



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

October 20, 2009

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 COMBINED LICENSE APPLICATION – RESPONSE TO SAFETY
EVALUATION REPORT PLANT-SPECIFIC OPEN ITEMS FOR CHAPTER 02**

Reference: Letter from Stephanie Coffin (NRC) to Andrea L. Sterdis (TVA), Bellefonte
Units 3 and 4 Safety Evaluation Report with Open Items for Chapter 2, "Site
Characteristics," dated September 4, 2009.

This letter provides the Tennessee Valley Authority's (TVA) response to the Nuclear Regulatory
Commission's (NRC) plant-specific open items (OIs) included in the subject Safety Evaluation
Report (SER).

A response to each NRC plant-specific open item is addressed in the enclosure which also
identifies any associated changes that will be made in a future revision of the BLN application.
No standard or generic open items were identified in the SER.

If you should have any questions, please contact Tom Spink at 1101 Market Street, LP5A,
Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-7062, or via email at
tespink@tva.gov.

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

Executed on this 20th day of Oct, 2009.

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

Enclosure
cc: See Page 2

DOCS
NRW

Document Control Desk

Page 2

October 20, 2009

cc: (w/ Enclosures)

J. P. Berger, EDF
J. M. Sebrosky, NRC/HQ
E. Cummins, Westinghouse
S. P. Frantz, Morgan Lewis
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

cc: (w/o Enclosure)

B. C. Anderson, NRC/HQ
M. M. Comar, NRC/HQ
B. Hughes/NRC/HQ
R. G. Joshi, 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

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

Responses to NRC Safety Evaluation Report with Open Items for Chapter 02
(20 pages, including this list)

<u>OI Number</u>	<u>Date of TVA Response</u>
02.00-01	BLN Plant-Specific - See enclosed response (NRC action)
02.02.03-01	BLN Plant-Specific - See enclosed response
02.02.03-02	BLN Plant-Specific - See enclosed response
02.02.03-03	BLN Plant-Specific - See enclosed response
02.02.03-04	BLN Plant-Specific - See enclosed response (NRC action)
02.03.04-01	BLN Plant-Specific – response expected prior to December 20, 2009
02.03.04-02	BLN Plant-Specific – response expected prior to December 20, 2009
02.03.05-01	BLN Plant-Specific - response expected prior to December 20, 2009
02.04-01	BLN Plant-Specific - See enclosed response (NRC action)
02.05.01-01	BLN Plant-Specific - See enclosed response
02.05.02-01	BLN Plant-Specific - response expected prior to December 20, 2009
02.05.02-02	BLN Plant-Specific - See enclosed response (NRC action)
02.05.04-01	BLN Plant-Specific - response expected prior to December 20, 2009
02.05.04-02	BLN Plant-Specific - response expected prior to December 20, 2009
02.05.04-03	BLN Plant-Specific - response expected prior to December 20, 2009
02.05.04-04	BLN Plant-Specific - See enclosed response
02.05.04-05	BLN Plant-Specific - See enclosed response

Associated Additional Attachments / Enclosures

Pages Included

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.00-01

With the exception of the site boundary atmospheric dispersion value, the site-specific parameters listed in BLN COL FSAR Tables 2.0-201 and 2.0-202 are enveloped by the DCD values addressed in DCD Table 2-1. In response to request for additional information (RAI) 15.00.3-1, Tennessee Valley Authority (TVA or the applicant) requested an exemption to this parameter. The staff's evaluation of this exemption request is addressed in Sections 2.3, Chapter 6, and Chapter 15 of this SER. The staff's evaluation of the exemption request is Open Item 2.0-1.

