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

February 2, 2009

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: 1) 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

2) Response letter from Andrea L. Sterdis (TVA) to Document Control Desk (NRC), Response to Request for Additional Information – LOCA DBA Dose Analyses, dated November 14, 2008

This letter provides the Tennessee Valley Authority's (TVA) supplemental response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) item 15.00.03-01 included in the Reference 1 letter and partially responded to in Reference 2.

A supplemental response to the NRC request in the Reference 1 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 2nd day of Feb, 2009.

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

Enclosure
cc: See Page 2

D085
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Enclosure
TVA letter dated February 2, 2009
RAI Responses

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

Subject: LOCA DBA Doses in the Final Safety Analysis Report

RAI Number	**Date of TVA Response**
15.00.03-01	November 14, 2008; Supplemented with this letter – see following pages

Associated Additional Attachments / Enclosures	**Pages Included**
None	

Enclosure
TVA letter dated February 2, 2009
RAI Response

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: 2394

BLN RESPONSE:

An initial RAI response to BLN-RAI-LTR-129 was provided on November 14, 2008. This RAI supplement is being provided to update the NRC on the items referenced in the original RAI response.

FSAR MCR and LPZ χ/Q Impacts.

DCD Revision 17 has been incorporated by reference into Revision 1 of the FSAR for Main Control Room (MCR) and Low Population Zone (LPZ) LOCA dose calculations. Chapter 15 and Section 6.4 of the BLN COLA FSAR required no revisions 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 have been revised in Revision 1 of the FSAR to incorporate the revised AP1000 DCD Site Parameter values. As shown in COLA FSAR Tables 2.0-201 and 2.0-202, the MCR and LPZ FSAR site characteristic values remain bounded by DCD Revision 17 site parameter values as shown in DCD Site Parameter Table 5.0-1.

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

A site specific calculation has been completed to address the BLN EAB χ/Q site parameter exceedance. This calculation takes credit for reduction of conservatisms that are currently included in the DCD Revision 17 LOCA analysis. The specific conservatisms reduced in the BLN site-specific EAB Calculation are:

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

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

These reductions in 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. Utilizing this 1% power uncertainty margin is allowable and acceptable as documented in the Section 4.3.1.3.1 of the certified design. The reduction in power uncertainty from 2% to 1% in the site specific LOCA dose calculation does not reduce the power uncertainty below the minimum allowed in the certified design.

   2. Core design - A 4% conservatism was originally included in core design calculations to provide margin for uncertainties in the predicted core designs. The core source term calculations have been revised for the first three core loadings and an equilibrium core cycle that will be utilized for AP1000. Refining the site specific core source terms based on a more detailed evaluation of the first three core loadings and an equilibrium core cycle reduces the uncertainty in the core design so that the original 4% design conservatism is not necessary.

b. Containment leak rate reduction assumption.

   The AP1000 utilizes a steel containment vessel design with a concrete shield building. The AP1000 has significantly fewer (approximately 60% less than current Westinghouse 4-Loop PWR) mechanical and electrical penetrations than operating plants. The overall allowable leakage rate requirements are based on maintaining the dose consequences of a LOCA below the regulatory limit. 10CFR Part 50, Appendix J, and NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10CFR50 Appendix J" require the allowable Type A limits and cumulative Type B and C limits to be measured and monitored. This allows for appropriate corrective actions to be taken when the individual or cumulative leakages are approaching Administrative Limits to prevent exceeding the limits in the Site Specific Technical Specifications. The lower assumed and licensed Containment Leak Rate assumption used in the BLN site-specific EAB LOCA dose analysis does not represent a reduction in the margin of safety assumed in the LOCA analysis.

The site-specific adjustments to the χ/Q calculations described above will reduce the BLN site-specific EAB LOCA dose by approximately 15%. This compensates for the BLN EAB χ/Q exceedance over the DCD site parameter allowable value.

Environmental Report χ/Q Impacts.

