Jack A. Bailey (TVA) to Document Control Desk(NRC), Bellefonte Combined License Application-Periodic Update-Hydrology, dated February 2, 2010.
- (3) Letter from Jack A. Bailey (TVA) to Document Control Desk(NRC), Bellefonte Combined License Application-Periodic Update-Hydrology, dated February 3, 2010.
- (4) Letter from Andrea L. Sterdis (TVA) to Document Control Desk(NRC), Bellefonte Combined License Application-Periodic Update-Hydrology, dated February 5, 2010.

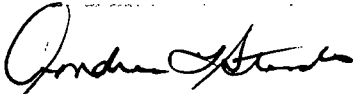
This letter provides the Tennessee Valley Authority's (TVA) supplemental response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) items included in Reference 1. This response supplements TVA's previous responses provided in References 2, 3, and 4.

If you should have any questions, please contact Tom Ryan at 1101 Market Street, LP5A, Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-2596, or via email at wtryan@tva.gov.

D085
NR0

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I declare under penalty of perjury that the foregoing is true and correct.
Executed on this 8th day of Feb, 2010.



Andrea L. Sterdis
Manager, New Nuclear Licensing and Industry Affairs
Nuclear Generation Development

Enclosure
cc: See Page 3

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cc: (w/ Enclosures)

S. Frantz, Morgan Lewis
A. Monroe, Scana
A. Bhatnagar, TVA
C. Pierce, Southern Co.
G. Zonke, Entergy
P. Hinnenkamp, Entergy
J. Seprosky, NRC
L. Reyes, NRC
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R. Kitchen, PGN

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G. Arent
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C. Haynes
S. McCrary

Enclosure
 TVA letter dated February 8, 2010
 RAI Response

Responses to NRC Request for Additional Information letter No. 158 dated May 12, 2009
 (3 pages, including this list)
 Subject: Hydrology Probable Maximum Flood Level Calculations

RAI Number Date of TVA Response
 02.04.03-08 May 15, 2009; Supplemented by this letter – see following pages

<u>Associated Additional Attachments / Enclosures</u>	<u>Pages Included</u>	
Attachment 02.04.03-08A	RAI 158 Supplement 3 Calculation List	7 pages
Attachment 02.04.03-08B	Nickajack Dam Local Watershed (Subbasins 47A and 47B) Unit Hydrograph Validation CDQ000020080060	57 pages
Attachment 02.04.03-08C	Chickamauga Dam Local Watershed (Subbasins 44B and 45) Unit Hydrograph Validation CDQ000020080064	42 pages
Attachment 02.04.03-08D	Watts Bar Dam Local Watershed (Subbasins 25, 33, 34, 36, and 37) Unit Hydrograph Validation CDQ000020080065	69 pages
Attachment 02.04.03-08E	Melton Hill Dam Local Watershed (Subbasins 27) Unit Hydrograph Validation CDQ000020080068	41 pages
Attachment 02.04.03-08F	Fort Loudon-Tellico Dam Local Watershed (Subbasins 8, 16, 17, 18, and 24) Unit Hydrograph Validation CDQ000020080069	83 pages

Enclosure
TVA letter dated February 8, 2010
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NRC Letter Dated: May 12, 2009

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.04.03-08

TVA presents calculation of the probable maximum flood (PMF) height at the Bellefonte COL Site in Section 2.4.3 of the FSAR. These calculations address regulatory requirements associated with General Design Criterion 2 and 10 CFR 100.20(c). TVA has continued to develop its analysis since the FSAR was submitted, and has developed additional calculation packages/documents associated with computation of the PMF height. The specifics of this analysis were discussed during a March 30, 2009 public meeting held at NRC Headquarters (see ML091180052 and ML0911204490). The NRC staff requests that TVA provide the following input deliverables:

- (a) V&V Docs (16 docs; April 2009)1
- (b) UH Calcs – Rev 0 (17 calcs; April 2009)
- (c) UH Calcs – Rev 1 (5 calcs; June 2009)
- (d) Dam Rating Curves (20 calcs; March 2009)
- (e) SOCH Calibrations (6 calcs; July 2009)
- (f) Other Input Calcs (3 calcs; April 2009)

The titles of these input deliverables follow the naming convention used by TVA on Slide 10 of its March 30, 2009 presentation (see ML091180052). The number of calculations/documents and the anticipated TVA completion date are shown in parenthesis. This information also originates from Slide 10 of the presentation.