BLN RAI/OI ID: 3676

BLN RESPONSE:

As indicated in the open item discussion, the NRC Staff is still evaluating the exemption request. A supplemental response will be provided for this item should additional concerns be identified.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.02.03-01

As part of the response to RAI 2.2.3-1, the applicant provided a proposed revision to FSAR subsection 2.2.3.1.1 that includes a discussion detailing the bases for the waterway analysis and how the calculation of explosion probability was performed. However, the revised information is misplaced in FSAR Revision 1. As this information belongs to the discussion of hazards associated with waterways, it should start at the end of the discussion of railway hazards, where the waterways discussion begins. Placement of the additional waterway hazards discussion identified in the response to RAI 2.2.3-1 in the correct location in the FSAR is Open Item 2.2.3-1.

BLN RAI/OI ID: 3677

BLN RESPONSE:

The previously provided information will be relocated in the FSAR as indicated in the COL Application Revisions section below.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

COLA Part 2, FSAR Chapter 2, Subsection 2.2.3.1.1, will be revised to relocate the following paragraphs from their current location:

Eight paragraphs under the heading Spill Frequency on the Tennessee and Associated Rivers, and eight paragraphs under the heading Quantified Risk of Detonation.

To follow the paragraph shown below.

The nearest transportation route to the BLN is the Guntersville Reservoir. Its nearest bank is located 0.65 miles from the site. An assessment was performed to evaluate potential hazards represented by flammable and explosive cargo transported via barge past the BLN on the Guntersville Reservoir. An initial screening of commodities included in cargo shipped via the Guntersville Reservoir past the BLN site was conducted to identify those materials that warranted more detailed evaluation, that is, "commodities of interest." This initial screening of the hazardous commodities eliminated all but two requiring further analysis for potential adverse impact to the BLN site from waterway transportation (barge) accidents. These two commodities are styrene and ethanol. Commodities are screened out based on their physical properties. The primary physical parameter is the commodities' flash point. The National Fire Protection Association Hazard Identification System (NFPA 704) (Reference 237) is used. Only commodities with flammability hazards classified as three or four (serious hazard and severe hazard, respectively) are considered.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.02.03-02

In response to the NRC staff's RAI 2.2.3-10, pertaining to the onsite storage of chemicals, the applicant identified site specific chemicals in addition to the standard chemicals addressed in the AP1000 DCD and listed all of the chemicals in BLN COL FSAR Table 6.4-202. The applicant also stated that Standard DCD and Standard COL chemicals identified in BLN COL FSAR Table 6.4-202 were assessed by Westinghouse as part of the main control room habitability hazard analysis. However, the documentation of this analysis is being requested for review and is Open Item 2.2.3-2 until it is submitted and reviewed.

BLN RAI/OI ID: 3678

BLN RESPONSE:

The identified documentation has been made available for NRC Staff review. A supplemental response will be provided for this item should additional concerns be identified from this review.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.02.03-03

In addition, the applicant's response did not provide enough information to justify screening out sodium hypochlorite. This information is required for conducting the staff's review and to allow the staff to perform confirmatory analysis. This is identified as Open Item 2.2.3-3.

BLN RAI/OI ID: 3679

BLN RESPONSE:

The identified documentation has been made available for NRC Staff review. A supplemental response will be provided for this item should additional concerns be identified from this review.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.02.03-04

The gasoline, due to road transport, was not analyzed by the applicant based on using the calculated weighted average immediate danger to life and health (IDLH) value of 780 parts per million (ppm) for screening out the gasoline by applying RG 1.78 methodology. Instead of using the conservative value among other standard limiting concentration values such as threshold limiting value (TLV), time weighted average (TWA) value or temporary emergency exposure limits, acute exposure guideline level, Emergency Response Planning Guideline, protective action criteria (PAC), the applicant uniquely determined a weighted average IDLH value and screened out gasoline from the analysis. The applicability of the methodology to determine a weighted average IDLH value and use for screening the gasoline is identified as Open Item 2.2.3-4.

