



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

December 2, 2009

10 CFR 52.79

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

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. 160 Related to SRP Section 2.4.3 for the
Bellefonte Units 3 and 4 Combined License Application, dated May 29, 2009.

(2) Letter from Andrea L. Sterdis (TVA) to Document Control Desk (NRC)
Bellefonte Units 3 and 4, COLA-Response to Request for Additional Information
(RAI) - Hydrology Probable Maximum Flood Level Calculations, dated
November 13, 2009.

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 response provided in
Reference 2.

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.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 2nd day of Dec, 2009.

Jack A. Bailey,
Vice President, Nuclear Generation Development

Enclosure
cc: See Page 2

D085
NRC

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cc: (w/ Enclosures)

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M. W. Gettler, FP&L
R. Grumbir, NuStart
P. S. Hastings, NuStart
P. Hinnenkamp, Entergy
M. C. Kray, NuStart
D. Lindgren, Westinghouse
G. D. Miller, PG&N
M. C. Nolan, Duke Energy
N. T. Simms, Duke Energy
K. N. Slays, NuStart
G. A. Zinke, NuStart

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B. C. Anderson, NRC/HQ
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B. Hughes/NRC/HQ
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R. H. Kitchen, PGN
M. C. Kray, NuStart
A. M. Monroe, SCE&G
C. R. Pierce, SNC
R. Reister, DOE/PM
L. Reyes, NRC/RII
T. Simms, NRC/HQ
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Enclosure
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December 2, 2009

Responses to NRC Request for Additional Information letter No. 160 dated May 29, 2009
(3 pages, including this list)

Subject: Request for Additional Information Letter No. 160 Related to SRP Section 2.4.3 for the
Bellefonte Units 3 and 4 Combined License Application

<u>RAI Number</u>	<u>Date of TVA Response</u>
02.04.03-09	June 29, 2009; Supplemented by this letter— see following pages.

<u>Associated Additional Attachments / Enclosures</u>	<u>Pages Included</u>
Attachment 02.04.03-09A: BLN Hydrology Project Calc DVD data files	7
Attachment 02.04.03-09B: SOCH Calibration- Wheeler CDQ000020080042, Rev. 0	127
Attachment 02.04.03-09C: Wheeler Dam Watershed Unit Hydrograph (Subbasins 51, 52, 54, 55, 56, 58, 63, 64 and 65) CDQ000020080072, Rev. 0	101
Attachment 02.04.03-09D: Wheeler Dam Watershed Unit Hydrograph (Subbasins 53, 57, 59, 60, 61 and 62) CDQ000020080073, Rev. 0	100

NRC Letter Dated: May 12, 2009

NRC Review of Final Safety Analysis Report

TVA presents calculations 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). This question is a follow-on question to RAI 2.4.3-8, which was issued on 5/12/09. In RAI 2.4.3-8 the staff requested that TVA provide calculation packages/documents associated with TVA's computation of the probable maximum flood height (PMF). The information that was requested in this RAI was based on a TVA presentation at a public meeting on March 30, 2009. The calculation packages that the staff requested were for the watershed that TVA was modeling above the Guntersville Dam on the Tennessee River.

In a May 15, 2009, letter updating the status of TVA's hydrology review (ADAMS accession number ML091390057) TVA informed the staff that it had altered its approach to account for the tailwater effect and rating curve for the Guntersville Dam. To do this TVA is adding the Wheeler Reservoir to the Bellefonte 3 and 4 probable maximum flood model to determine the Guntersville Dam tailwater effect. The NRC requests that TVA provide the input files used to model the Wheeler Reservoir. This request includes unit hydrographs, dam -rating curves, and other input calculations that TVA is developing for this reservoir. The staff requests this information in order to develop its confirmatory model of the Tennessee River.