Enclosure

1) TVA can provide the information in item (a) above on the docket or provide the information in reading rooms to which NRC and its' contractors have access.

BLN RAI ID: 2778

BLN RESPONSE:

TVA is providing BLN Hydrology Calculation List to support the information requested in the associated RAI request. See attached Attachment 02.04.03-08A, "BLN Hydrology Project Calculation List" for the documents and disks that are associated with this submittal.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

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ASSOCIATED ATTACHMENTS/ENCLOSURES:

Attachment 02.04.03-08A	BLN Hydrology Project	RAI 158 Supplement 3 Calculation List
Attachment 02.04.03-08B	CDQ000020080060	Nickajack Dam Local Watershed (Subbasins 47A and 47B) Unit Hydrograph Validation
Attachment 02.04.03-08C	CDQ000020080064	Chickamauga Dam Local Watershed (Subbasins 44B and 45) Unit Hydrograph Validation
Attachment 02.04.03-08D	CDQ000020080065	Watts Bar Dam Local Watershed (Subbasins 25, 33, 34, 36, and 37) Unit Hydrograph Validation
Attachment 02.04.03-08E	CDQ000020080068	Melton Hill Dam Local Watershed (Subbasins 27) Unit Hydrograph Validation
Attachment 02.04.03-08F	CDQ000020080069	Fort Loudon-Tellico Dam Local Watershed (Subbasins 8, 16, 17, 18, and 24) Unit Hydrograph Validation

Attachment 02.04.03-08A
TVA letter dated February 8, 2010
RAI Response

ASSOCIATED ATTACHMENTS/ENCLOSURES:

Attachment 02.04.03-8A: BLN Hydrology Project RAI 158 Supplement 3 Calculation List

(7 Pages including Cover Sheet)

Calculation **CDQ000020080060, Rev. 2**

Title **Nickajack Dam Local Watershed (Subbasins 47A and 47B) Unit Hydrograph Validation**

EDMS Number: **L58 091230 036**

Summary

Total Hard Copy Pages:	<u>56</u>
Total Electronic Files on DVD:	<u>22</u>

File Inventory for NRC Documentation Submittal

	<u>Type</u>	<u>Pages</u>	<u>NRC ADAMS Form</u>
Calculation Main Body	pdf	56	Paper
<u>Electronic Attachments</u>			
Attachment_1-1_nickajack.rev0.xls	xls	NA	File
Attachment_1-10_Antecedent_1973.xls	xls	NA	File
Attachment_1-11_FLDHYDRO_OUTPUT.xls	xls	NA	File
Attachment_1-12_Nickajack Reservoir_Results.xls	xls	NA	File
Attachment_1-13_Initial_Flood_Hydrographs.xls	xls	NA	File
Attachment_1-2_chickamauga_rev0.xls	xls	NA	File
Attachment_1-3_SChickNrChickamauga_rev0.xls	xls	NA	File
Attachment_1-4_SouthChickamaugaCreek.txt	txt	NA	File
Attachment_1-5_NickajackDam_Hourly_Precip_01012003_12312003_R000A.xls	xls	NA	File
Attachment_1-6-NWS_Precip_Basins-47AandB_CT.xls	xls	NA	File
Attachment_1-7_MassBalance&Baseflow Separation.xls	xls	NA	File
Attachment_1-8_Rainfall_Nickajack_Reservoir_Calculations.xls	xls	NA	File
Attachment_1-9-Rainfall_1973.xls	xls	NA	File
Attachment_2-1-B47_1973.dat	dat	NA	File
Attachment_2-2-B47_2003.dat	dat	NA	File
Attachment_2-3-NRes_1973.dat	dat	NA	File
Attachment_2-4-B47_1973.out	out	NA	File
Attachment_2-5-B47_2003.out	out	NA	File
Attachment_2-6-NRes_1973.out	out	NA	File
Attachment_4-1_Nickajack_Observed vs. SOCH Mar 2003 Hydrographs.xlsx	xlsx	NA	File