BLN RAI/OI ID: 3680

BLN RESPONSE:

Additional information related to this open item was submitted for NRC Staff review on June 29, 2009 in response to RAI 02.02.03-08 via BLN-RAI-LTR-132. A supplemental response will be provided for this item should additional concerns be identified from this review.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.03.04-01

The proposed BLN COL FSAR revision provided in RAI 2.3.4-1 lacks certain information requested by the original RAI, which states:

(1) Were terrain recirculation factors or other adjustments used in the PAVAN calculations? The staff noted that terrain recirculation factors were used in the annual average χ/Q calculations in Section 2.3.5, but not in the PAVAN calculations in Section 2.3.4. Evaluate for consistency and provide the basis for the selected assumptions and inputs.

(2) In accordance with RG 1.206, BLN COL FSAR Section 2.3.4 should discuss the effects of topography and nearby bodies of water on short-term dispersion estimates.

Provide this discussion in the BLN COL FSAR. This is identified as Open Item 2.3.4-1.

BLN RAI/OI ID: 3681

BLN RESPONSE:

A response to this item is in preparation to supplement the January 27, 2009, response to RAI 02.03.04-01 via BLN-RAI-LTR-094. The supplemental information is expected to be provided on the schedule shown on page 1 of this Enclosure.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.03.04-02

The staff's confirmatory analysis used the full 2-year meteorological data set and produced results similar to the applicant's results (within ± 2 percent). The staff, therefore finds the BLN site-specific TSC atmospheric dispersion factors (χ/Q values) acceptable. However the applicant did not include these site-specific TSC atmospheric dispersion factors in the FSAR Section 2.3.4. This is identified as Open Item 2.3.4-2. (RAI 2.3.4-5)

BLN RAI/OI ID: 3682

BLN RESPONSE:

A supplemental FSAR revision is identified in the COL Application Revisions section below to include the information provided in the January 30, 2009, response to RAI 02.03.04-05 via BLN-RAI-LTR-119 in the FSAR. The information will be included in a future FSAR update.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

COLA Part 2, FSAR Chapter 2, Section 2.3.4, will be revised to add new Subsection 2.3.4.4 following the existing Subsection 2.3.4.3.

2.3.4.4 Technical Support Center Atmospheric Dispersion Factors

The atmospheric dispersion estimates for the Technical Support Center (TSC) were calculated using the guidance provided in Regulatory Guide 1.194 and the ARCON96 computer code (NUREG/CR-6331). ARCON96 uses meteorological data in the form of hourly electronic meteorological data files including the day of the year, the hour of the day, the stability, the wind direction, and wind speed at the lower measurement level. The meteorological data used in the TSC calculation is the BLN onsite meteorological data for the year beginning April 1, 2006 and ending March 31, 2007. Atmospheric stability was determined by the vertical temperature difference (ΔT) measured over the difference in measurement height and the stability classes given in Regulatory Guide 1.23.

The TSC is located in the east end of the BLN maintenance building as shown in the Site Layout, FSAR Figure 1.1-202. The locations of the receptors of interest, the TSC HVAC intake and facility entrance, are conservatively assumed to be located on the wall of the new maintenance building closest to Unit 3 at an elevation of 1.5 m.

The AP1000 release locations are given on DCD Figure 15A-1 and Table 15A-7. The release locations that are closest to the TSC are the containment shell, the plant vent, the fuel building blowout panel, and the radwaste building truck staging area door. According to DCD Table 15A-6, the fuel building blowout panel and the radwaste building truck staging area door are release locations associated with spent fuel pool boiling and the fuel handling accident (FHA) occurring outside containment, respectively. Spent fuel pool boiling occurs as a result of loss of spent fuel pool cooling. The 30-day contribution of pool boiling to the dose at the low population zone boundary is less than 0.01 rem TEDE (see DCD Subsection 15.6.5.3). The duration of the FHA is two hours. In addition, the offsite doses are 25 percent or less than the dose guideline of 25 rem TEDE identified in 10 CFR 50.34 (see DCD Subsection 15.7.4.5). The limiting AP1000 offsite radiological consequences are associated with a LOCA with core melt scenario (see DCD Table 15.6.5-3). Therefore, since the distance and direction to the containment shell and plant vent are similar and the release height of the containment shell is lower, the containment shell is the most conservative LOCA release location to consider in the evaluation of TSC

atmospheric dispersion values. Therefore, a LOCA release from the containment shell is conservatively assumed.

