



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

April 15, 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

**BELLEVILLE COMBINED LICENSE APPLICATION – RESPONSE TO REQUEST FOR
ADDITIONAL INFORMATION – PROBABILISTIC RISK ASSESSMENT**

Reference: Letter from Ravindra Joshi (NRC) to Andrea Sterdis (TVA), Request for
Additional Information Letter No. 152 Related to SRP Section 19 for the
Belleville Units 3 and 4 Combined License Application, dated March 11, 2009.

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 each NRC request in the subject 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 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 15th day of April, 2009.

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

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cc: See Page 2

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NRW

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cc: (w/Enclosure)

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E. Cummins, Westinghouse
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M.W. Gettler, FP&L
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P. S. Hastings, NuStart
P. Hinnenkamp, Entergy
R. G. Joshi, NRC/HQ
M. C. Kray, NuStart
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B.C. Anderson, NRC/HQ
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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

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Responses to NRC Request for Additional Information letter No. 152 dated March 11, 2009
(24 pages, including this list)

Subject: Probabilistic Risk Assessment in the Final Safety Analysis Report

| <u>RAI Number</u> | <u>Date of TVA Response</u> |
|-------------------|-----------------------------------|
| 19-08 | This letter – see following pages |
| 19-09 | This letter – see following pages |
| 19-10 | This letter – see following pages |
| 19-11 | This letter – see following pages |
| 19-12 | This letter – see following pages |
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| 19-21 | This letter – see following pages |

Associated Additional Attachments / Enclosures

Attachment 19-09A

Pages Included

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NRC Letter Dated: March 11, 2009

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-08

[Follow-up to Question 19-02]

In your RAI response dated 9/4/08, there is a table of external events. One column of this table is labeled "Applicable to Site? (Y/N)" The staff considers all events that are physically possible to be "applicable" and expects that they will be discussed. For example, if there is no dam a higher elevation in the same watershed as the site, flooding due to dam failure would not apply. Some of the assessments documented in the response are not consistent with this understanding. Please clarify what is meant by "applicable" in your response and ensure that the response is consistent with this meaning.

BLN RAI ID: 3193

BLN RESPONSE:

An event was considered applicable to the site if the initiating event frequency is greater than $1E-07$, or if a quantitative consequence evaluation demonstrated that there are site specific parameters that exceed the parameters used in APP-GW-GLR-101, AP1000 Probabilistic Risk Assessment Site-Specific Considerations (AP1000 DCD Reference 19.59-4). Therefore, an event was considered to be not applicable to the site if the initiating event frequency is less than $1E-07$ or if the quantitative consequence evaluation demonstrated that the event will not adversely impact the safe operation of BLN Units 3 and 4.

The "External Event Frequencies for BLN" table provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to reflect the staff definition of "applicable" and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to include clarification of "Applicable" in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

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NRC RAI NUMBER: 19-09

[Follow-up to Question 19-02]

The staff agrees that many of the events applicable to a site may be screened from further evaluation because they are so infrequent that their contribution to risk is too small to affect the plant CDF or LRF, even if core damage is assumed to result. Other events that are less frequent than 1E-06 may also be screened if the conditional core damage probability is so low that the risk from all such sequences taken together is too small to affect CDF or LRF. The basis for screening and assessment of risk from events that cannot be screened (including a description of the logic used to screen the event and reference for numerical values) must be reported in the BLN Final Safety Analysis Report (FSAR) along with other PRA results and assumptions. Please document these PRA results in the FSAR. (Format and content expectations are documented in Appendix A to Section C.I.19 of RG 1.206, "Combined License Applications for Nuclear Power Plants.")

BLN RAI ID: 3194

BLN RESPONSE:

"Table 1 – External Event Frequencies for BLN" provided in the response to NRC Request for Additional Information Letter No. 083, dated July 21, 2008, RAI 19-02, will be revised to detail the screening basis and assumptions used in the PRA results. Additionally, the table will include the results of other RAIs in this letter. The revised table will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

The associated application revisions include items that are both PLANT-SPECIFIC and items that are expected to be STANDARD for the S-COLAs as shown in the Application Revisions section below. The portion of this response which presents new supplement 19.58-1 and the new table provided in Attachment 19.09A are PLANT-SPECIFIC. The remaining portion, COLA change number 5, is expected to be STANDARD for the S-COLAs.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 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.

2. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to add new Subsection 19.58.3, that reads

19.58.3 Conclusion

Add the following information at the end of DCD Subsection 19.58.3:

BLN SUP 19.58-1 Table 19.58-201 documents the site-specific external events evaluation that has been performed for BLN Units 3 and 4. This table provides a general explanation of the evaluation and resultant conclusions and provides a reference to applicable sections of the COL where more detailed supporting information

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(including data used, methods and key assumptions) regarding the specific event is located. Based upon this evaluation, it is concluded that the BLN Units 3 and 4 site is bounded by the High Winds, Floods and Other External Events analysis documented in DCD Section 19.58 and APP-GW-GLR -101 (Reference 201) and no further evaluations are required at the COL application stage.

3. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to add new Subsection 19.58.4, that reads

19.58.4 References

201. Westinghouse Electric Company LLC, "AP1000 Probabilistic Risk Assessment Site-Specific Considerations," Document Number APP-GW-GLR-101, Revision 1, October 2007.
202. NUREG/CR-4461, "Tornado Climatology of the Contiguous United States," Revision 2, February 2007.
203. Texas Tech University, Wind Science and Engineering Center, "A Recommendation for an Enhanced Fujita Scale (EF-Scale)," June 2004.
204. ASCE Standard ASCE/SEI 7-05, "Minimum Design Loads for Buildings and Other Structures," 2006.