No impact. The Environmental Report uses the DCD Revision 17 LOCA EAB dose results in developing the site doses given in ER Section 7.1.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

Revisions incorporating Revised DCD Site Parameters for LPZ and MCR χ/**Q** are incorporated in BLN COL Application Revision 1 submitted to NRC on January 21, 2009.

The application revisions identified below are based on Revision 1 of the FSAR.

1. COLA Part 2, FSAR Chapter 1, Table 1.9-202, sheet 9 of 27, will be revised from:

6.2.6	Containment Leakage Testing	Acceptable	See Notes d, e, and f.

To read:

6.2.6	Containment Leakage Testing	Exception	See Notes d, e, and f. The Exception is taken to the guidance in SRP Section II, item 4 in that the proposed acceptable containment leakage rate is less than 0.10% of containment air by weight.

2. COLA Part 2, FSAR Chapter 2, Table 2.0-201, sheet 6 of 7, will be revised from:

	AP1000 DCD Site Parameter[a]	BLN Site Characteristic	BLN FSAR Reference	BLN Within Site Parameter
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(j)

To read:

	AP1000 DCD Site Parameter[a]	BLN Site Characteristic	BLN FSAR Reference	BLN Within Site Parameter
Atmospheric Dispersion Values - χ/Q[f]				
Site Boundary (0-2 hr)	$\leq 5.1 \times 10^{-4}$ sec/m^3	5.85×10^{-4} sec/m^3	Table 2.3-319	No[j]

3. COLA Part 2, FSAR Chapter 2, Table 2.0-201, sheet 7 of 7, will be revised from:

j) These Site Characteristics and comparison evaluation to be provided in a future amendment.

To read:

j) This Site Characteristic evaluated on a site specific basis. See Section 15.0, Subsection 15.6.5, and Appendix 15A, Subsection 15A.3.3.

4. COLA Part 2, FSAR Chapter 6, will be revised to include the following new Subsection 6.2.5.1.2 with an LMA of BLN DEP 2.3-1.

6.2.5.1.2 Power Generation Design Basis

Replace the second sentence of DCD Subsection 6.2.5.1.2 with the following sentence.

The specified maximum allowable containment leak rate is 0.09 weight percent of the containment air mass per day at the calculated peak accident pressure, P_a, identified in subsection 6.2.1.

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5. COLA Part 2, FSAR Chapter 6, Section 6.5 will be revised from:

This section of the referenced DCD is incorporated by reference with no departures or supplements.

To read:

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

6. COLA Part 2, FSAR Chapter 6, Section 6.5, will be revised to add the following new table with an LMA of BLN DEP 2.3-1.

TABLE 6.5-201
BLN PRIMARY CONTAINMENT OPERATION FOLLOWING A DESIGN BASIS ACCIDENT

BLN Design basis containment leak rate	0.09% containment air weight per day

Note: This table supplements DCD Table 6.5.3-1.

7. COLA Part 2, FSAR Chapter 14, Section 14.3, will be revised to add the following new table with an LMA of BLN DEP 2.3-1.

TABLE 14.3-202
BLN RADIOLOGICAL ANALYSIS

Reference	Design Feature	Value
Section 2.3.4	BLN Atmospheric dispersion factors – *X*/Q (sec/m^3) - Site Boundary *X*/Q 0 - 2 hour time interval	 $\leq 5.85 \times 10^{-4}$

Note: This table supplements DCD Table 14.3-7.

8. COLA Part 2, FSAR Chapter 15, Section 15.0 will be revised from:

This section of the referenced DCD is incorporated by reference with no departures or supplements.

To read:

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

9. COLA Part 2, FSAR Chapter 15, Section 15.0 will be revised to add the following information with an LMA of BLN DEP 2.3-1.

15.0.3.2 Initial Conditions

Replace the third paragraph of DCD Subsection 15.0.3.2 with the following:

Core power ±2 percent allowance for calorimetric error. The main feed water flow measurement supports a 1-percent power uncertainty; use of a 2-percent power uncertainty is conservative. Accidents use 2% core power uncertainty unless identified in Table 15.0-2.

