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

November 14, 2008

10 CFR 52.79

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

In the Matter of) Docket No. 52-014 and 52-015
Tennessee Valley Authority)

BELLEFONTE COMBINED LICENSE APPLICATION – RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – LOCA DBA DOSE ANALYSES

Reference: Letter from Ravindra G. Joshi (NRC) to Andrea L. Sterdis (TVA), Request for Additional Information Letter No. 129 Related to SRP Section 15.00.03 for the Bellefonte Units 3 and 4 Combined License Application, dated October 14, 2008

This letter provides the Tennessee Valley Authority's (TVA) response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) items included in the reference letter.

A response to the NRC request in the reference letter is addressed in the enclosure which also identifies any associated changes that will be made in a future revision of the BLN application.

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 14th day of Nov, 2008.

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

Enclosure
cc: See Page 2

D085
NRO

cc: (w/Enclosure)
J. P. Berger, EDF
E. Cummins, Westinghouse
S. P. Frantz, Morgan Lewis
M.W. Gettler, FP&L
R. C. Grumbir, NuStart
P. S. Hastings, NuStart
P. Hinnenkamp, Entergy
R. G. Joshi, NRC/HQ
M. C. Kray, NuStart
D. Lindgren, Westinghouse
G. D. Miller, PG&N
M. C. Nolan, Duke Energy
N. T. Simms, Duke Energy
G. A. Zinke, NuStart

cc: (w/o Enclosure)
B.C. Anderson, NRC/HQ
M. M. Comar,NRC/HQ
B. Hughes,NRC/HQ
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
K. N. Slays, NuStart
J. M. Sebrosky, NRC/HQ

Enclosure
TVA letter dated November 14, 2008
RAI Responses

Response to NRC Request for Additional Information letter No. 129 dated October 14, 2008
(9 pages, including this list)

Subject: LOCA DBA Doses in the Final Safety Analysis Report

RAI Number	Date of TVA Response
15.00.03-01	This letter – see following pages

Associated Additional Attachments / Enclosures	Pages Included
None	

NRC Letter Dated: October 14, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 15.00.03-01

By letter dated August 14, 2008, NRC informed the AP1000 vendor that an assumption made in evaluating the LOCA DBA for Revision 16 of the AP1000 DCD was not technically justified. Both FSAR Chapter 15 and Section 6.4 of the subject COL application incorporate by reference the design basis accident analyses in Revision 16 of the AP1000 DCD. Provide an evaluation of the LOCA that does not make use of the rejected assumption. Describe any design or siting changes that are intended to compensate for the rejected assumption.

BLN RAI ID: 2164

BLN RESPONSE:

Westinghouse has issued Revision 17 of the AP1000 DCD, which contains a reevaluation of the LOCA dose calculation. This reevaluation does not make use of the rejected assumption, but does include other design changes to obtain acceptable LOCA doses.

FSAR MCR and LPZ χ/Q Impacts.

DCD Revision 17 will be incorporated by reference into the next revision of the COLA for Main Control Room (MCR) and Low Population Zone (LPZ) LOCA dose calculations. Chapter 15 and Section 6.4 of the BLN COLA FSAR do not need to be revised as a result of this change to the DCD for the BLN MCR and LPZ LOCA dose calculations. However, the short-term (accident) χ/Q values for MCR and LPZ LOCA release calculations used in the DCD evaluation of the LOCA, and to which the site-specific values for MCR and LPZ are compared, have been revised. For this reason, COLA FSAR Tables 2.0-201 and 2.0-202 will be revised as shown below to incorporate the revised AP1000 DCD Site Parameter values. The MCR and LPZ FSAR Site Specific values remain bounded by DCD Revision 17 values.

FSAR EAB χ/Q Impacts.

The BLN Site Specific χ/Q value for the LOCA shown in Table 2.0-201 exceeds the DCD Revision 17 χ/Q Site Boundary EAB (Exclusion Area Boundary) values as shown below.

EAB χ/Q Comparison
(sec/m^3)

Time	DCD Rev 17	BLN FSAR
0 to 2 hr	5.1E-04	5.85E-04

Plan for Resolution

A site specific calculation is being developed to address the BLN 3&4 COL application exceedance for the EAB χ/Q site parameter. The calculation will eliminate excess conservatism from the assumptions included in the DCD Revision 17 LOCA dose analysis. The specific conservatisms that are being reduced are:

a. Core source term
   - Reduced calorimetric power uncertainty to the AP1000 Certified value of 1% (from 2% previously used in the dose analysis)
   - Removed excess conservatism for fuel cycle variations resulting in approximate 4% reduction

b. Reduced the containment leak rate used in the analysis from 0.10 wt%/day to 0.09 wt%/day.