BLN RAI ID: 2936

BLN RESPONSE:

TVA will provide the following input information associated with adding the Wheeler Reservoir to the BLN 3&4 PMF model by the dates defined below:

- Unit Hydrographs 11/20/09
- Channel Geometry Cross Sections 10/23/09
- Dam Rating Curves 09/30/09
- SOCH Calibration 11/30/09
- Other Input Calcs* 09/30/09

* Other Input Calcs include calculation revisions for: Precipitation Data Processing (1973 Storm); NEXRAD Data Rainfall Data; Reservoir Storage Tables; and Operating Guidelines.

This response is PLANT-SPECIFIC.

In support of the information requested, TVA is providing the enclosed copies of requested calculations and a BLN Hydrology data DVD. All calculations submitted under this letter are new calculations required to support the Wheeler Reservoir extension of the project.

The actual calculation Data Files being submitted on DVD media are shown in Attachment 02.04.03-09A.

The following provides an updated status reflecting the cumulative list of documents and calculations submitted to date.

- | | |
|-----------------------------------|----------|
| • Unit Hydrographs | Complete |
| • Channel Geometry Cross Sections | Complete |
| • Dam Rating Curves | Complete |
| • SOCH Calibration | Complete |
| • Other Input Calcs | Complete |

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

ASSOCIATED ATTACHMENTS/ENCLOSURES:

Attachment 02.04.03-09A: BLN Hydrology Project Calculation DVD calculation data files

Attachment 02.04.03-09B: SOCH Model Calibration, Wheeler CDQ000020080042, Rev. 0

Attachment 02.04.03-09C: Wheeler Dam Watershed Unit Hydrograph (Subbasins 51, 52, 54, 55, 56, 58, 63, 64 and 65) CDQ000020080072, Rev. 0

Attachment 02.04.03-09D: Wheeler Dam Watershed Unit Hydrograph (Subbasins 53, 57, 59, 60, 61 and 62) CDQ000020080073, Rev. 0

ASSOCIATED ATTACHMENTS/ENCLOSURES:

Attachment 02:04.03-09A: BLN Hydrology Project Calculation DVD calculation data files

(7 Pages including Cover Sheet)

RAI 02.04.03-9

RAI 160 Supplement 3

SOCH Software Documentation

TABLE - Data on DVD-010

Calculation **CDQ000020080042, Rev. 0**

Title **SOCH Model Calibration - Wheeler**

EDMS Number: **L58 091130 002**

Summary

Total Hard Copy Pages:	<u>126</u>
Total Electronic Files on DVD:	<u>53</u>

File Inventory for NRC Documentation Submittal

	Type	NRC ADAMS Form
Calculation Main Body	pdf	Paper
<u>Electronic Attachments</u>		
Appendix_A_Final Manning's n, SOCH Geometry and Calibration Graphs.pdf	pdf	Paper
Final_Mannings_n.xls	xls	File
Observed vs SOCH Dec2004 Hydrographs 112309.xls	xls	File
Observed vs SOCH Mar 1973 Hydrographs 112309.xls	xls	File
Wheeler_HEC_RAS_SS_Profiles_112309.xls	xls	File
Wheeler_HECRAS_SOCH_SS_Profiles_112309.xls	xls	File
WheelerRev1.1.geo	geo	File
Appendix_B_March 1973 Observed Elevations and Discharges.pdf	pdf	Paper
Observed_data_TN_River_gages_Mar_1973_Rev.0.xls	xls	File
Tims_Ford_March_1973_observed_elevations_and_discharges_Rev.0.pdf	pdf	Paper
Wheeler Reservoir Elevations and Discharges 1973.xls	xls	File
Wheeler_March_1973_observed_elevations_and_discharges_Rev.0.pdf	pdf	Paper
Appendix_C_December 2004 Observed Elevations and Discharges.pdf	pdf	Paper
Guntersville_Hourly_Reservoir_Data_rev0.xls	xls	File
Observed_data_TN_River_gages_Dec_2004_Rev.0.xls	xls	File
Wheeler Reservoir Elevations and Discharges 2004.xls	xls	File
wheeler.xls	xls	File
Appendix_D_SOCH Input Files, Steady State.pdf	pdf	Paper
Wheeler_Calibrate_100Kto1400K.bnd	bnd	File
Wheeler_Calibrate_100Kto1400K.dat	dat	File