4. COLA Part 2, FSAR Chapter 19, Section 19.58, add new Table 19.58-201 as shown in Attachment 19-09A.

5. COLA Part 2, FSAR Chapter 19, Subsection 19.59.10.5, fourth paragraph will be revised from:

It has been confirmed that the Winds, Floods, and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Chapter 19 of the AP1000 DCD is applicable to this design.

To read:

As discussed in Section 19.58.3, it has been confirmed that the Winds, Floods, and Other External Events analysis documented in DCD Section 19.58 is applicable to the site. The site-specific design has been evaluated and is consistent with the AP1000 PRA assumptions. Therefore, Section 19.58 of the AP1000 DCD is applicable to this design.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

Attachment 19-09A

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NRC RAI Number: 19-10

[Follow-up to Question 19-02]

Section 19.58 of the AP1000 Design Control Document (DCD) classifies tornadoes according to the enhanced Fujita scale. To allow direct comparison between the FSAR and the referenced DCD, please re-classify tornadoes reported in the FSAR using the enhanced Fujita scale.

BLN RAI ID: 3195

BLN RESPONSE:

The Texas Tech University (TTU) research Publication, "A Recommendation for an Enhanced Fujita Scale (EF-Scale)," (Reference 1) correlates the Fujita-Scale wind speeds with the EF-Scale wind speeds, and states that a tornado rated according to the Fujita-Scale will have the same "F-Number" in the EF Scale, e.g. F3 translates into EF3, although the wind speed ranges are different. TTU developed the linear regression function demonstrating the correlation between the two scales and the resulting table:

$$Y = 0.6246X + 36.393$$

| Fujita Scale | | EF Scale | |
|--------------|-------------------|----------|-------------------|
| Fujita Scale | 3s Wind Gust, mph | EF Scale | 3s Wind Gust, mph |
| F0 | 45-78 | EF0 | 65 - 85 |
| F1 | 79 - 117 | EF1 | 86 - 109 |
| F2 | 118 - 161 | EF2 | 110 - 137 |
| F3 | 162 - 209 | EF3 | 138 - 167 |
| F4 | 210 - 261 | EF4 | 168 - 199 |
| F5 | 262 - 317 | EF5 | 200 - 234 |

Y is the EF-Scale wind speed and X is the Fujita-Scale wind speed (both are 3-second gust in mph).

The "External Event Frequencies for BLN" table provided in the response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02 will be revised to present the tornado events classified using the Enhanced Fujita Scale and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

REFERENCE: Texas Tech University, Wind Science and Engineering Center, "A Recommendation for an Enhanced Fujita Scale (EF-Scale)," June, 2004.

This response is PLANT-SPECIFIC.

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ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to provide the requested information based on Fujita-Scale in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC RAI NUMBER: 19-11

[Follow-up to Question 19-02]

The BLN tornado analysis uses only data from Jackson County (21 tornadoes); this data set does not provide an adequate sample size. (NUREG/CR-4461, "Tornado Climatology of the Contiguous United States," recommends using data from a box two degrees to four degrees (latitude and longitude) on a side to obtain a representative sample. It also states that 1-degree boxes should only be used if the number of events is large enough to ensure reliable statistics. The information in FSAR Table 2.3-208 provides data from a seven-county region around the BLN site.) Please revise the site-specific tornado frequency calculations using data from an area larger than Jackson County. Provide the basis for determining that observations were taken over a sufficiently large area and justify the adequacy of the sample size.

BLN RAI ID: 3196

BLN RESPONSE:

The information in FSAR Table 2.3-208 provides an adequate sample size for the BLN tornado analysis. The combined area of the seven neighboring counties represented in the table is 4,447 square miles, which is slightly larger than a 1-degree box centered on the site (3,943 square miles). NUREG/CR-4461, "Tornado Climatology of the Contiguous United States," states that 1-degree boxes should only be used if the number of events is large enough to ensure reliable statistics. NUREG/CR-4461, Appendix C, indicates that a minimum of 10 events and 20 or more events are desirable. FSAR Table 2.3-208 provides 151 events for the seven counties. Therefore, the NUREG/CR-4461 criterion for sample size is met.

Revised tornado frequency estimates using the data from FSAR Table 2.3-208 for all seven counties is provided in response to RAI 19-12, this letter.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

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NRC RAI NUMBER: 19-12

[Follow-up to Question 19-02]

For tornado classes EF0 to EF3, the BLN frequency estimates are based on a point-structure strike probability. Use of a point-structure strike probability alone may be optimistic. (NUREG/CR-4461, Section 4.2, indicates that for large structures, the probability of a tornado strike should consider characteristic dimensions of the structure and the expected length of the tornado's path.) Please justify the use of a point-structure strike probability or revise the site-specific tornado frequencies to account for the dimensions of the plant structures and tornado path length.

BLN RAI ID: 3197

BLN RESPONSE:

Tornado activity for the seven-county region around the BLN site from 1950 through 2005 is provided in FSAR Table 2.3-208. As discussed in response to RAI 19-11, this letter, the information in FSAR Table 2.3-208 provides an adequate sample size for the BLN tornado analysis. Using the methodology for large structure-strike probability in NUREG/CR-4461, Section 4.2, and the methodology described in the response to RAI 19-10, this letter, to convert from the Fujita scale to the enhanced Fujita scale, the BLN frequency estimates are as follows:

BLN Large-Structure Frequency Estimates

| | EF0 Tornado | EF1 Tornado | EF2 Tornado | EF3 Tornado | EF4 Tornado | EF5 Tornado |
|----------|--------------------|----------------|----------------|--------------------|--------------------|--------------------|
| Jackson | 7.74E-06 | 1.22E-05 | 2.58E-05 | 1.61E-05 | No recorded events | No recorded events |
| Dakalb | 7.09E-06 | 1.68E-05 | 6.91E-05 | 1.77E-05 | 2.48E-05 | No recorded events |
| Marshall | 2.43E-06 | 7.29E-05 | 1.18E-04 | 4.62E-05 | 1.22E-05 | No recorded events |
| Madison | 2.91E-05 | 6.41E-05 | 8.72E-05 | 4.45E-05 | 1.62E-05 | 2.39E-05 |
| Franklin | 2.48E-06 | 4.35E-05 | 1.12E-05 | 4.97E-06 | 4.47E-05 | No recorded events |
| Marrion | 4.15E-06 | 1.52E-05 | 2.08E-05 | No recorded events | No recorded events | No recorded events |
| Dade | No recorded events | 1.19E-05 | 1.58E-05 | No recorded events | No recorded events | No recorded events |