10. COLA Part 2, FSAR Chapter 15, Section 15.0, will be revised to add the following new table with an LMA of BLN DEP 2.3-1.

TABLE 15.0-201
BLN SUMMARY OF INITIAL CONDITIONS AND COMPUTER CODES USED

Section	Faults	Computer Codes Used	Reactivity Coefficients Assumed			Initial Thermal Power Output Assumed (MWt)
			Moderator Density ($\Delta k/gm/cm^3$)	Moderator Temperature (pcm/°F)	Doppler	
	LOCAs resulting from the spectrum of postulated piping breaks within the reactor coolant pressure boundary	NOTRUMP WCOBRA/ TRAC HOTSPOT	See subsection 15.6.5 references	-	See subsection 15.6.5 references	3468.0 (SBLOCA) 3434.0 (LBLOCA) 3434.0 (BLN Dose)

Note: This table supplements DCD Table 15.0-2.

11. COLA Part 2, FSAR Chapter 15, Subsection 15.6 will be revised to add the following information with an LMA of BLN DEP 2.3-1.

15.6.5.3.1.2 Core Release

Replace the first two sentences of the second paragraph of DCD Subsection 15.6.5.3.1.2 with the following sentence:

The core fission product inventory at the time of the most accidents is based on operation near the end of a fuel cycle is provided in Table 15A-3 of DCD Appendix 15A and in Table 15A-201 of FSAR Appendix 15A.

12. COLA Part 2, FSAR Chapter 15, Subsection 15.6.5.3.7.3, will be revised from:

[Site-specific χ/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.)]

To read:

Site-specific χ/Q values provided in Subsection 2.3.4 are not bounded by the values given in DCD Tables 15A-5 and 15A-6. Therefore, a site-specific dose consequence analysis was performed as discussed in Subsection 15.6.5.

13. COLA Part 2, FSAR Chapter 15, Section 15.6 will be revised to add the following information with an LMA of BLN DEP 2.3-1.

TABLE 15.6-201
BLN ASSUMPTIONS AND PARAMETERS USED IN CALCULATING
RADIOLOGICAL CONSEQUENCES OF A LOSS-OF-COOLANT ACCIDENT

BLN Containment leakage release data - Containment leak rate, 0-24 hr (% per day)	 0.09 (for EAB) 0.10 (for LPZ and Control Room)

Note: This table supplements DCD Table 15.6.5-2.

14. COLA Part 2, FSAR Chapter 15, Section 15.6 to add the following information with an LMA of BLN DEP 2.3-1.

TABLE 15.6-202
BLN RADIOLOGICAL CONSEQUENCES OF A
LOSS-OF-COOLANT ACCIDENT WITH CORE MELT

BLN Exclusion zone boundary dose (1.4 - 3.4 hr)(1)	23.8

Notes:

1. The effective unfiltered inleakage is based on a total inleakage of 5 cfm with credit taken for purging of the vestibule volume and the incomplete mixing of the vestibule and control room volumes with outside air following ingress/egress.

2. This table supplements DCD Table 15.6.5-2.

15. COLA Part 2, FSAR Chapter 15, Appendix 15A will be revised to add the following information with an LMA of BLN DEP 2.3-1.

15A.3.1.3 Core Source Term

Replace the first sentence of DCD Subsection 15.A.3.1.3 with the following sentence:

Table 15A-3 and FSAR Table 15A-201 list the core source terms at shutdown.

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16. COLA Part 2, FSAR Chapter 15, Appendix 15A will be revised to add the following new Table 15A-201 with an LMA of BLN DEP 2.3-1.