These reductions in excess conservatisms are justified as follows:

a. Core source term

   1. Power uncertainty - This reduction in conservatism is acceptable because a 1% power uncertainty is included in the certified design.

   2. Core design - A 4% conservatism was included in calculations to provide margin for uncertainties in the predicted core designs. The source term calculations were performed early in the design phase. The core source term calculations are being revised for the first 3 core loadings and an equilibrium core cycle that will be utilized for AP1000. These calculations are being prepared to demonstrate the acceptability of eliminating the 4% uncertainty. The results of the core source term calculations will be summarized in the January 31, 2009 supplemental RAI response.

b. Containment leak rate reduction assumption.

   The AP1000 utilizes a steel containment vessel design with a concrete shield building. The AP1000 has significantly fewer mechanical and electrical penetrations than operating plants. A technical justification for this reduction is being developed and will be included in the final RAI response supplement.

The combined benefit of the changes described above will reduce the EAB LOCA dose by approximately 15%. This compensates for the BLN EAB χ/Q exceedance over the DCD allowable value.

The LOCA dose analysis for the BLN EAB is underway to support the BLN site specific atmospheric dispersion factor and incorporating the changes above. Supporting calculations will be available for NRC review after January 31, 2009. Summary results will be included in the BLN Supplemental RAI response planned for January 31, 2009. This supplemental response will also include FSAR markups and a revision to COLA Part 4, BLN Technical Specifications. The changes are only being applied to the LOCA dose analysis; the other remaining design basis accident radiological dose calculations remain unchanged. Any departures and exemption requests necessary to support the BLN site-specific EAB dose calculation will be included in the January RAI response supplement.

Environmental Report χ/Q Impacts.

A preliminary calculation has been performed to evaluate the impact of the revised LOCA dose analysis in Revision 17 of the AP1000 DCD on the BLN ER. The results of the preliminary calculation show that the expected EAB LOCA dose will be well within regulatory requirements.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

COLA Part 2, FSAR, Chapter 2, Tables 2.0-201 (Sheet 5 of 5) and 2.0-202 (Sheet 2 of 3) will be revised to read as shown below.

COLA Part 2 FSAR, Chapter 15, Section 15.6, section 15.6.5.3.7.3 will be revised as shown below.

COLA Part 2 FSAR, Chapter 15, Section 15.6, Appendix 15A-3.3 will be revised as shown below.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Bellefonte Nuclear Plant, Units 3 & 4
COL Application
Part 2, FSAR

TABLE 2.0-201 (Sheet 5 of 5)

BLN SUP 2.0-1

COMPARISON OF AP1000 DCD SITE PARAMETERS AND BELLEFONTE NUCLEAR PLANT UNITS 3 & 4 SITE CHARACTERISTICS

	AP1000 DCD Site Parameter[a]	BLN Site Characteristic	BLN FSAR Reference	BLN Within Site Parameter
Snow / Ice	75 pounds per square foot on ground with exposure factor of 1.0 and importance factors of 1.2 (safety) and 1.0 (non-safety)	10.4 pounds per square foot	Subsection 2.3.1.2.2.3	Yes
Atmospheric Dispersion Values - χ/Q[f]				
Site Boundary (0-2 hr)	$\leq 5.1 \times 10^{-4}$ sec/m^3	0.585×10^{-3} sec/m^3	Table 2.3-319	No[h]
Site Boundary (annual average)	$\leq 2.0 \times 10^{-5}$ sec/m^3	0.14×10^{-5} sec/m^3	Table 2.3-325	Yes
Low population zone boundary				
0 - 8 hr	$\leq 2.2 \times 10^{-4}$ sec/m^3	1.23×10^{-4} sec/m^3	Table 2.3-319	Yes
8 - 24 hr	$\leq 1.6 \times 10^{-4}$ sec/m^3	0.826×10^{-4}sec/m^3	Table 2.3-319	Yes
24 - 96 hr	$\leq 1.0 \times 10^{-4}$ sec/m^3	0.349×10^{-4} sec/m^3	Table 2.3-319	Yes
96 - 720 hr	$\leq 8.0 \times 10^{-5}$ sec/m^3	1.01×10^{-5} sec/m^3	Table 2.3-319	Yes
Control Room	See Table 2.0-202	See Table 2.0-202	See Table 2.0-202	Yes
Population Distribution				
Exclusion area (site)	0.5 mi.	The minimum distance from the effluent release boundary to the exclusion area boundary is 2805 feet (0.53 mile).	Figure 2.1-205	Yes