The containment shell is a diffuse area source. The height and width of the area source are taken as the maximum vertical and horizontal dimensions of the above grade shield building cross-sectional area perpendicular to the line of sight from the building center to the TSC receptor location. The area of the containment obscured by the radwaste and auxiliary building was determined and subtracted from the total projected area of the containment to determine a representative area of the diffuse source, i.e., 36.6 m (120.1 ft) high by 44.2 m (145 ft) wide. The release height is set at the vertical center of the projected plane. The source-to-receptor distance is measured from the shield building to the TSC intake. Based on this approach, the vertical and horizontal diffusion coefficients are determined to be 6.1 m (20.0 ft) and 7.4 m (24.2 ft), respectively. The release height is at elevation 64.7 m (212.3 ft) or 34.2 m (112.3 ft) above grade. The horizontal distance from the projected plane of the Unit 3 containment to the TSC HVAC inlet is 91 m (@234°) and the horizontal distance from the projected plane of the Unit 4 containment to the TSC HVAC inlet is 224 m (@157°).

The direction to the source is used to establish which range of wind directions should be used in the assessment of the χ/Q values. The direction must have the same point of reference as the wind directions reported in the meteorological data; therefore, the directions from the receptors to the sources obtained from the site layout, are measured relative to True North.

The ARCON96 code uses the building area in determining the wake diffusion. The area of the building to be used in the determination of building wake effects is conservatively estimated as the above grade, cross-sectional area of the shield building which is determined to be 2842 m².

The releases are assumed to be ground level releases. Consistent with Regulatory Guide 1.194 guidance, a surface roughness of 0.2 and an averaging sector width constant of 4.3 are assumed for this application. A minimum wind speed of 0.45 m/s associated with the meteorological tower wind and direction instrumentation verification is assumed.

The site-specific TSC atmospheric dispersion values are listed below. The TSC atmospheric dispersion values determined for an accident at Unit 3 bound the values determined for an accident at Unit 4; therefore, the Unit 3 values are used to determine bounding radiological consequences for the TSC.

TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (s/m³)

Time Interval	Unit 3 Containment Shell Release	Unit 4 Containment Shell Release
0 – 2 hours	4.05E-04	1.06E-04
2 – 8 hours	3.16E-04	7.18E-05
8 – 24 hours	1.44E-04	2.94E-05
1 – 4 days	1.09E-04	2.22E-05
4 – 30 days	8.43E-05	1.59E-05

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.03.05-01

BLN site-specific terrain values found in the input files provided for XOQDOQ model runs, do not correlate with BLN COL FSAR Figures 2.3-286 and 2.3-287. These inconsistencies, if not adequately addressed, may impact this or other sections of this SER. This is identified as Open Item 2.3.5-1.

BLN RAI/OI ID: 3683

BLN RESPONSE:

A response to this item is in preparation to supplement the January 12, 2009, response to RAI 02.03.05-07 via BLN-RAI-LTR-140. The supplemental information is expected to be provided on the schedule shown on page 1 of this Enclosure.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.04-01

In a letter dated October 22, 2008, TVA requested that the NRC reschedule the review of the hydrology portion of the FSAR because it was having problems meeting the commitments it had made as a result of the NRC inspection. As a result of TVA's October 22, 2008, letter, the staff issued a letter, dated October 29, 2008, stating that it would stop the FSAR hydrology review and restart it after TVA satisfactorily passed an inspection and when reviewer resources were available. The NRC staff does not intend to issue Section 2.4 with the SER with open items for BLN 3 and 4. Instead, the staff intends to provide this section of the SER at a later time. The resolution of hydrologic engineering issues is identified as Open Item 2.4-1.