Note: Tornadoes with zero length were addressed by giving them average lengths based on other tornadoes in the same class and county. Also, EF0 tornadoes with zero lengths for Marshall and Franklin counties

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were given a 2 mi. length, because 2 mi. is the highest average length for EF0 tornados amongst the seven counties. Additionally, the characteristic dimension is taken from NUREG/CR-4461, Section 4.2 as 0.0379 miles.

The total large-structure strike probability for any category storm occurring in these combined seven counties is $8.89E-04$ events/year. BLN has conservatively assumed that the strike probability for a tornado of a given intensity is equal to the overall strike probability for any tornado. These event frequencies are bounded by the limiting initiating event frequencies given in Table 3.0-1 of APP-GW - GLR -101.

Therefore, the safety features of the AP1000 are unaffected and the Core Damage Frequencies given in APP-GW-GLR-101, AP1000 Probabilistic Risk Assessment Site-Specific Considerations, Table 3.0-1 for these events are applicable to BLN Units 3 and 4.

“Table 1 - External Event Frequencies for BLN,” provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to present the tornado event probabilities using Large-Structure Frequency Estimates and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to provide the requested tornado information in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2008

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NRC RAI NUMBER: 19-13

[Follow-up to Question 19-02]

The response to Question 19-02 indicates that no hurricanes have been recorded within 25 miles of Jackson County since 1851. The path of a particular hurricane is too unpredictable for this to be an adequate sample. The staff expects applicants to evaluate observations over a larger area (within 100 miles). However, if a site is clearly outside a "hurricane-prone" region (as defined in ASCE-705, "Minimum Design Loads for Buildings and Other Structures"), the staff considers it reasonable to assume that the frequency of very severe hurricanes is negligibly small. Hurricanes in each of the higher categories (Category 3, 4, or 5) may be screened out unless hurricane-strength winds associated with that category (or a higher one) have been observed within 100 miles of the site. Please provide hurricane frequencies based on observations within 100 miles of the site or provide the basis for concluding that BLN is not in a hurricane-prone region.

BLN RAI ID: 3198

BLN RESPONSE:

ASCE/SEI 7-05 defines Hurricane Prone Regions as:

Areas vulnerable to hurricanes; in the United States and its territories defined as

1. The U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 mi/h, and
2. Hawaii, Puerto Rico, Guam, Virgin Islands, and American Samoa.

Figure 6-1B of ASCE/SEI 7-05 shows the basic wind speed for the eastern part of the Gulf of Mexico, including the state of Alabama. BLN is located in the northeast part of the state beyond the 90 mph contour. Thus, it is concluded BLN is not located in a Hurricane Prone Region.

Historical data for tropical weather is archived by the NOAA Coastal Services Center, and dates back to 1851. The Historical Hurricane Tracks data base, which can be accessed via <http://maps.csc.noaa.gov/hurricanes/viewer.html>, shows no hurricanes have been reported within 100 miles of the site since record-keeping was initiated in 1851.

Therefore, it is concluded that the safety features of the AP 1000 are unaffected and the resultant CDFs given in APP-GW-GLR-101, AP1000 Probabilistic Risk Assessment Site-Specific Considerations, Table 3.0-1 for hurricanes are applicable to BLN Units 3 and 4.

"Table 1 - External Event Frequencies for BLN," provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to reflect this discussion and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

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ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to include the requested hurricane information in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-14

[Follow-up to Question 19-02]

The response to Question 19-02 states that the Category 5 hurricane frequency is determined by dividing the measured duration by the number of occurrences of tropical weather. It is more likely that the number of occurrences was divided by the interval over which observations were recorded. Please clarify the definition of event frequency in the FSAR.

BLN RAI ID: 3199

BLN RESPONSE:

As discussed in the response to RAI 19-13, this letter, there are no recorded hurricanes of any category within 100 miles of the site since record-keeping was initiated in 1851. The explanation provided in the table submitted in the response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, has been clarified. "Table 1 - External Event Frequencies for BLN" provided in response to RAI 19-02 will be revised to delete this note for Category 5 hurricanes and will be added to the FSAR as new Table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to provide the requested hurricane information in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-15

[Follow-up to Question 19-02]

The AP1000 DCD includes consideration of tropical storms in its evaluation of the risk from high winds. Please revise the FSAR to include an estimate of extratropical cyclone frequency. Include hurricanes downgraded to tropical storms (or less) by the time they approach the BLN site. Demonstrate that this frequency is bounded by the corresponding value in the AP1000 DCD.

BLN RAI ID: 3200

BLN RESPONSE:

Historical data for tropical weather is archived by the National Coastal Services Center, and dates back to 1851. The Historical Hurricane Tracks data base identifies a total of 32 separate tropical storms within 100 statute miles of the site. These 32 separate tropical storms include hurricanes downgraded to tropical storms (or less).

The event frequencies are based on the number of recorded events over the 158 year period of record.

| Event | Events/year |
|------------------------|-------------|
| Tropical Storm | 8.23E-02 |
| Tropical Depression | 1.01E-01 |
| Extratropical Cyclones | 1.90E-02 |

The maximum wind speed of these storms is less than 65 mph. As documented in FSAR Table 2.0-201, the BLN site characteristic operating basis wind speed (96 mph) is below the DCD site characteristic operating basis wind speed of 145 mph and bounds the maximum wind speed identified above (65 mph). Therefore, it is concluded that the safety features of the AP 1000 are unaffected by tropical storms and the resultant CDFs given in APP-GW-GLR-101, AP1000 Probabilistic Risk Assessment Site-Specific Considerations, Table 3.0-1 for these events are applicable to BLN Units 3 and 4.