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a) AP1000 DCD Site Parameters are a compilation of DCD Tier 1 Table 5.0-1 and DCD Tier 2 Table 2-1.

b) Maximum and minimum safety values are based on historical data and exclude peaks of less than 2 hours duration.

c) Maximum and minimum normal values are the 1 percent exceedance magnitudes.

d) The non-coincident wet bulb temperature is applicable to the cooling tower only.

e) Per APP-GW-GLR-020, the kinetic energies of the missiles discussed in DCD Section 3.5 are greater than the kinetic energies of the missiles discussed in Regulatory Guide 1.76 and result in a more conservative design.

f) For AP1000, the term "site boundary" and "exclusion area boundary" are used interchangeably. Thus, the χ/Q specified for the site boundary applies whenever a discussion refers to the exclusion area boundary. At BLN the "site boundary" and "exclusion area boundary" are not interchangeable. See Figures 2.1-201 and 2.1-205.

g) With ground response spectra as given in DCD Figures 3.7.1-1 and 3.7.1-2. Seismic input is defined at finished grade except for sites where the nuclear island is founded on hard rock.

h) This comparison evaluation to be provided in a future amendment.

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TABLE 2.0-202 (Sheet 2 of 3)

BLN SUP 2.0-1

COMPARISON OF CONTROL ROOM ATMOSPHERIC DISPERSION FACTORS FOR ACCIDENT ANALYSIS FOR AP1000 DCD AND BELLEFONTE NUCLEAR PLANT UNITS 3 & 4

NOTE: Site χ/Q Values are from Table 2.3-321

	χ/Q (s/m^3) at HVAC Intake for the Identified Release Points[a]		χ/Q (s/m^3) at Control Room Door for the Identified Release Points[b]	
	Ground Level Containment Release Points[d]		Ground Level Containment Release Points[d]	
	DCD	FSAR	DCD	FSAR
0 - 2 hours	6.0E-3	2.4E-3	1.0E-3	7.4E-4
2 - 8 hours	3.6E-3	1.8E-3	7.5E-4	5.8E-4
8 - 24 hours	1.4E-3	7.1E-4	3.5E-4	2.5E-4
1 - 4 days	1.8E-3	6.4E-4	2.8E-4	2.0E-4
4 - 30 days	1.5E-3	5.4E-4	2.5E-4	1.6E-4

	χ/Q (s/m^3) at HVAC Intake for the Identified Release Points[a]		χ/Q (s/m^3) at Control Room Door for the Identified Release Points[b]	
	PORV and Safety Valve Releases[e]		PORV and Safety Valve Releases[e]	
	DCD	FSAR	DCD	FSAR
0 - 2 hours	2.0E-2	1.0E-4	4.0E-3	1.8E-3
2 - 8 hours	1.8E-2	3.8E-3	3.2E-3	6.0E-4
8 - 24 hours	7.0E-3	2.2E-3	1.2E-3	2.9E-4
1 - 4 days	5.0E-3	1.5E-3	1.0E-3	2.7E-4
4 - 30 days	4.5E-3	9.3E-4	8.0E-4	1.9E-4

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15.6 DECREASE IN REACTOR COOLANT INVENTORY

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

15.6.5.3.7.3 Atmospheric Dispersion Factors

Add the following paragraph at the end of DCD Subsection 15.6.5.3.7.3.

BLN COL 2.3-4 [Site-specific /Q values provided in Subsection 2.3.4 are bounded by the values given in DCD Tables 15A-5 and 15A-6. (This text to be revised in a future amendment.)]

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APPENDIX 15A
EVALUATION MODELS AND PARAMETERS FOR ANALYSIS OF RADIOLOGICAL CONSEQUENCES OF ACCIDENTS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

15A.3.3 Atmospheric Dispersion Factors

Replace the third paragraph in DCD Subsection 15A.3.3 with the following:

BLN COL 2.3-4 [Site-specific /Q values provided in Subsection 2.3.4 are bounded by the values given in DCD Tables 15A-5 and 15A-6. (This text to be revised in a future amendment.)]