BLN RAI/OI ID: 3684

BLN RESPONSE:

As indicated in the open item discussion, the NRC Staff is still evaluating the hydrology portion of the FSAR. A supplemental response will be provided for this item should additional concerns be identified.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.01-01

Based upon its review of BLN COL FSAR Section 2.5.1.2.5, and the applicant's response to RAI 2.5.1-2, the staff concludes that the applicant provided a thorough and complete description of the site structural geology in support of its COL application as required by 10 CFR 52.79 and 10 CFR 100.23. Because of the potential for displacements to be present in the rock underlying the BLN site, the staff proposes a condition that the COL holder perform geologic mapping (based on guidance provided in RG 1.208) and geophysical exploration (discussed in Section 2.5.4 of this SER) of future excavations for safety-related structures, evaluate any unforeseen geologic features that are encountered, and notify the NRC no later than 30 days before any excavations for safety-related structures are open for the NRC's examinations and evaluation. The addition of this commitment to the FSAR is Open Item 2.5.1-1. This is proposed Commitment 2.5.1-1.

BLN RAI/OI ID: 3685

BLN RESPONSE:

A supplemental FSAR revision is identified in the COL Application Revisions section below to include the requested commitment in the FSAR. The information will be included in a future FSAR update.

However, we understand that additional guidance is being prepared by NRC regarding commitment documentation. Once this new guidance is available, it will be considered and if necessary, the technical information in this FSAR subsection will be appropriately revised or otherwise incorporated into the COL application.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

COLA Part 2, FSAR Chapter 2, Subsection 2.5.4.5.5, will be revised from:

Geologic maps of the excavation sides and the bearing surface are prepared to document the subgrade conditions, identify features requiring additional exploration, and identify areas needing additional rock removal, placement of dental concrete or grout, or installation of rock bolts for slope integrity, or prior to placing concrete or a mud mat for subgrade protection. Subsection 2.5.4.12 provides further discussion of the improvement techniques.

To read:

Geologic mapping (based on guidance provided in Appendix A of NUREG/CR-5738 as referenced in Regulatory Guide 1.132) and geophysical exploration (as discussed in Subsection 2.5.4.12.6) of excavations for safety-related structures are conducted. Geologic maps of the excavation sides and the bearing surface are used to document the subgrade conditions and to identify features requiring additional exploration. Unforeseen geologic features that are encountered during mapping or geophysical exploration are evaluated. The geologic maps are also used (prior to placement of concrete or a mud mat for subgrade protection) to identify areas needing additional rock removal, placement of dental concrete or grout, or installation of rock bolts for slope integrity. Subsection 2.5.4.12 provides further discussion of the improvement techniques.

The NRC will be notified no later than 30 days before any excavations for safety-related structures are scheduled to be open to allow for NRC examinations and evaluation.

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.02-01

The staff is concerned with the applicant's use of Model A, as it did not consider potential construction delays; neither did it consider the possibility of the prospective BLN nuclear power plant license being extended beyond the initial license period of 40 years. Seismic hazard analyses are not repeated during the license renewal process. The combined impact from using the applicant's present time and time period of interest may not be negligible. These parameters need to be properly determined for the lifecycle of a commercial nuclear power plant and used in calculating time dependent seismic hazard for NMSZ, which contributes significantly to the seismic hazard of the BLN site. This is identified as Open Item 2.5.2-1.

BLN RAI/OI ID: 3686

BLN RESPONSE:

A response to this item is in preparation to supplement the October 20, 2008, response to RAI 02.05.02-05 via BLN-RAI-LTR-125. The supplemental information is expected to be provided on the schedule shown on page 1 of this Enclosure.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.02-02