Appendix_E_SOCH Input Files, March 1973.pdf	pdf	Paper
Wheeler_Calibrate_Mar1973.bnd	bnd	File
Wheeler_Calibrate_Mar1973.dat	dat	File
Wheeler_Calibrate_Mar1973.loc	loc	File
Appendix_F_SOCH Input Files, December 2004.pdf	pdf	Paper
Wheeler_Calibrate_Dec2004.bnd	bnd	File
Wheeler_Calibrate_Dec2004.dat	dat	File
Wheeler_Calibrate_Dec2004.loc	loc	File
Appendix_G_SOCH Output Files, Steady State.pdf	pdf	Paper
Wheeler_Calibrate_100Kto1400K.out	out	File
Appendix_H_SOCH Output Files, March 1973.pdf	pdf	Paper
Wheeler_Calibrate_Mar1973.out	out	File
Wheeler_Calibrate_Mar1973.prt	prt	File
Appendix_I_SOCH Output Files, December 2004.pdf	pdf	Paper
Wheeler_Calibrate_Dec2004.out	out	File
Wheeler_Calibrate_Dec2004.prt	prt	File
Appendix_J_Calibrated Steady-State HEC-RAS Model.pdf	pdf	Paper
Wheeler.f01	f01	File
Wheeler.f03	f03	File
Wheeler.g01	g01	File
Wheeler.p01	p01	File
Wheeler.p02	p02	File
Wheeler.prj	prj	File
Appendix_K_Geometry Modifications and CONVEY Files.pdf	pdf	Paper
Wheeler CONVEY2009 1123.dat	dat	File
Wheeler CONVEY2009 1123.out	out	File
Wheeler CONVEY2009 1123.prt	prt	File
Wheeler CONVEY2009 1123.xls	xls	File
Wheeler Merge 2009 1123.xls	xls	File
Wheeler.g01	g01	File
WheelerRev1.0.geo	geo	File
Appendix_L_Drainage Areas for Streams in Tennessee River Basin.pdf	pdf	Paper
Appendix_M_Local Inflows Developed From Unit Hydrographs.pdf	pdf	Paper
03-73 Instantaneous Routing for SOCH.xls	xls	File
03-73 Instantaneous Routing for SOCH_modforhourly.xlsm	xlsm	File
12-04 Instantaneous Routing for SOCH.xls	xls	File
12-04 Instantaneous Routing for SOCH_hourly.xlsm	xlsm	File
Attachment_01-Initial Geometry Files.pdf	pdf	Paper
Wheeler CONVEY20090929.xls	xls	File
Wheeler Merge 20090929.xls	xls	File
Wheeler20090928.g01	g01	File

Wheeler20090929.geo	geo	File
Attachment_02_HEC-Hydraulic Reference Manual.pdf	pdf	Paper
Attachment_03-Wheeler Dam Headwater Rating Curve.pdf	pdf	Paper
Wheeler.xls	xls	File
Attachment_04_Guntersville Dam Tailwater Rating Curve.pdf	pdf	Paper
Guntersville.xls	xls	File
Attachment_05_SOCH Input Preprocessor, Steady State.pdf	pdf	Paper
Wheeler_100Ksteps_BuildSOCHdata.xls	xls	File
Attachment_06_SOCH Input Preprocessor, March 1973 Flood.pdf	pdf	Paper
Mar1973_BuildSOCHdata112309.xlsm	xlsm	File
Attachment_07_SOCH Input Preprocessor, December 2004 Flood.pdf	pdf	Paper
Dec2004_BuildSOCHdata112309.xls	xls	File
Attachment_08_Macro File for SOCH Preprocessor.pdf	pdf	Paper
SOCH_Macros.xls	xls	File
Attachment_09_Macro File for Extraction of SOCH Output.pdf	pdf	Paper
Flood_ExtractSelectedSOCHOutputHydrographs.xls	xls	File
CDQ000020080042_Rev_0_112409.doc (NOT SUBMITTED)	NA	NA

