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

June 12, 2008 10 CFR 52.79

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

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

BELLEFONTE COMBINED LICENSE APPLICATION – RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION – REGIONAL CLIMATOLOGY

Reference: Letter from Joseph M. Sebrosky (NRC) to Andrea L. Sterdis (TVA), Request for Additional Information Letter No. 022 Related to SRP Section 02.03.01 for the Bellefonte Units 3 and 4 Combined License Application, dated May 20, 2008.

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

A response to each NRC request in the subject letter is addressed in the enclosure and 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 Phillip Ray at 1101 market Street, LP5A, Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-7030, or via email at pmray@tva.gov.

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

Executed on this 12th day of June ,2008.

Jack A. Bailey
Vice President, Nuclear Generation Development

Enclosure/Attachments

cc: See Page 2

D085
NRO

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

cc: (w/o Enclosure)

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

Enclosure
TVA letter dated June 12, 2008
RAI Responses

Responses to NRC Request for Additional Information letter No. 022 dated May 20, 2008
(12 pages, including this list)

Subject: Regional Climatology in the Final Safety Analysis Report

RAI Number	Date of Response
02.03.01-01	This letter – see following pages
02.03.01-02	This letter – see following pages
02.03.01-03	This letter – see following pages
02.03.01-04	This letter – see following pages
02.03.01-05	This letter – see following pages
02.03.01-06	This letter – see following pages
02.03.01-07	This letter – see following pages
02.03.01-08	Future submittal expected by July 31, 2008

Enclosures/Attachments	Pages Included
None	

Enclosure
TVA letter dated June 12, 2008
RAI Responses

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-01

It appears that the tornado wind speed values in FSAR section 2.3.1.2.1.2 (e.g., 10-7 probability of expected maximum tornado wind speed of 285 mi/h) were taken from NUREG/CR-4461 Rev. 1, while the Design Basis Tornado Parameters in FSAR section 2.3.1.4 (e.g., Design Basis Tornado maximum wind speed of 230 mi/h) were taken from Revision 1 of Regulatory Guide 1.76, which is based on NUREG/CR-4461 Rev. 2. Justify the inconsistency between these values.

BLN RAI ID: 371

BLN RESPONSE:

When the original draft of FSAR Section 2.3 was developed, only Revision 1 of NUREG/CR-4461 was available. Subsequently, Revision 1 of Regulatory Guide 1.76 was issued and Subsection 2.3.1.4 was revised to use Regulatory Guide 1.76 as the source for the design basis conditions. Use of Revision 2 of NUREG/CR-4461 results in a reduction in both the expected maximum tornado windspeed and the upper limit of the expected windspeed. As discussed in Revision 2 of NUREG/CR-4461, this reduction in windspeeds is a result of switching from the Fujita Scale to the Enhanced Fujita Scale. The revised values are provided by the changes to page 2.3-7 of the FSAR given below. These changes will be incorporated in Revision 1 of the FSAR.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

COLA Part 2, FSAR Chapter 2, Subsection 2.3.1.2.1.2, will be revised from:

This result shows that the frequency of a tornado in the immediate vicinity of the site is less than the frequency in the surrounding counties. Another methodology for determining the tornado strike probability at the BLN site is given in NUREG/CR-4461. Based on a two longitude and latitude box centered on the BLN site, the number of tornadoes is 385. The corresponding expected maximum tornado wind speed and upper limit (95 percentile) of the expected wind speed is given below with the associated probabilities.

Probability	Expected maximum tornado windspeed mph	Upper limit (90 percent) of the expected tornado windspeed mph
10^{-5}	182	190
10^{-6}	237	245
10^{-7}	285	294

To read:

This result shows that the frequency of a tornado in the immediate vicinity of the site is less than the frequency in the surrounding counties. Another methodology for determining the tornado strike probability at the BLN site is given in NUREG/CR-4461, Revision 1. Based on a two longitude and latitude box centered on the BLN site, the number of tornadoes is 385. The corresponding expected maximum tornado wind speed and upper limit (90 percentile) of the expected wind speed is given below with the associated probabilities.