Attachment 02.04.03-08A
 TVA letter dated February 8, 2010
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Attachment_4-2 Nickajack_Observed vs. SOCHMar 1973 Hydrographs.xlsx	xlsx	NA	File
Attachmetn_4-3_Validated_6HR_UH.xls	xls	NA	File

Calculation **CDQ000020080064, Rev. 2**

Title **Chickamauga Dam Local Watershed (Subbasins 44B and 45) Unit Hydrograph Validation**

EDMS Number: **L58 091230 040**

Summary

Total Hard Copy Pages:	<u>41</u>
Total Electronic Files on DVD:	<u>22</u>

File Inventory for NRC Documentation Submittal

	<u>Type</u>	<u>Pages</u>	<u>NRC ADAMS Form</u>
Calculation Main Body	pdf	41	Paper
<u>Electronic Attachments</u>			
Att 1-1_Subbasins 44B-45 Hydrographs for SOCH.xls	xls	NA	File
Att 1-2_03566000 Hiwassee River at Charleston.txt	txt	NA	File
Att 1-3_wattsbar_rev0.xls	xls	NA	File
Att 1-4_chickamauga_rev0.xls	xls	NA	File
Att 1-5_May 2003 gridded precip (subbasins 44B-45).xls	xls	NA	File
Att 1-6_Water budget for subbasins 44B-45.xls	xls	NA	File
Att 2-1_Basin45_March1973.dat	dat	NA	File
Att 2-2_Basin45_March1973.prn	prn	NA	File
Att 2-3_Basin45_March1973.plt	plt	NA	File
Att 3-1_44B-45_March1973_1.dat	dat	NA	File
Att 3-10_ChickRes_March1973.out	out	NA	File
Att 3-2_44B-45_March1973_1.out	out	NA	File
Att 3-3_44B-45_May2003_1.dat	dat	NA	File
Att 3-4_44B-45_May2003_1.out	out	NA	File
Att 3-5_44B-45_March1973_2.dat	dat	NA	File
Att 3-6_44B-45_March1973_2.out	out	NA	File
Att 3-7_44B-45_May2003_2.dat	dat	NA	File
Att 3-8_44B-45_May2003_2.out	out	NA	File
Att 3-9_ChickRes_March1973.dat	dat	NA	File

Attachment 02.04.03-08A
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Att 4-1_Chick_Observed vs SOCH Mar1973 Hydrographs 072109.xlsx	xlsx	NA	File
Att 4-2_Chick_Observed vs SOCH May2003 Hydrographs 072109.xlsx	xlsx	NA	File
Att 4-3 Chick_validated_UH.xls	xls	NA	File

Calculation **CDQ000020080065, Rev. 2**

Title **Watts Bar Dam Local Watershed (Subbasins 25, 33, 34, 36, and 37) Unit Hydrograph Validation**