“Table 1 - External Event Frequencies for BLN” provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to include evaluation of tropical storms and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to provide the requested extratropical cyclones information in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

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NRC RAI NUMBER: 19-16

[Follow-up to Question 19-02]

For risk from external flooding, expand the discussion to address all potential causes of elevated water levels (e.g., precipitation, dam failure), including credible combinations of sources. Provide a justification for screening external floods as a significant risk contributor, or include them in the site-specific PRA. Given that no basis has been provided for concluding that CCDP is less than unity when water levels exceed plant grade elevation, external flooding can only be screened if a conservative analysis demonstrates that the frequency is negligible.

BLN RAI ID: 3201

BLN RESPONSE:

FSAR Section 2.4 addresses the impact of external flooding, including PMP, PMF, dam failure, and credible combinations of sources.

As discussed in FSAR Subsection 2.4.2, the maximum flood elevation at the BLN site is 622.5 ft. msl. Coincident wind waves would create maximum waves of 5.41 ft. (trough to crest) and produce maximum flood levels of 624.03 ft. msl, including wind wave setup and run-up. The BLN plant grade of 628.6 ft. msl is above the worst potential flood considerations.

Additionally, as discussed in FSAR Subsection 2.4.2, the maximum water level due to the local PMP event without drainage is 627.53 ft. msl in the vicinity of the safety-related structures, which is below plant grade. Therefore, no external flood protection measures are required for BLN Units 3 and 4.

As discussed in FSAR Subsection 2.4.3.5, the maximum flood elevation at the BLN was determined to be 622.1 ft. msl, produced by the 21,400 sq. mi. storm and coincident overtopping failure of the west saddle dike at Watts Bar Dam and the north embankment at Nickajack Dam. Chickamauga Dam is overtopped but was assumed not to fail. However, proposed dam safety modifications to allow overtopping at Chickamauga Dam have not been performed. Without the dam safety modifications at Chickamauga Dam, the maximum flood elevation was determined to be 622.5 ft. msl. The BLN safety-related structures are located at elevation 628.6 ft. msl and are unaffected by flood conditions.

As discussed in FSAR Subsection 1.2.2, the BLN plant grade elevation of 628.6 ft. msl corresponds to DCD grade elevation 100 ft. Based upon the quantitative evaluations performed, the BLN site is not susceptible to any external floods which would adversely impact safe operation of BLN Units 3 and 4.

This is consistent with the evaluation presented in Section 4.0 of APP-GW-GLR-101, AP1000 Probabilistic Risk Assessment Site-Specific Considerations, which states that the AP1000 is protected against floods up to the 100 ft. level. Therefore, it is concluded that the resultant CDF of 5.85E-15 events per year given in APP-GW-GLR-101, Section 4.0 is bounding.

“Table 1 - External Event Frequencies for BLN” provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to reflect this discussion and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

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ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to include the flooding information in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-17

[Follow-up to Question 19-02]

The applicant's response to risk from manmade hazards does not address those associated with toxic materials. Please discuss the level of risk related to potential hazards associated with toxic materials and the systematic method used to assess or screen the hazard including the basis for numerical values used. Deterministic evaluations documented in other parts of the FSAR need not be repeated but should be cited if they are used to help support the assessment of risk.

BLN RAI ID: 3202

BLN RESPONSE:

FSAR Subsection 2.2.3.1.3, Toxic Chemicals, as revised in response to NRC Request for Additional Information Letter No. 132, dated October 23, 2008, RAI 02.02.03-08, evaluates releases of toxic chemicals from stationary industrial sources and mobile sources. FSAR Subsection 2.2.3.1.3, as revised in response to RAI 02.02.03-08, indicates that all chemicals evaluated from these sources were screened out using the screening criteria of Regulatory Guide 1.78, with the exception of ethyl alcohol for barge traffic, nitrogen for the truck traffic, and the chlorine, anhydrous ammonia, propylene oxide, and hydrogen fluoride railroad tanker traffic release events.

FSAR Subsection 6.4.4.2, Toxic Chemical Habitability Analysis, as revised in response to NRC Request for Additional Information Letter No. 132, dated October 23, 2008, RAI 02.02.03-08, evaluates the release events that were not screened out in FSAR Subsection 2.2.3.1.3. The maximum concentration at the control room HVAC intake for each of these events is less than the IDLH (i.e., immediately dangerous to life and health) for the respective chemicals except for chlorine and hydrogen fluoride. The analysis presented in FSAR Subsection 6.4.4.2 shows that for the case resulting in the most rapid rise in either the chlorine or hydrogen fluoride concentration inside the control room, there is sufficient time for the control room operators to take protective measures within two minutes after detection, the Regulatory Guide 1.78 criterion. These protective measures are also described in this subsection.

Based on these evaluations, release of toxic chemicals from stationary industrial sources and mobile sources in the vicinity of BLN does not pose a credible threat to the control room operators. Thus, these events are not considered to be risk-important.

"Table 1 - External Event Frequencies for BLN" provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to reflect this discussion and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to provide the toxic gas information in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

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ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

NRC Review of Final Safety Analysis Report

NRC RAI Number: 19-18

[Follow-up to Question 19-02]

The DCD lists “nearby facility accidents” among the manmade external hazards but describes no approach to addressing these potential hazards. It is clear that such hazards can exist, and it is expected that COL applicants will address them by screening them out of the PRA or subjecting them to additional analysis by methods similar to those used for transportation hazards and pipelines. Both physical and chemical hazards should be assessed. Please discuss the level of risk related to potential hazards associated with nearby facilities and the systematic method used to assess or screen the hazard including the basis for numerical values used. Deterministic evaluations documented in other parts of the FSAR need not be repeated but should be cited if they are used to help support the assessment of risk.