Probability	Expected maximum tornado windspeed mph	Upper limit (90 percent) of the expected tornado windspeed mph
10^{-5}	150	155
10^{-6}	186	192
10^{-7}	219	225

ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated June 12, 2008
RAI Responses

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-02

FSAR section 2.3.1.2.1.3 estimated 17 thunderstorm events per year in northeast Alabama and extreme south central Tennessee. The NCDC Local Climatological Data from the first order NWS station at Huntsville, AL identified a frequency of 55.6 thunderstorms per year. Please justify the value chosen.

BLN RAI ID: 372

BLN RESPONSE:

The data used in this section was obtained from the NCDC Storm Event database for the time period of 01/01/1950 through 12/31/2005. Further examination of this database indicates that thunderstorm and high wind events may have been under reported prior to 1983. For example, during the years 1956-1982 the number of storms per year in Jackson County was 0.56 while 5.09 per year were reported between 1983 and 2005. When the data prior to 1983 is ignored for the counties surrounding the site, the frequency increases to 36 per year. The remaining difference between the frequency in the local area and the LCD for Huntsville may be due to differences in local reporting procedures.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

COLA Part 2, FSAR Chapter 2, Subsection 2.3.1.2.1.3 will be revised from:

Locations in northeast Alabama and extreme south central Tennessee experience approximately 17 thunderstorms events per year. Regionally, storms with wind speeds reaching 35 to 50 mph may occur several times a year. During the period 1950-2005, there were 132 thunderstorm or high wind events in Jackson County (see Table 2.3-209). Of these, 86 events had a wind speed of greater than or equal to 50 knots (≥57 mph). The number of high wind speed (50 knots) events is 1.5 per year in Jackson County. Approximately 51 percent of the thunderstorms in Jackson County occur during the warm months (June-August), indicating that the majority are warm air-mass thunderstorms. From 1950-2005, 933 thunderstorms are listed for this seven county region, with Jackson County receiving 14.1 percent, DeKalb County receiving 14.5 percent, Marshall County receiving 16.0 percent, Madison County receiving 28.9 percent, Franklin County, Tennessee receiving 11.9 percent, Marion County, Tennessee receiving 10.0 percent, and Dade County, Georgia receiving 4.6 percent of the thunderstorms. (Reference 208)

To read:

Locations in northeast Alabama and extreme south central Tennessee experience approximately 36 thunderstorms events per year. Regionally, storms with wind speeds reaching 35 to 50 mph may occur several times a year. During the period 1981-2005, there were 117 thunderstorm or high wind events in Jackson County (see Table 2.3-209). Of these, 33 events had a wind speed of greater than or equal to 50 knots (≥57 mph). The number of high wind speed (50 knots) events is 1.4 per year in Jackson County. Approximately 50 percent of the thunderstorms in Jackson County occur during the warm months (June-August), indicating that the majority are warm air-

mass thunderstorms. From 1981-2005, 822 thunderstorms are listed for this seven county region, with Jackson County receiving 14.2 percent, DeKalb County receiving 14.2 percent, Marshall County receiving 16.2 percent, Madison County receiving 27.1 percent, Franklin County, Tennessee receiving 12.4 percent, Marion County, Tennessee receiving 10.6 percent, and Dade County, Georgia receiving 5.2 percent of the thunderstorms. (Reference 208)

COLA Part 2, FSAR Section 2.3, Table 2.3-209, will be revised from 2 sheets to 1 sheet to read:

TABLE 2.3-209 (Sheet 1 of 1)
THUNDERSTORMS AND HIGH WIND EVENTS IN JACKSON, DEKALB, MARSHALL, MADISON ALABAMA, FRANKLIN TENNESSEE, MARION TENNESSEE, AND DADE GEORGIA