TABLE 15A-201 (Sheet 1 of 2)
BLN REACTOR CORE SOURCE TERM[1]

	Nuclide	Inventory (Ci)		Nuclide	Inventory (Ci)
Iodines	I-130	1.84E+06	Noble Gases	Kr-85m	2.47E+07
	I-131	9.29E+07		Kr-85	1.05E+06
	I-132	1.36E+08		Kr-87	4.86E+07
	1-133	1.92E+08		Kr-88	6.53E+07
	I-134	2.15E+08		Xe-131m	1.01E+06
	I-135	1.82E+08		Xe-133m	5.95E+06
Cs Group	Cs-134	1.62E+07		Xe-133	1.88E+08
	Cs-136	3.79E+06		Xe-135m	4.00E+07
	Cs-137	1.07E+07		Xe-135	3.80E+07
	Cs-138	1.78E+08		Xe-138	1.63E+08
	Rb-86	1.77E+05	Sr & Ba	Sr-89	9.30E+07
Te Group	Te-127m	1.35E+06		Sr-90	8.18E+06
	Te-127	8.28E+06		Sr-91	1.14E+08
	Te-129m	4.65E+06		Sr-92	1.22E+08
	Te-129	2.45E+07		Ba-139	1.70E+08
	Te-131m	1.85E+07		Ba-140	1.64E+08
	Te-132	1.33E+08	Ce Group	Ce-141	1.56E+08
	Sb-127	8.54E+06		Ce-143	1.45E+08
	Sb-129	2.62E+07		Ce-144	1.20E+08
Ru Group	Ru-103	1.41E+08		Pu-238	2.18E+05
	Ru-105	9.73E+07		Pu-239	2.48E+04
	Ru-106	4.45E+07		Pu-240	3.88E+04
	Rh-105	9.03E+07		Pu-241	9.90E+06
	Mo-99	1.74E+08		Np-239	1.95E+09
	Tc-99m	1.53E+08			

TABLE 15A-201 (Sheet 2 of 2)
BLN REACTOR CORE SOURCE TERM[1]

	Nuclide	Inventory (Ci)
La Group	Y-90	8.55E+06
	Y-91	1.21E+08
	Y-92	1.24E+08
	Y-93	1.40E+08
	Nb-95	1.62E+08
	Zr-95	1.60E+08
	Zr-97	1.59E+08
	La-140	1.74E+08
	La-141	1.54E+08
	La-142	1.49E+08
	Pr-143	1.41E+08
	Nd-147	6.00E+07
	Am-241	1.02E+04
	Cm-242	2.76E+06
	Cm-244	2.38E+05

Note:
1. The following assumptions apply:
   - Core thermal power of 3434 MWt (1 percent above the design core power of 3400 MWt).
   - Three-region equilibrium cycle core at end of life.
   - These source terms applied only for the EAB doses.

17. COLA Part 2, FSAR Chapter 15, Appendix 15A, will be revised to add the following information with an LMA of BLN DEP 2.3-1.

TABLE 15A-202
BLN OFFSITE ATMOSPHERIC DISPERSION FACTORS (χ/Q)
FOR ACCIDENT DOSE ANALYSIS[1]

BLN Site Boundary X/Q (s/m^3) 0 - 2 hours[2]	5.85×10^{-4}

Notes:

1. The LOCA dose analysis models the bounding atmospheric dispersion factors listed above. Other analyses model more conservative values.

2. Nominally defined as the 0- to 2-hour interval but is applied to the 2-hour interval having the highest activity releases in order to address 10 CFR Part 50.34 requirements.

3. This table supplements DCD Table 15A-5.

18. COLA Part 2, FSAR Chapter 16, Section 16.1, first sentence, will be revised from:

Subsections 16.1.1 and 16.1.2 of the DCD are incorporated by reference with no departures or supplements.

To read:

Subsections 16.1.1 and 16.1.2 of the DCD are incorporated by reference with the following departures and/or supplements.

19. COLA Part 2, FSAR Chapter 16, Section 16.1 will be revised to add the following at the end of the current text with an LMA of BLN DEP 2.3-1:

The plant-specific Technical Specifications include an allowable primary containment leakage rate of 0.09% of primary containment air weight per day. This departure from the DCD Generic Technical Specifications and Bases is described and justified in Parts 4 and 7 of the COL application.

20. COLA Part 4, Section A, will be revised to include new Section A.3 to read:

A.3 The following items are departures from the AP1000 DCD Generic Technical Specifications and Bases.