EDMS Number: **L58 091230 041**

Summary

Total Hard Copy Pages:	<u>68</u>
Total Electronic Files on DVD:	<u>23</u>

File Inventory for NRC Documentation Submittal

	<u>Type</u>	<u>Pages</u>	<u>NRC ADAMS Form</u>
Calculation Main Body	pdf	68	Paper
<u>Electronic Attachments</u>			
Attachment_1-10-WattsBarReservoir.xls	xls	NA	File
Attachment_1-11-Rainfall_1973.xls	xls	NA	File
Attachment_1-12-Excess_Precip.xls	xls	NA	File
Attachment_1-13-HMS_Results.xls	xls	NA	File
Attachment_1-14-Initial_Flood_Hydrographs.xls	xls	NA	File
Attachment_1-1-wattsbar_rev0.xls	xls	NA	File
Attachment_1-2-fortloudoun_rev0.xls	xls	NA	File
Attachment_1-3-meltonhill_rev0.xls	xls	NA	File
Attachment_1-4-tellico_rev0.xls	xls	NA	File
Attachment_1-5-EmoryAtOakdale_rev0.xls	xls	NA	File
Attachment_1-6-Emory_Oakdale_03540500_February- March1973.txt	txt	NA	File
Attachment_1-7-Adopted_Unit_Hydrographs.xls	xls	NA	File
Attachment_1-8-WaterBudget_1973_2003.xls	xls	NA	File
Attachment_1-9-NWS_Rainfall_2003.xls	xls	NA	File
Attachment_2-1-WB_1973.dat	dat	NA	File
Attachment_2-2-Mar1973_Reservoir.dat	dat	NA	File
Attachment_2-3-WB_2003.dat	dat	NA	File
Attachment_2-4-WB_1973.out	out	NA	File

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Attachment_2-5-Mar1973_Reservoir.out	out	NA	File
Attachment_2-6-WB_2003.out	out	NA	File
Attachment_4-1 WattsBar_Observed vs. SOCH Mar 1973 Hydrographs.xlsx	xlsx	NA	File
Attachment_4-2 WattsBar_Observed vs. SOCH May 2003 Hydrographs.xlsx	xlsx	NA	File
Attachment_4-3_Validate_6HR_UH.xls	xls	NA	File

Calculation **CDQ000020080068, Rev. 2**
 Title **Melton Hill Dam Local Watershed (Subbasin 27) Unit Hydrograph Validation**

EDMS Number: **L58 091230 044**

Summary

Total Hard Copy Pages:	<u>40</u>
Total Electronic Files on DVD:	<u>17</u>

File Inventory for NRC Documentation Submittal

	<u>Type</u>	<u>Pages</u>	<u>NRC ADAMS Form</u>
Calculation Main Body	pdf	40	Paper
<u>Electronic Attachments</u>			
Att_4-3_Melton_Hill_Validated_6HR_UH.xls	xls	NA	File
Attachment 1-1 norris_rev0.xls	xls	NA	File
Attachment 1-2 meltonhill_rev0.xls	xls	NA	File
Attachment 1-3 GriddedPrecipitationDataAllSubbasins2003.xls	xls	NA	File
Attachment 1-4 Basin 27 Effective PPT.xls	xls	NA	File
Attachment 1-5 Basin 27 Runoff Volume Calc.xls	xls	NA	File
Attachment 1-6 Total Local Hydrograph Development.xls	xls	NA	File
Attachment 2-1 UGBasin27.dat	dat	NA	File
Attachment 2-2 UGBasin27.prn	prn	NA	File
Attachment 2-3 Basin27-1973.dat	dat	NA	File
Attachment 2-4 Basin27-1973.out	out	NA	File
Attachment 2-5 MHReservoir1973.dat	dat	NA	File
Attachment 2-6 MHIReservoir1973.out	out	NA	File
Attachment 2-7 Basin27-2003.dat	dat	NA	File

Attachment 02.04.03-08A
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Attachment 2-8 Basin27-2003.out	out	NA	File
Attachment 4-1 MH_Observed vs. SOCH Mar 1973 Hydrographs.xlsx	xlsx	NA	File
Attachment 4-2 MH_Observed vs. SOCH May 2003 Hydrographs.xlsx	xlsx	NA	File

Calculation **CDQ000020080069, Rev. 2**
 Title **Fort Loudoun-Tellico Dam Local Watershed (Subbasins 8, 16, 17, 18, and 24) Unit Hydrograph Validation**
 EDMS Number: **L58 091230 045**