Calculation **CDQ000020080072, Rev. 0**

Title **Wheeler Dam Watershed Unit Hydrograph
(Subbasins 51, 52, 54, 55, 56, 58,63, 64 and 65)**

EDMS Number: **L58 091130 001**

Summary

Total Hard Copy Pages:	100
Total Electronic Files on DVD:	25

File Inventory for NRC Documentation Submittal

	Type	NRC ADAMS Form
Calculation Main Body	pdf	Paper
<u>Electronic Attachments</u>		
Attachment 1-01_Table2-TVA UHParameters.xls	xls	File
Attachment 1-02_Wheeler_March_1973_Model.xls	xls	File
Attachment 1-03_Wheeler_Model_December_2004.xls	xls	File
Attachment 1-04_IND-Convov-51.xls	xls	File
Attachment 1-05_IND-Convov-52.xlsx	xlsx	File

Attachment 1-06_IND-Convolve-54.xlsx	xlsx	File
Attachment 1-07_IND-Convolve-55.xls	xls	File
Attachment 1-08_IND-Convolve-56.xlsx	xlsx	File
Attachment 1-09_IND-Convolve-58.xls	xls	File
Attachment 1-10_IND-Convolve-63.xlsx	xlsx	File
Attachment 1-11_IND-Convolve-64.xls	xls	File
Attachment 1-12_IND-Convolve-65.xlsx	xlsx	File
Attachment 1-13_Rainfall Data.xlsx	xlsx	File
Attachment 1-14_Wheeler_Reservoir-Rain.xls	xls	File
Attachment 1-15_Validated_Unit_Hydrograph_Ordinates.xls	xls	File
Attachment 1-16_wheeler_Rev0.xls	xls	File
Attachment 1-17_2004_Wheeler_Watershed_Hourly_Precip_Data.xls	xls	File
Attachment 2-1_Wheeler_0373_O.dat	dat	File
Attachment 2-2_Wheeler_0373_O.out	out	File
Attachment 2-3_Wheeler_1204_M.dat	dat	File
Attachment 2-4_Wheeler_1204_M.out	out	File
Attachment 3-1_Observed vs SOCH Mar 1973 Hydrographs 111209.xls	xls	File
Attachment 3-2_Observed vs SOCH Dec2004 Hydrographs 111209.xls	xls	File
Attachment 3-3_03-73 Instantaneous Routing for SOCH.xls	xls	File
Attachment 3-4_12-04 Instantaneous Routing for SOCH.xls	xls	File

Calculation **CDQ000020080073, Rev. 0**

Title **Wheeler Dam Watershed Unit Hydrograph
(Subbasins 53, 57, 59, 60, 61 and 62)**

EDMS Number: **L58 091125 001**

Summary

Total Hard Copy Pages:	<u>99</u>
Total Electronic Files on DVD:	<u>71</u>

File Inventory for NRC Documentation Submittal

	Type	NRC ADAMS Form
Calculation Main Body	pdf	Paper
<u>Electronic Attachments</u>		
Attachment 1-01 -Wheeler Subbasin Areas and Scaled Unit Hydrographs	xls	File
Attachment 1-02-FlintNrChase.xls	xls	File