GTS 5.5.8 The maximum allowable primary containment leakage rate, L_a, at P_a, is reduced from the GTS value of 0.10% to 0.09% of primary containment air weight per day. This departure is further discussed and justified in Part 7 of the COL application.

21. COLA Part 4, Section B, Technical Specification 5.5.8 will be revised from:

5.5.8 Containment Leakage Rate Testing Program

c. The maximum allowable primary containment leakage rate, La, at Pa, shall be 0.10% of primary containment air weight per day.

To read:

5.5.8 Containment Leakage Rate Testing Program

c. The maximum allowable primary containment leakage rate, La, at Pa, shall be 0.09% of primary containment air weight per day.

22. COLA Part 4, Section B, Bases 3.6.1, Applicable Safety Analyses, second paragraph will be revised from:

The DBAs that result in a challenge to containment OPERABILITY from high pressures and temperatures are a loss of coolant accident (LOCA), a steam line break, and a rod ejection accident (REA) (Ref. 2). In addition, release of significant fission product radioactivity within containment can occur from a LOCA or REA. The DBA analyses assume that the containment is OPERABLE such that, for the DBAs involving release of fission product radioactivity, release to the environment is controlled by the rate of containment leakage. The containment is designed with an allowable leakage rate of 0.10% of containment air weight of the original content of containment air after a DBA per day (Ref. 3). This leakage rate, used in the evaluation of offsite doses resulting from accidents, is defined in 10 CFR 50, Appendix J (Ref. 1), as L_a: the maximum allowable containment leakage rate at the calculated peak containment internal pressure (P_a) resulting from the limiting DBA. The allowable leakage rate represented by L_a forms the basis for the acceptance criteria imposed on containment leakage rate testing. L_a is assumed to be 0.10% per day in the safety analysis.

To read:

The DBAs that result in a challenge to containment OPERABILITY from high pressures and temperatures are a loss of coolant accident (LOCA), a steam line break, and a rod ejection accident (REA) (Ref. 2). In addition, release of significant fission product radioactivity within containment can occur from a LOCA or REA. The DBA analyses assume that the containment is OPERABLE such that, for the DBAs involving release of fission product radioactivity, release to the environment is controlled by the rate of containment leakage. The containment is designed with an allowable leakage rate of 0.09% of containment air weight of the original content of containment air after a DBA per day (Ref. 3). This leakage rate, used in the evaluation of offsite doses resulting from accidents, is defined in 10 CFR 50, Appendix J (Ref. 1), as L_a: the maximum allowable containment leakage rate at the calculated peak containment internal pressure (P_a) resulting from the limiting DBA. The allowable leakage rate represented by L_a forms the basis for the acceptance criteria imposed on containment leakage rate testing. L_a is assumed to be 0.09% per day in the safety analysis.

23. COLA Part 4, Section B, Bases 3.6.2, Applicable Safety Analyses, first paragraph will be revised from:

The DBA that results in the largest release of radioactive material within containment is a loss of coolant accident (LOCA) (Ref. 3). In the analyses of DBAs, it is assumed that containment is OPERABLE, such that release of fission products to the environment is controlled by the rate of containment leakage. The containment is designed with an allowable leakage rate of 0.10% of containment air weight of the original content of containment air per day after a DBA (Ref. 2). This leakage rate is defined in 10 CFR 50, Appendix J (Ref. 1), as La, the maximum allowable containment leakage rate at the calculated peak containment internal pressure Pa following a DBA. This allowable leakage rate forms the basis for the acceptance criteria imposed on the SRs associated with the air locks.

To read:

The DBA that results in the largest release of radioactive material within containment is a loss of coolant accident (LOCA) (Ref. 3). In the analyses of DBAs, it is assumed that containment is OPERABLE, such that release of fission products to the environment is controlled by the rate of containment leakage. The containment is designed with an allowable leakage rate of 0.09% of containment air weight of the original content of containment air per day after a DBA (Ref. 2). This leakage rate is defined in 10 CFR 50, Appendix J (Ref. 1), as La, the maximum allowable containment leakage rate at the calculated peak containment internal pressure Pa following a DBA. This allowable leakage rate forms the basis for the acceptance criteria imposed on the SRs associated with the air locks.