Because the staff has not previously reviewed either the TVA-DSS or the simplified model used by the applicant to model the Charleston seismic source for its PSHA, the staff is concerned that both of these source models may not adequately characterize the seismic hazard of the Charleston seismic source. Specifically, the staff is concerned that assigning a weight of 67 percent to the smaller fault-based source models may not adequately represent the uncertainty in the location(s) of the large-magnitude Charleston earthquakes. This issue is further amplified by the applicant's decision to use the single Woodstock fault model for its final PSHA. Much of the present day seismic activity in the Charleston seismic source zone is located fairly close to the Woodstock fault; however, this may not be the location of the repeating large-magnitude earthquakes, such as the magnitude 6.8 to 7.5 1886 earthquake. In addition, the applicant's characterization of the Charleston seismic source zone differs significantly from the Charleston seismic source zone hazard model used by Southern Nuclear Operating Company for its Vogtle ESP and previously approved by the NRC staff. In RAI 2.5.2-10, the staff asked the applicant to explain its use of the Woodstock fault as the sole source of the Charleston-type repeating large earthquakes and to provide hazard curves for the BLN site to show contribution of the Charleston seismic source to the total hazard. Because the staff has not yet reviewed the response to RAI 2.5.2-10, this is identified as Open Item 2.5.2-2.

BLN RAI/OI ID: 3687

BLN RESPONSE:

Additional information related to this open item was submitted for NRC Staff review on May 11, 2009 in response to RAI 02.05.02-10 via BLN-RAI-LTR-155. A supplemental response will be provided for this item should additional concerns be identified from this review.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.04-01

However, the staff concludes that the applicant did not adequately demonstrate the minimum cavity dimensions that could exist beneath the foundation basemat that are not observed using exploration techniques and that may have an adverse impact on the BLN 3 and 4 foundation and its structures. The basis for the staff's conclusion regarding minimum cavity dimension is the fact that the applicant did not adequately describe the Obert, Duvall and Merrill method that it used to formulate its RAI response and the staff is concerned that this method's criteria do not represent the conditions present at the BLN site. Therefore, in order to resolve this issue the applicant has to adequately address the minimum dimensions of a cavity that could adversely impact both the static and the dynamic design for the foundation basemat and the intersecting walls for BLN 3 and 4. This is Open Item 2.5.4-1.

BLN RAI/OI ID: 3688

BLN RESPONSE:

A response to this item is in preparation to supplement the January 13, 2009, response to RAI 02.05.04-01 via BLN-RAI-LTR-101. The supplemental information is expected to be provided on the schedule shown on page 1 of this Enclosure.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.04-02

Based on its review of the applicant's response to RAI 2.5.4-14, the staff concurs with the applicant that, since the compactor will be kept at least 1.5 m (5 ft.) from the wall that the additional stress will be negligible. The staff also agrees with the applicant's evaluation of the induced load from compaction near the exterior wall of the nuclear islands and agrees that an ITAAC is not needed for the compaction method. However, the staff concludes that the applicant needs to provide a commitment to ensure that the quality of the fill is sufficient to provide lateral stability to the nuclear island foundation basemat. This is identified as Open Item 2.5.4-2 and Commitment 2.5.4-1.

BLN RAI/OI ID: 3689

BLN RESPONSE:

A response to this item is in preparation to supplement the January 13, 2009, response to RAI 02.05.04-01 via BLN-RAI-LTR-101. The supplemental information is expected to be provided on the schedule shown on page 1 of this Enclosure.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.04-03

Based on its review of the applicant's response to RAI 2.5.4-8, the staff agrees with the applicant's conclusion that the grouting program does not meet the criteria for an ITAAC, but should be included in the NRC construction inspection portion of the post-COL activities. However, the staff has concerns regarding the grouting program because grouting pressure is dependent on the depth of a crack to be filled. A 34 kPa (5 psi) pressure, as indicated by the applicant, may not be sufficient to ensure a quality grouting (Army Corps of Engineers, 1984). Therefore, the need for further explanation of the grouting procedure proposed by the applicant is identified as Open Item 2.5.4-3.