Attachment 1-03-LimestoneNrAthens.xls	xls	File
Attachment 1-04-ElkAbvFayetteville.xls	xls	File
Attachment 1-05-ElkAtProspect.xls	xls	File
Attachment 1-06-Richland Creek.xls	xls	File
Attachment 1-07-timsford.xls	xls	File
Attachment 1-08-2002_Wheeler_Watershed_Hourly_Precip_Data.xls	xls	File
Attachment 1-09-2003_Wheeler_Watershed_Hourly_Precip_Data.xls	xls	File
Attachment 1-10-2004_Wheeler_Watershed_Hourly_Precip_Data.xls	xls	File
Attachment 1-11-2006_Wheeler_Watershed_Hourly_Precip_Data.xls	xls	File
Attachment 1-13-2009-10-19_Convol-53v5.xls	xls	File
Attachment 1-14-2009-10-19_Convol-57v5.xls	xls	File
Attachment 1-15-2009-10-19_Convol-59v5.xls	xls	File
Attachment 1-16-2009-10-19_Convol-60v5.xls	xls	File
Attachment 1-17-2009-10-19_Convol-61v5.xls	xls	File
Attachment 1-18-2009-10-19_Convol-62v6.xls	xls	File
Attachment 1-19-2009-10-19-53-Base_Flow.xls	xls	File
Attachment 1-20-2009-10-19-57-Base_Flow.xls	xls	File
Attachment 1-21-2009-10-19-59-Tims Ford Reverse Routing.xls	xls	File
Attachment 1-22-2009-10-19-60-Base_Flow.xls	xls	File
Attachment 1-23-2009-10-19-61-Base_Flow.xls	xls	File
Attachment 1-24-2009-10-19-62-Base_Flow.xls	xls	File
Attachment 2-01-UA_53_02052004_A.out	out	File
Attachment 2-02-UA_53_02052004_B.out	out	File
Attachment 2-03-UA_53_03052004_A.out	out	File
Attachment 2-04-UA_53_03052004_B.out	out	File
Attachment 2-05-UA_57_02052004_A.out	out	File
Attachment 2-06-UA_57_02052004_B.out	out	File
Attachment 2-07-UA_57_12052004_A.out	out	File
Attachment 2-08-UA_57_12052004_B.out	out	File
Attachment 2-09-UA_59_05052003_A.out	out	File
Attachment 2-10-UA_59_05052003_B.out	out	File
Attachment 2-11-UA_59_12052004_A.out	out	File
Attachment 2-12-UA_59_12052004_B.out	out	File
Attachment 2-13-UA_60_02052004_A.out	out	File
Attachment 2-14-UA_60_02052004_B.out	out	File
Attachment 2-15-UA_60_03172002_A.out	out	File
Attachment 2-16-UA_60_03172002_B.out	out	File
Attachment 2-17-UA_61_01222006_A.out	out	File
Attachment 2-18-UA_61_01222006_B.out	out	File
Attachment 2-19-UA_61_02052004_A.out	out	File
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Attachment 2-21-UA_62_01222006_A.out	out	File

Attachment 2-22-UA_62_01222006_B.out	out	File
Attachment 2-23-UA_62_02052004_A.out	out	File
Attachment 2-24-UA_62_02052004_B.out	out	File
Attachment 2-25-UA_53_02052004_A.dat	dat	File
Attachment 2-26-UA_53_02052004_B.dat	dat	File
Attachment 2-27-UA_53_03052004_A.dat	dat	File
Attachment 2-28-UA_53_03052004_B.dat	dat	File
Attachment 2-29-UA_57_02052004_A.dat	dat	File
Attachment 2-30-UA_57_02052004_B.dat	dat	File
Attachment 2-31-UA_57_12052004_A.dat	dat	File
Attachment 2-32-UA_57_12052004_A.dat	dat	File
Attachment 2-33-UA_59_05052003_A.dat	dat	File
Attachment 2-34-UA_59_05052003_B.dat	dat	File
Attachment 2-35-UA_59_12052004_A.dat	dat	File
Attachment 2-36-UA_59_12052004_B.dat	dat	File
Attachment 2-37-UA_60_02052004_A.dat	dat	File
Attachment 2-38-UA_60_02052004_B.dat	dat	File
Attachment 2-39-UA_60_03172002_A.dat	dat	File
Attachment 2-40-UA_60_03172002_B.dat	dat	File
Attachment 2-41-UA_61_01222006_A.dat	dat	File
Attachment 2-42-UA_61_01222006_B.dat	dat	File
Attachment 2-43-UA_61_02052004_A.dat	dat	File
Attachment 2-44-UA_61_02052004_B.dat	dat	File
Attachment 2-45-UA_62_01222006_A.dat	dat	File
Attachment 2-46-UA_62_01222006_B.dat	dat	File
Attachment 2-47-UA_62_02052004_A.dat	dat	File
Attachment 2-48-UA_62_02052004_B.dat	dat	File