BLN RAI ID: 3203

BLN RESPONSE:

FSAR Subsection 2.2.3.1.1.3 discusses potential design basis events associated with accidents at nearby facilities. FSAR 2.2.3.2 concludes that the effects of events from these facilities on the safety-related components of the plant are insignificant. Therefore, because no risk-important consequences were identified, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.

“Table 1 - External Event Frequencies for BLN” provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to address accidents from nearby facilities and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to include clarification of “nearby facility accidents” in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2009

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-19.

[Follow-up to Question 19-02]

The DCD calls for the applicant to “reevaluate the qualitative screening of external fires” and perform a risk assessment if it cannot be demonstrated that the frequency of hazard is $<1E-07$ per year. Please document this reevaluation or assessment in the FSAR.

BLN RAI ID: 3204

BLN RESPONSE:

FSAR Subsection 2.2.3.1.4 discusses external fires and concludes that fires originating from accidents at nearby facilities or transportation routes, and brush and forest fires will not endanger the safe operation of the station. Additionally, this subsection states that fire and smoke from accidents at nearby homes, industrial facilities, transportation routes, or from area forest or brush fires do not jeopardize the safe operation of the plant due to the separation distance from the plant.

Therefore, because no risk-important consequences were identified, the potential for hazards from external fires is minimal and will not adversely affect safe operation of BLN Units 3 and 4.

“Table 1 - External Event Frequencies for BLN” provided in response to NRC Request for Additional Information Letter No. 083 dated July 21, 2008, RAI 19-02, will be revised to address external fires and will be added to the FSAR as new table 19.58-201 in a future revision to the COLA.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, Subsection 19.58 will be revised to include the external fires evaluation in FSAR Table 19.58-201. Refer to response to RAI 19-09, this letter, for the details of COLA changes.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-20

[Follow-up to Question 19-05)

In response to NRC RAI 19-05, a change to COL Information Item 19.59.10-2 was proposed to account for plant-specific design, design changes, or departures from the design certification that affect the PRA. A similar issue appears in COL Information Item 19.59.10 3 (dealing with internal fire and internal flood analyses). It should be addressed in a similar manner. Both COL Information Item Nos. 19.59.10 2 and 19.59.10 3 appear again in License Condition No. 2, "Summary of COL Information Holder Items," of Part 10 of the BLN COLA, which should also be updated. Please propose an appropriate revision to the application.

BLN RAI ID: 3205

BLN RESPONSE:

The process for development of the plant specific internal fire and internal flood analyses provided in STD COL 19.59.10-3 will include evaluation of plant as-built differences, departures from certified design and the results of the plant specific review of the DCD. Differences will be evaluated and the internal fire and internal flood analyses modified as necessary to reflect the plant specific design.

To be consistent with the response to RAI 19-05, STD COL 19.59.10-1 will also be revised to remove the term "significant adverse effect." A review of the differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis will be completed prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated and the seismic margins analysis modified as necessary to reflect the plant specific design.

COL Information Items 19.59.10-1 and 19.59.10-3 will be clarified concerning "significant adverse effect" and to make the wording similar to COL item 19.59.10-2 as describe above. In addition, COL Information Item Nos. 19.59.10-1, 19.59.10-2, and 19.59.10-3 in License Condition No. 2, "Summary of COL Information Holder Items," of Part 10 of the BLN COLA will be revised to conform with the wording of the respective COL items in a future revision to the COLA.

This response is expected to be STANDARD for the S-COLAs.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 19, subsection 19.59.10.5, STD COL 19.59.10-1, first three sentences will be changed from:

A review of the differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis will be completed prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated to determine if there is a significant adverse effect on the seismic margins analysis results.

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To read:

A review of the differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis will be completed prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated and the seismic margins analysis modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design.

2. COLA Part 2, FSAR Chapter 19, Subsection 19.59.10.5, STD COL 19.59.10-3 will be revised from:

A review of the differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis will be completed prior to fuel load. Differences will be evaluated to determine if there is significant adverse effect on the internal fire and internal flood analysis results.

To read:

A review of the differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analyses will be completed prior to fuel load. Plant specific internal fire and internal flood analyses will be evaluated and the analyses modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design.

3. COLA Part 10, License Conditions and ITAAC, BLN Proposed License Condition 2, COL Holder Items, first paragraph, will be revised from:

| | | | |
|---|--|------------|----------------------------|
| 19.59.10-1 | As-Built SSC HCLPF Comparison to Seismic Margin Evaluation | 19.59.10.5 | Prior to initial fuel load |
| <p>The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated to determine if there is a significant adverse effect on the seismic margins analysis results. Spacial interactions are addressed by COL information item 3.7-3. Details of the process will be developed by the Combined License holder.</p> | | | |

To read:

| | | | |
|---|--|------------|----------------------------|
| 19.59.10-1 | As-Built SSC HCLPF Comparison to Seismic Margin Evaluation | 19.59.10.5 | Prior to initial fuel load |
| <p>The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis prior to fuel load. A verification walkdown will be performed with the purpose of identifying differences between the as-built plant and the design. Any differences will be evaluated and the seismic margins analysis modified as necessary to account for the plant specific-design, and any design changes or departures from the certified design. Spacial interactions are addressed by COL information item 3.7-3. Details of the process will be developed by the Combined License holder.</p> | | | |