	Jackson County	Dekalb County	Marshall County	Madison County	Franklin County, TN	Marion County, TN	Dade County, GA	All Seven Areas	Average per Year
Month	(#)	(#)	(#)	(#)	(#)	(#)	(#)		
Jan	4	6	5	11	1	1	0	28	1.22
Feb	5	10	8	10	8	4	2	47	2.04
Mar	7	5	11	15	6	4	3	51	2.22
Apr	8	13	13	18	9	5	4	70	3.04
May	17	7	11	26	11	15	8	95	4.13
Jun	20	14	22	29	22	10	6	123	5.35
Jul	30	23	34	49	24	20	11	191	8.30
Aug	9	20	13	42	9	11	0	104	4.52
Sep	5	6	4	11	6	2	3	37	1.61
Oct	2	2	1	2	1	5	1	14	0.61
Nov	5	7	7	6	5	7	3	40	1.74
Dec	5	4	4	4	0	3	2	22	0.96
Annual	117	117	133	223	102	87	43	822	35.74
	14.2%	14.2%	16.2%	27.1%	12.4%	10.6%	5.2%		

Length of Record 23 yrs

Notes:

1. Storms listed at different sites in the same county on the same day were counted as separate events.
2. Average/yr were based on the period 1981 through 2005 (last storm in database). Prior to 1981, the yearly storm averages were markedly less frequent, suggesting less thorough storm data collection.

3. The BLN is in Jackson County. The other counties are adjacent to Jackson County. (Reference 208)

ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated June 12, 2008
RAI Responses

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-03

The BLN FSAR identified the Air Quality Control Region (AQCR) for Jackson County as part of the Tennessee River Valley (Alabama)-Cumberland Mountains (Tennessee) Interstate Air Quality Control Region. Attainment designations were provided, and a nonattainment for PM-2.5 (particulate matter with a diameter less than 2.5 microns) was identified for Jackson County. Please describe any impact that the nonattainment area designation has on the design and/or operation of the proposed nuclear power unit.

BLN RAI ID: 373

BLN RESPONSE:

The nearest non-attainment area is in Walker County, Alabama in an area described by U.S. Census 2000 block group identifiers 01-127-0214-5, 01-127-0215-4, and 01-127-0216-2. This area is approximately 14 miles north east of the site as shown on the enclosed map. The design and/or operation of the BLN units will not be impacted by this nonattainment area due to the distance between the nonattainment area and the site. Likewise, the operation of the proposed nuclear power plants will have no impact on this nonattainment area due to the very low particulate matter release from BLN. A map with the highlighted nonattainment area is provided on the next page of this response.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