24. COLA Part 7, Section A, STD and BLN Departures, will be revised to add the following new departure information.

Departure Number	Description
BLN DEP 2.3-1	EAB atmospheric dispersion value

25. COLA Part 7, Section A.2, Departures That Require NRC Approval Prior To Implementation, will be revised to add the following new departure information.

Departure Number	Description
BLN DEP 2.3-1	EAB atmospheric dispersion value

Departure Number: BLN DEP 2.3-1

Affected DCD/FSAR Sections: 2.0, 6.2.5, 6.5, 14.3, 15.0, 15.6.5, 15A.3, 16.1, and the Technical Specifications and associated Bases

Summary of Departure:

Revision 17 of the AP1000 DCD changed the exclusion area boundary (EAB) atmospheric dispersion (χ/Q) value to 5.1E-01 sec/m^3. The corresponding site characteristic atmospheric dispersion (χ/Q) value is 5.85E-04 sec/m^3. Since the DCD generic site parameter at the EAB does not bound the site characteristic, a plant-specific dose consequence analysis is necessary to determine the doses at the EAB.

Extent/Scope of Departure:

Key site parameters that are specified for the design of safety-related aspects of structures, systems, and components for the AP1000 are provided in Table 2.0-201. An actual site is acceptable if its site characteristics fall within the AP1000 plant site design parameters. Contrary to this requirement, the site characteristic exclusion area boundary (EAB) atmospheric dispersion (χ/Q) value for the BLN Units 3&4 exceeds the AP1000 site parameter. This Departure is identified in the FSAR Section 2.0, Chapter 6, Chapter 14, Chapter 15, and Chapter 16 and the associated plant specific Technical Specifications and Bases.

Departure Justification:

This departure is associated with the dose consequences of a design basis loss of coolant accident (LOCA). Because the BLN atmospheric dispersion (χ/Q) value is not bounded by the corresponding DCD site parameter, the LOCA EAB dose reported in the DCD is not applicable. Consequently, a site-specific LOCA dose analysis was performed to determine the EAB dose applicable to BLN. This site specific analysis also removed some conservatism in the core source term and the containment leak rate. The conservatisms removed from the core source term were: 1) reduction of the calorimetric power uncertainty to the AP1000 certified value of 1% (from 2% previously used in the dose analysis) and 2) removal of the excess conservatism for fuel cycle variations resulting in an approximate 4% reduction in the core source term. The containment leak rate used in the LOCA analysis was reduced from 0.10 wt%/day to 0.09 wt%/day.

These reductions in excess conservatisms are justified as follows:

1. Core source term.
    a. Power uncertainty - This reduction in conservatism is acceptable because a 1% power uncertainty is included in the certified design. Site specific calculations have been completed to document the core source term with this power uncertainty. Utilizing this 1% power uncertainty margin is allowable and acceptable as documented in the certified design. The reduction in power uncertainty in the site specific calculation does not reduce the calculated minimum allowable margin of safety to an unacceptable level.
    b. Core design - A 4% conservatism was originally included in core source term calculations to provide margin for uncertainties in the predicted core

designs. A site specific core source term calculation removing this conservatism has been completed for both the first three core loadings and an equilibrium core cycle that will be utilized for BLN Units 3&4. Refining the site specific core source terms based on a more detailed evaluation of the first three core loadings and an equilibrium core cycle does not reduce the calculated minimum allowable margin of safety assumed in the LOCA dose analysis used in the BLN 3&4 accident analysis to an unacceptable level .