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4. COLA Part 10, License Conditions and ITAAC, BLN Proposed License Condition 2, COL Holder Items, will be revised from:

| | | | |
|---|--|------------|----------------------------|
| 19.59.10-2 | Evaluation of As-Built Plant Versus Design in AP1000 PRA and Site-Specific PRA External Events | 19.59.10.5 | Prior to initial fuel load |
| <p>The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 PRA and Table 19.59-18 prior to fuel load. If the effects of the differences are shown, by a screening analysis, to potentially result in a significant increase in core damage frequency or large release frequency, the PRA will be updated to reflect these differences.</p> | | | |

To read:

| | | | |
|--|--|------------|----------------------------|
| 19.59.10-2 | Evaluation of As-Built Plant Versus Design in AP1000 PRA and Site-Specific PRA External Events | 19.59.10.5 | Prior to initial fuel load |
| <p>The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 PRA and Table 19.59-18 prior to fuel load. The plant specific PRA-based insight differences will be evaluated and the plant specific PRA model modified as necessary to account for the plant specific-design and, any design changes or departures from the design certification PRA.</p> | | | |

5. COLA Part 10, License Conditions and ITAAC, BLN Proposed License Condition 2, COL Holder Items, will be revised from:

| | | | |
|---|---|------------|----------------------------|
| 19.59.10-3 | Internal Fire and Internal Flood Analyses | 19.59.10.5 | Prior to initial fuel load |
| <p>The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis prior to fuel load. Differences will be evaluated to determine if there is significant adverse effect on the internal fire and internal flood analysis results.</p> | | | |

To read:

| | | | |
|--|---|------------|----------------------------|
| 19.59.10-3 | Internal Fire and Internal Flood Analyses | 19.59.10.5 | Prior to initial fuel load |
| <p>The Combined License holder referencing the AP1000 certified design will review differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analyses prior to fuel load. Plant specific internal fire and internal flood analyses will be evaluated and the analyses modified as necessary to account for the plant-specific design, and any design changes or departures from the certified design</p> | | | |

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

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NRC Letter Dated: March 11, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 19-21

[Follow-up to Question 19-03)

In response to NRC RAI 19-03, three changes to STD COL Information Item 19.59.10-4 were proposed: (1) implementing SAMG on a site-specific basis, interfacing with the emergency operating procedures and the emergency plan, as well as providing training for the emergency response organization; (2) providing a schedule for this implementation; and (3) shifting responsibility from the COL applicant to the COL holder. The staff understands that development of SAMG has been completed. Revise the proposed COL information item and associated license conditions (2 and 6) to address a schedule for the future implementation, rather than for the development, of site-specific SAMG.

BLN RAI ID: 3206

BLN RESPONSE:

STD COL information item 19.59.10-4 described in FSAR Subsection 19.59.10.5 addresses implementation, not development, of a site-specific SAMG. Thus, no change is required to this section of FSAR. The COL item tabulation in FSAR Table 1.8-202 and the associated license conditions (2 and 6) will be revised in a future revision to the COLA to address a schedule for the future implementation, rather than for the development, of site-specific SAMG.

This response is expected to be STANDARD for the S-COLAs.

ASSOCIATED BLN COL APPLICATION REVISIONS:

1. COLA Part 2, FSAR Chapter 1, Table 1.8-202, COL ITEM 19.59.10-4 will be changed from:

Develop and Implement Severe Accident Management Guidance

To read:

Implement Severe Accident Management Guidance

2. COLA Part 10, License Conditions and ITAAC, BLN Proposed License Condition 2, Col Holder Items, will be revised from:

| | | | |
|------------|---|------------|--------------------------|
| 19.59.10-4 | Develop and Implement Severe Accident Management Guidance | 19.59.10.5 | Prior to startup testing |
|------------|---|------------|--------------------------|

To read:

| | | | |
|------------|---|------------|--------------------------|
| 19.59.10-4 | Implement Severe Accident Management Guidance | 19.59.10.5 | Prior to startup testing |
|------------|---|------------|--------------------------|

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3. COLA Part 10, License Conditions and ITAAC, BLN Proposed License Condition 6, Operational Program Readiness, will be revised from:

b. This schedule shall include a schedule for the development of a site specific Severe Accident Management Guidance.

To read:

b. This schedule shall include a schedule for the implementation of a site specific Severe Accident Management Guidance.

ASSOCIATED ATTACHMENTS/ENCLOSURES:

None

Attachment 19-09A
TVA letter dated April 15, 2009
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Attachment 19-09A
FSAR Section 19.58
New Table 19.58-201

Table 19.58-201
External Event Frequencies for BLN

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|------------|-------------|--|--|--------------------|
| High Winds | EF0 Tornado | Y | <p>The Texas Tech University (TTU) research Publication, "A Recommendation for an Enhanced Fujita Scale (EF-Scale)," (Reference 203) correlates the Fujita-Scale wind speeds with the EF-Scale wind speeds, and states that a tornado rated according to the Fujita Scale will have the same "F-Number" in the EF Scale, e.g. F3 translates into EF3, although the wind speed ranges are different. Accordingly, the tornado classifications are presented using the EF scale for consistency with APP-GW-GLR-101 (Reference 201).</p> <p>Tornado activity for the seven county region around the BLN site is provided in FSAR Table 2.3-208 from 1950 through 2005. The information in this table provides an adequate sample size for the BLN tornado analysis. The combined area of the seven neighboring counties represented in the table is 4,447 square miles which is slightly larger than a 1-degree box centered on the site (3,943 square miles). NUREG/CR-4461 (Reference 202), states that 1-degree boxes should only be used if the number of events is large enough to ensure reliable statistics. NUREG/CR-4461, Appendix C, indicates that a minimum of 10 events and 20 or more events are desirable. FSAR Table 2.3-208 provides 151 events for the seven counties. Therefore, the NUREG/CR-4461 criterion for sample size is met.</p> <p>The strike probability is determined using the methodology for large structure strike probability in NUREG/CR-4461, Section 4.2. Note, tornados with zero length were addressed by giving them average lengths based on other tornados in the same class and county. Also, EF0 tornados with zero lengths for Marshall and Franklin county were given a 2 mi length, because 2 mi is the highest average length for EF0 tornados amongst the seven counties. Additionally the characteristic dimension is taken from NUREG/CR-4461, Section 4.2 as 0.0379 miles.</p> <p>BLN has conservatively assumed that the</p> | 8.89E-04 events/yr |
| | EF1 Tornado | Y | | 8.89E-04 events/yr |
| | EF2 Tornado | Y | | 8.89E-04 events/yr |
| | EF3 Tornado | Y | | 8.89E-04 events/yr |
| | EF4 Tornado | Y | | No Recorded Events |
| | EF5 Tornado | Y | | No Recorded Events |