Summary

Total Hard Copy Pages:	<u>82</u>
Total Electronic Files on DVD:	<u>51</u>

File Inventory for NRC Documentation Submittal

	<u>Type</u>	<u>Pages</u>	<u>NRC ADAMS Form</u>
Calculation Main Body	pdf	82	Paper
<u>Electronic Attachments</u>			
Att 1-1_DistributedLocalHydrographGraph.xls	xls	NA	File
Att 1-10_03470500 French Broad River near Knoxville.txt	txt	NA	File
Att 1-11_03498500 Little River near Maryville.txt	txt	NA	File
Att 1-12_03498850 Little River near Alcoa.txt	txt	NA	File
Att 1-13_LittlePigeonAtSevierville_rev0.xls	xls	NA	File
Att 1-14_Gridded rainfall for May 2003 storm.xls	xls	NA	File
Att 1-15_Water budgets for Fort Loudoun-Tellico basins.xls	xls	NA	File
Att 1-16_Reservoir elevation-area data.xls	xls	NA	File
Att 1-2_Cherokee_rev0 (daily).xls	xls	NA	File
Att 1-3_Douglas_rev0 (daily).xls	xls	NA	File
Att 1-4_03518300 Little Tennessee River below Chilhowee Dam.txt	txt	NA	File
Att 1-5_chilhowee.xls	xls	NA	File
Att 1-6_FortLoudoun_rev0 (daily).xls	xls	NA	File
Att 1-7_Tellico_rev0 (daily).xls	xls	NA	File
Att 1-8_03470000 Little Pigeon River at Sevierville_daily.txt	txt	NA	File

Attachment 02.04.03-08A
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Att 1-9_03495500 Holston River near Knoxville.txt	txt	NA	File
Att 2-1_Basins7_8_Composite.dat	dat	NA	File
Att 2-10_LittleTennesseeR_Composite.prn	prn	NA	File
Att 2-2_Basins7_8_Composite.prn	prn	NA	File
Att 2-3_Basin16_Composite.dat	dat	NA	File
Att 2-4_Basin16_composite.prn	prn	NA	File
Att 2-5_Basin17_Composite.dat	dat	NA	File
Att 2-6_Basin17_composite.prn	prn	NA	File
Att 2-7_Basin18_Composite.dat	dat	NA	File
Att 2-8_Basin18_Composite.prn	prn	NA	File
Att 2-9_LittleTennesseeR_Composite.dat	dat	NA	File
Att 3-1_Basin8_March1973.dat	dat	NA	File
Att 3-10_FortLoudounReservoir_March1973_1.out	out	NA	File
Att 3-11_Basin18_March1973_2.dat	dat	NA	File
Att 3-12_Basin18_March1973_2.out	out	NA	File
Att 3-13_FortLoudounReservoir_March1973_2.dat	dat	NA	File
Att 3-14_FortLoudounReservoir_March1973_2.out	out	NA	File
Att 3-15_Basin24_March1973.dat	dat	NA	File
Att 3-16_Basin24_March1973.out	out	NA	File
Att 3-17_Basin17_May2003.dat	dat	NA	File
Att 3-18_Basin17_May2003.out	out	NA	File
Att 3-19_FortLoudounTellico_May2003_1.dat	dat	NA	File
Att 3-2_Basin8_March1973.out	out	NA	File
Att 3-20_FortLoudounTellico_May2003_1.out	out	NA	File
Att 3-21_FortLoudounTellico_May2003_2.dat	dat	NA	File
Att 3-22_FortLoudounTellico_May2003_2.out	out	NA	File
Att 3-3_Basin16_March1973.dat	dat	NA	File
Att 3-4_Basin16_March1973.out	out	NA	File
Att 3-5_Basin17_March1973.dat	dat	NA	File
Att 3-6_Basin17_March1973.out	out	NA	File
Att 3-7_Basin18_March1973_1.dat	dat	NA	File
Att 3-8_Basin18_March1973_1.out	out	NA	File
Att 3-9_FortLoudounReservoir_March1973_1.dat	dat	NA	File
Attachment 4-1_FTL-Tel_Observed vs. SOCH Mar 1973 Hydrographs.xlsx	xlsx	NA	File
Attachment 4-2_FTL-Tel_Observed vs. SOCH May 2003 Hydrographs.xlsx	xlsx	NA	File
Attachment_4-3_Validated_6HR_UH.xls	xls	NA	File