BLN RAI/OI ID: 3690

BLN RESPONSE:

A response to this item is in preparation to supplement the September 19, 2008, response to RAI 02.05.04-03 via BLN-RAI-LTR-101. The supplemental information is expected to be provided on the schedule shown on page 1 of this Enclosure.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.04-04

In addition, the staff agrees with the applicant's explanation on the limitation of visual inspection and the necessity for geophysical methods in detecting subsurface cavities. Therefore, the staff concludes that a commitment should be made by the applicant in the FSAR to apply geophysical methods including resistivity, ground penetrating radar, or other exploratory methods to ensure that no cavities are present beneath safety-related structures, following excavation. This is Open Item 2.5.4-4 and Commitment 2.5.4-2.

BLN RAI/OI ID: 3691

BLN RESPONSE:

This commitment already exists in FSAR Subsection 2.5.4.12.6, Foundation Improvement Verification Program, which states "Inspection and mapping of the completed excavations is accomplished through observation and examination by appropriately-qualified and trained project inspection personnel. Geophysical techniques such as Ground Penetrating Radar, electrical resistivity, and microgravity surveying are performed on the excavation base to check for indications of larger cavities, consistent with the capability of the techniques, or anomalies that are further explored using test holes or probes. Soundings, test holes, and similar measures are used to augment visual identification of areas needing repairs and to document that appropriate corrective measures have been completed."

However, we understand that additional guidance is being prepared by NRC regarding commitment documentation. Once this new guidance is available, it will be considered and if necessary, the technical information in this FSAR subsection will be appropriately revised or otherwise incorporated into the COL application.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

To be provided in a future supplemental response (if needed).

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated October 20, 2009
SER OI Responses

NRC Letter Dated: September 4, 2009

NRC Review of Final Safety Analysis Report

NRC SER OI NUMBER: 02.05.04-05

Based on its review of the applicant's response to RAI 2.5.4-9, the staff agrees with the applicant's conclusion that the blasting program at the site does not meet the criteria for an ITAAC. However the staff concludes that a commitment should be made by the applicant, in the FSAR, to ensure that there is no unnecessary fracturing of the in-situ rock due to blasting damage and that any necessary post-blasting remediation will take place. This is Open Item 2.5.4-5 and Commitment 2.5.4-3.

BLN RAI/OI ID: 3692

BLN RESPONSE:

A supplemental FSAR revision is identified in the COL Application Revisions section below to include the requested commitment in the FSAR.

However, we understand that additional guidance is being prepared by NRC regarding commitment documentation. Once this new guidance is available, it will be considered and if necessary, the technical information in this FSAR subsection will be appropriately revised or otherwise incorporated into the COL application.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS

COLA Part 2, FSAR Chapter 2, Subsection 2.5.4.5.2.1, will be revised from:

Blasting is quicker than rock predrilling or line drilling, but would also result in more noise and vibrations, and a greater potential for damage to rock bearing surfaces. On the other hand, rock predrilling or line drilling would be slower than blasting, but reduces potential for overexcavation to remove damaged rock. The experience from construction of Bellefonte Units 1 and 2 shows that predrilling and line drilling were used for the near-vertical rock excavation sides with controlled blasting techniques for the foundation areas with normal and acceptable levels of damage that were readily addressed by inspection and repairs (Reference 201).

To read:

Blasting is quicker than rock predrilling or line drilling, but would also result in more noise and vibrations, and a greater potential for damage to rock bearing surfaces. On the other hand, rock predrilling or line drilling would be slower than blasting, but reduces potential for overexcavation to remove damaged rock. The experience from construction of Bellefonte Units 1 and 2 shows that predrilling and line drilling were used for the near-vertical rock excavation sides with controlled blasting techniques for the foundation areas with normal and acceptable levels of damage that were readily addressed by inspection and repairs (Reference 201). Blasting is similarly controlled for Units 3 and 4 to minimize fracturing of the in-situ rock consistent with the needs for removal. The exposed foundation rock after removal of the blasted rock is assessed by the geologic mapping program described in Subsection 2.5.4.5.5, and areas judged to have damages from blasting are remediated.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None