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|----------|------------------------|--|--|-----------------|
| | | | <p>strike probability for a tornado of a given intensity is equal to the overall strike probability for any tornado. These event frequencies are bounded by the limiting initiating event frequencies given in Table 3.0-1 of APP-GW - GLR -101.</p> <p>Therefore, the safety features of the AP1000 are unaffected and the CDFs given in APP-GW-GLR-101 Table 3.0-1 for these events are applicable to BLN Units 3 and 4.</p> | |
| | Cat.1 Hurricane | Y | <p>Historical data for tropical weather is archived by the National Coastal Services Center, and dates back to 1851. This data was used to analyze the occurrence of tropical weather traveling directly over Jackson County, or near enough to Jackson County to have a substantial impact (perimeter distance defined as 100 miles).</p> <p>Figure 6-1B of ASCE/SEI 7-05 (Reference 204) shows the basic wind speed for the eastern part of the Gulf of Mexico, including the state of Alabama. BLN is located in the northeast part of the state beyond the 90 mph contour. Thus, it is concluded that BLN is not located in a Hurricane Prone Region.</p> <p>There were no recorded events for hurricanes. However, a conservative event frequency of <1E-02 was assigned for these events, consistent with APP-GW-GLR-101 for Category 4 and 5 hurricanes (Reference 201).</p> | <1E-02 |
| | Cat.2 Hurricane | Y | | <1E-02 |
| | Cat.3 Hurricane | Y | | <1E-02 |
| | Cat.4 Hurricane | Y | | <1E-02 |
| | Cat.5 Hurricane | Y | | <1E-02 |
| | Tropical Storm | Y | <p>The event frequencies for tropical storms, depressions, and cyclones are based on the number of recorded events over the 158 year period of historical data archived by the National Coastal Services Center.</p> <p>The maximum wind speed of these storms is less than 65 mph. As documented in FSAR Table 2.0-201, the BLN site characteristic operating basis wind speed (96 mph) is below the DCD site characteristic operating basis wind speed of 145 mph and bounds the maximum wind speed identified above (65 mph).</p> <p>Therefore, it is concluded that the safety features of the AP1000 are unaffected by high</p> | 8.23E-02 |
| | Tropical Depression | Y | | 1.01E-01 |
| | Extratropical Cyclones | Y | | 1.90E-02 |

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|----------------|----------------|--|---|-----------------|
| | | | wind events and the resultant CDFs given in Table 3.0-1 of APP-GW-GLR-101 (Reference 201) for these events are applicable to BLN Units 3 and 4. | |
| External Flood | External Flood | Y | <p>As discussed in FSAR Subsection 2.4.2, the maximum flood elevation at the BLN site is 622.5 ft. msl. Coincident wind waves would create maximum waves of 5.41 ft. (trough to crest) and produce maximum flood levels of 624.03 ft. msl, including wind wave setup and run-up. The BLN plant grade of 628.6 ft. msl is above the worst potential flood considerations.</p> <p>Additionally, as discussed in FSAR Subsection 2.4.2, the maximum water level due to the local PMP event without drainage is 627.53 ft. msl in the vicinity of the safety-related structures, which is below plant grade. Therefore, no external flood protection measures are required for BLN Units 3 and 4.</p> <p>As discussed in FSAR Subsection 2.4.3.5, the maximum flood elevation at BLN was determined to be 622.1 ft. msl, produced by the 21,400 sq. mi. storm and coincident overtopping failure of the west saddle dike at Watts Bar Dam and the north embankment at Nickajack Dam. Chickamauga Dam is overtopped but was assumed not to fail. However, proposed dam safety modifications to allow overtopping at Chickamauga Dam have not been performed. Without the dam safety modifications at Chickamauga Dam, the maximum flood elevation was determined to be 622.5 ft. msl. The BLN safety-related structures are located at elevation 628.6 ft. msl and are unaffected by flood conditions.</p> <p>As discussed in FSAR Subsection 1.2.2, the BLN plant grade elevation of 628.6 ft. msl corresponds to DCD grade elevation 100 ft. Based upon the quantitative evaluations performed, the BLN site is not susceptible to any external floods which would adversely impact safe operation of BLN Units 3 and 4.</p> <p>This is consistent with the evaluation presented in Section 4.0 of APP-GW-GLR-101 (Reference 201), which states that the AP1000 is protected against floods up to the 100' level.</p> <p>Therefore, it is concluded that the resultant</p> | Note 2 |