2. Containment leak rate reduction assumption. The AP1000 utilizes a steel containment vessel design with a concrete shield building. The AP1000 has significantly fewer (approximately 60 % less than current Westinghouse 4-Loop PWR) mechanical and electrical penetrations than operating plants. This reduction in containment leak rate will be reflected in the BLN technical specifications. The overall allowable leakage rate requirements are based on maintaining the dose consequences of a LOCA below the regulatory limit. 10CFR Part 50, Appendix J, and NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10CFR50 Appendix J" require the allowable Type A limits and cumulative Type B and C limits to be measured and monitored. This allows for appropriate corrective actions to be taken when the individual or cumulative leakages are approaching Administrative Limits to prevent exceeding the limits in the Site Specific Technical Specifications. The lower assumed and licensed Containment Leak Rate used in the BLN site-specific EAB LOCA dose analysis does not represent a reduction in the margin of safety assumed in the LOCA analysis.

The resulting post-LOCA EAB dose determined in the site-specific dose analysis is 23.8 rem TEDE which meets dose guideline of 25 rem TEDE given in 10 CFR 50.34. Therefore, this change is acceptable.

Departure Evaluation:

This departure and the associated removal of conservatisms in the core source term and containment leak rate do not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;
2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety and previously evaluated in the plant-specific DCD;
3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;
4. Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific DCD;
5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;
6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;
7. Result in a design basis limit for a fission product barrier as described in the plant specific DCD being exceeded or altered; or
8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of a severe accident issue identified in the plant specific DCD. Therefore, this departure has no safety significance.

26. COLA Part 7, Section B, BLN Exemption Requests, will be revised from:

    TVA requests the following exemptions related to:

    1) Fitness for Duty Program Description, and

    2) Combined License Application Organization and Numbering

    To read:

    TVA requests the following exemptions related to:

    1) Fitness for Duty Program Description, and

    2) Combined License Application Organization and Numbering

    3) Containment leak rate technical specification, and

    4) AP1000 DCD Tier 1 EAB atmospheric dispersion site parameter.

27. COLA Part 7, Section B, Exemptions, will be revised to add the following new exemption information:

3) Containment leak rate technical specification

Applicable Regulation(s): 10 CFR 52, Appendix D, Subsection III.B

Specific wording from which an exemption is requested:

> B. An applicant or licensee referencing this appendix, in accordance with Section IV of this appendix, shall incorporate by reference and comply with the requirements of this appendix, including Tier 1, Tier 2, (including the investment protection short-term availability controls in Section 16.3 of the DCD), and the Generic TS except as otherwise provided in this appendix.

Pursuant to 10 CFR 52.7 and 52.93 (as amended and promulgated effective Sept. 27, 2007), the Tennessee Valley Authority (TVA) requests an exemption from the requirement of 10 CFR 52, Appendix D, Subsection III.B to comply with the requirements of the Generic TS, specifically Generic TS 5.5.8.c (as provided in the AP1000 DCD, Chapter 16), in its application for a combined operating license for the Bellefonte Nuclear Plant (BLN). TVA proposes to provide a more stringent containment leakage rate specification in lieu of the Generic TS.

Discussion:

The allowable leakage rate given in the BLN Technical specifications is 0.09% per day as used in the safety analysis. This leakage rate, used in the evaluation of offsite doses resulting from accidents, is defined in 10 CFR 50, Appendix J, as L_a: the maximum allowable containment leakage rate at the calculated peak containment internal pressure (P_a) resulting from the limiting DBA. The allowable leakage rate represented by L_a forms the basis for the acceptance criteria imposed on containment leakage rate testing. L_a is assumed to be 0.09% per day in the safety analysis. This leakage rate is acceptable because it mitigates the consequences of a design basis accident such that the dose requirements of 10 CFR Part 50.34 (25 rem TEDE) are met. The containment Technical Specification 3.6, along with this leakage rate, satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

This exemption request was evaluated per Section VIII.C.4 of the design certification rule which requires that 1) the change will not result in a significant decrease in the level of safety otherwise provided by the design; 2) the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security; 3) special circumstances are present as specified in 10 CFR 50.12(a)(2); and 4) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. As shown below, each of these four criteria are satisfied.

(1) As discussed above, the change does not have an adverse impact and therefore will not result in a significant decrease in the level of safety otherwise provided by the design.

(2) The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the change does not have an adverse impact and therefore will not present an undue risk to the public health and safety. The change does not relate to security and does not otherwise pertain to the common defense and security.