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|--|--|--|---|---------------------|
| | | | CDF of 5.85E-15 events per year given in APP-GW-GLR-101, Section 4.0 is bounding. | |
| Transportation and Nearby Facility Accidents | Aviation (commercial/general/military) | Y | <p>As discussed in FSAR Subsection 3.5.1.6, a calculation performed in accordance with the guidelines of Standard Review Plan (SRP) Section 3.5.1.6, determined the total probability of an aircraft crash into the plant to be 8.8E-07 per year. The probability of aircraft from the Scottsboro Municipal Airport crashing into the site is 7.8E-07 per year. This meets the criterion provided in APP-GW-GLR-101 (Reference 201) that sites that can demonstrate an aviation event frequency less than or equal to 1.21E-06 events/yr for small aircraft accidents are bounded by this evaluation.</p> <p>The probability of a crash from the high altitude airway J73 is conservatively estimated to be 1.0E-07 per year. This meets the commercial aircraft aviation event frequency of 1.0E-07 events per year provided in APP-GW-GLR-101.</p> <p>Therefore, it is concluded that the evaluation provided in APP-GW-GLR-101 remains applicable.</p> | 8.8E-07 events/year |
| | Marine (ship/barge) | Y | <p>As discussed in FSAR Subsection 2.2.3.1.1.1, a calculation was done to quantify the risk to the BLN site from barge accidents on the Tennessee River involving either explosions or flammable vapor clouds. The results of the detonation risk assessment (to the site) show a risk value less than 1.9E-08 per year.</p> <p>As discussed in FSAR Subsection 2.2.3.1.2, an evaluation determined no deflagrations would be expected at the BLN site resulting from a delayed ignition of a vapor cloud released from a postulated barge accident.</p> <p>Based upon the quantitative consequence evaluations performed, no risk-important events related to marine transportation have been identified for BLN Units 3 and 4. This is consistent with the evaluation provided in Subsection 5.4 of APP-GW-GLR-101 (Reference 201). Therefore, because no risk-important consequences were identified in the</p> | 1.9E-08 events/yr |

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|----------|--------------------|--|---|-----------------|
| | | | evaluation, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4. | |
| | Pipeline (gas/oil) | N | As stated in FSAR Subsection 2.2.2.3, there are no major pipelines within 5 miles of the BLN site. | Note 1 |
| | Railroad | Y | <p>As discussed in FSAR Subsection 2.2.3.1.1.1, the potential hazard resulting from railroad cars was evaluated using the methodology of RG 1.91. The maximum probable cargo based on RG 1.91 was used along with a conservative TNT equivalency, which resulted in a safe standoff distance which was less than the distance from the nearest approach of a railroad line to the site boundary.</p> <p>As discussed in FSAR Subsection 2.2.3.1.2, unconfined vapor clouds with delayed ignition were also evaluated for various energetic combustible materials, and were determined to pose no hazard to the plant.</p> <p>Based upon the quantitative consequence evaluations performed, no risk-important events related to rail transportation have been identified for BLN Units 3 and 4. This is consistent with the evaluation provided in Subsection 5.4 of APP-GW-GLR-101 (Reference 201). Therefore, because no risk-important consequences were identified in the evaluation, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.</p> | Note 2 |
| | Truck | Y | <p>As discussed in FSAR Subsection 2.2.3.1.1.1, the potential hazard resulting from trucks was evaluated using the methodology of RG 1.91. The maximum probable cargo based on RG 1.91 was used along with a conservative TNT equivalency, which resulted in a safe standoff distance which was less than the distance from the nearest highway to the site boundary.</p> <p>As discussed in FSAR Subsection 2.2.3.1.2, unconfined vapor clouds with delayed ignition were also evaluated for various energetic combustible materials, and determined to not</p> | Note 2 |

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|--------------|---|--|---|-----------------|
| | | | <p>result in any significant damage to the plant.</p> <p>Based upon the quantitative consequence evaluations performed, no risk-important events related to truck transportation have been identified for BLN Units 3 and 4. This is consistent with the evaluation provided in Subsection 5.4 of APP-GW-GLR-101 (Reference 201). Therefore, because no risk-important consequences were identified in the evaluation, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.</p> | |
| | Nearby Facility Accidents | Y | <p>FSAR Subsection 2.2.3.1.1.3 discusses potential design basis events associated with accidents at nearby facilities. FSAR 2.2.3.2 concludes that the effects of events from these facilities on the safety-related components of the plant are insignificant. Therefore, because no risk-important consequences were identified, the potential for hazards from these sources are minimal and will not adversely affect safe operation of BLN Units 3 and 4.</p> | Note 2 |
| Other events | <p>A number of external events beyond those evaluated in DCD Subsection 19.58 and APP-GW-GLR-101 (Reference 201) were evaluated for the BLN site. These events are discussed below.</p> | | <p>Based on the evaluations below, these events do not pose a credible threat to the safe operation of the station. Thus, these events are not considered to be risk-important and it can be concluded that the BLN Units 3 and 4 site is within the bounds of the Floods and Other External Events analysis documented in DCD Section 19.58 and APP-GW-GLR-101 (Reference 201).</p> | |
| | External Fires | Y | <p>FSAR Subsection 2.2.3.1.4 discusses external fires and concludes fires originating from accidents at nearby facilities or transportation routes, and brush and forest fires will not endanger the safe operation of the station. This subsection also states fire and smoke from accidents at nearby homes, industrial facilities, transportation routes, or from area forest or brush fires, do not jeopardize the safe operation of the plant. Therefore, because no risk-important consequences were identified, the potential for hazards from external fires are minimal and will not adversely affect safe</p> | Note 2 |

| Category | Event | Applicable to site? (Y/N) ¹ | Explanation of Applicability Evaluation | Event Frequency |
|----------|-------------------------|--|---|-----------------|
| | | | operation of BLN Units 3 and 4. | |
| | Toxic Chemical Releases | Y | Based on the evaluations provided in FSAR Subsections 2.2.3.1.3 and 6.4.4.2, release of toxic chemicals from stationary industrial sources and mobile sources in the vicinity of BLN does not pose a credible threat to the control room operators. Thus, these events are not considered to be risk-important. | Note 2 |

Notes:

1. All events that are physically possible are considered to be "applicable" and are discussed. Those events that are physically not possible are considered not applicable to the site.
2. A specific event frequency for this event has not been determined. A deterministic quantitative consequence evaluation has been performed that has demonstrated that the event does not adversely impact the safe operation of BLN Units 3 and 4. Additional details are provided in the "Explanation of Applicability Evaluation" along with references to the applicable FSAR Subsections.