(3) Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present, since application of Section 52.79(d)(1) and the AP1000 standard containment leakage rate in the DCD is not necessary to achieve the underlying purpose of the rules. The analysis described above shows that the reduced containment leakage rate does not affect the design. Additionally, special circumstance (iii) is present, since compliance would necessitate expanding the exclusion area boundary, which would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted.

(4) The special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the low frequency exceedance) caused by the exemption. Specifically, the change does not have an adverse impact and does not affect the configuration of the plant or the manner in which the plant is operated.

As demonstrated above, this exemption request complies with the requirements in Section VIII.C.4 of the design certification rule for the AP1000.

4) AP1000 DCD Tier 1 EAB atmospheric dispersion value

Applicable Regulation(s): 10 CFR 52, Appendix D, Subsection III.B

Specific wording from which an exemption is requested:

> B. An applicant or licensee referencing this appendix, in accordance with Section IV of this appendix, shall incorporate by reference and comply with the requirements of this appendix, including Tier 1, Tier 2, (including the investment protection short-term availability controls in Section 16.3 of the DCD), and the Generic TS except as otherwise provided in this appendix.

Pursuant to 10 CFR 52.7 and 52.93 (as amended and promulgated effective Sept. 27, 2007), the Tennessee Valley Authority (TVA) requests an exemption from the requirement of 10 CFR 52, Appendix D, Subsection III.B to comply with the requirements of the Tier 1 requirement, specifically Tier 1, Table 5.0-1, Site Parameter for the Site (Exclusion Area) Boundary (0-2 hour) atmospheric dispersion factor (as provided in the AP1000 DCD), in its application for a combined operating license for the Bellefonte Nuclear Plant (BLN). TVA proposes to provide a plant-specific dose consequence analysis using the site specific Site (Exclusion Area) Boundary atmospheric dispersion factor.

Discussion:

The AP1000 Tier 1 material in 5.0, Site Parameters, in Table 5.0-1 identifies the key site parameters that are specified for the design of safety-related aspects of structures, systems, and components for the AP1000. An actual site is acceptable if its site characteristics fall within the AP1000 plant site design parameters in Table 5.0-1. The atmospheric dispersion factor (χ/Q) given in Table 5.0-1 is 5.1×10^{-4} sec/m^3. The BLN Units 3&4 site specific atmospheric dispersion factor (χ/Q) factor is 5.85×10^{-4} sec/m^3. This site specific value is acceptable because analyses have demonstrated that the EAB doses resulting from a design basis LOCA are below the requirements of 10 CFR Part 50.34.

This exemption request was evaluated per Section VIII.A.4 of the design certification rule which requires that 1) the change will not result in a significant decrease in the level of safety otherwise

provided by the design; 2) the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security; 3) special circumstances are present as specified in 10 CFR 50.12(a)(2); and 4) the special circumstances outweigh any decrease in safety

(1) As discussed above, the change does not have an adverse impact and therefore will not result in a significant decrease in the level of safety otherwise provided by the design.

(2) The exemption is not inconsistent with the Atomic Energy Act or any other statute and therefore is authorized by law. As discussed above, the change does not have an adverse impact and therefore will not present an undue risk to the public health and safety. The change does not relate to security and does not otherwise pertain to the common defense and security.

(3) Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present, since application of Section 52.79(d)(1) and the site parameters in Tier 1 of the DCD is not necessary to achieve the underlying purpose of the rules. The analysis described above shows that the higher site-specific atmospheric dispersion values do not affect the design. Additionally, special circumstance (iii) is present, since compliance would necessitate expanding the exclusion area boundary, which would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted.

(4) The special circumstances outweigh any decrease in safety that may result from the reduction in standardization (due to the low frequency exceedance) caused by the exemption. Specifically, the change does not have an adverse impact and does not affect the configuration of the plant or the manner in which the plant is operated.

As demonstrated above, this exemption request complies with the requirements in Section VIII.A.4 of the design certification rule for the AP1000.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None