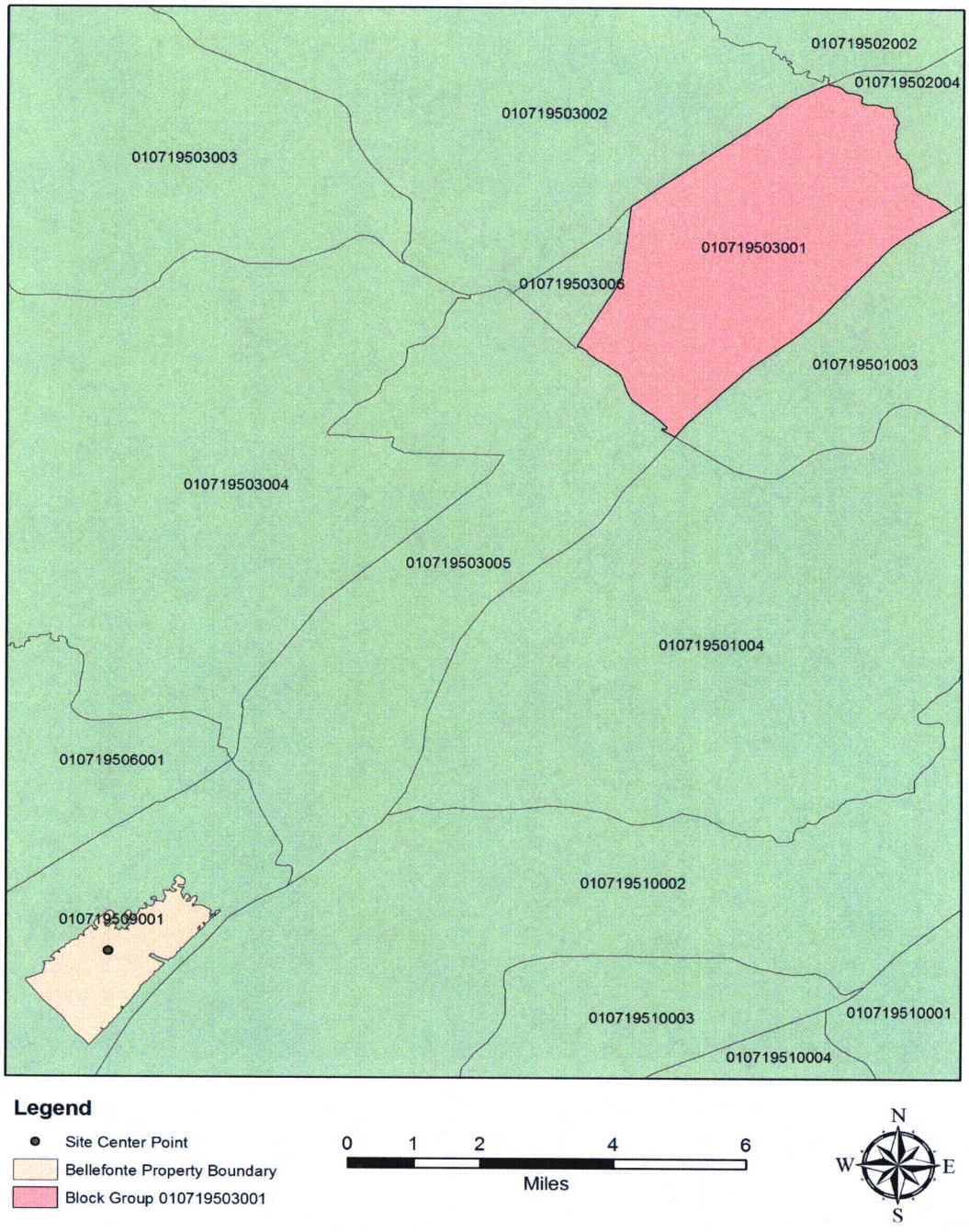
None

ATTACHMENTS/ENCLOSURES:

None

Enclosure
TVA letter dated June 12, 2008
RAI Responses

Jackson County Census Block Groups



Enclosure
TVA letter dated June 12, 2008
RAI Responses

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-04

FSAR section 2.3.1.2.2, "Severe Winter Storm Events", contains an estimate (7.53 inches liquid) of the 48 hour Probable Maximum Winter Precipitation (PMWP) derived from 5 years of BLN site data. This estimate appears to be inconsistent with the 48 hour PMWP value of 24.7 inches (based on HMR-53) listed in section 2.3.1.2.2.2, "Estimated Weight of the 48 hour Maximum Winter Precipitation". Please explain/justify the difference between these values.

BLN RAI ID: 374

BLN RESPONSE:

The data used to establish the Probable Maximum Winter Precipitation (PMWP) in section 2.3.1.2.2 was based on the data presented in Table 2.3-213 which was taken from the 1979 – 1982 & 2006 – 2007 site data. As shown in Table 2.3-213, the recent drought is evident in the reduction in rainfall during 2006-2007. The PMWP results obtained from this limited data set cannot be compared with the much longer period of data represented in HMR-53. This is why the HMR 53 data is used in establishing the PMWP for use in determining the estimated weight of the 48-hour maximum winter precipitation.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

ATTACHMENTS/ENCLOSURES:

None

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-05

FSAR section 2.3.1.2.2.1 states that the greatest snow depth recorded at Scottsboro was 10 inches, while section 2.3.1.2.2 states that the greatest snowfall in Scottsboro deposited 12 inches. Justify using the 10 inch value vs. the 12 inch freshly fallen snow value for the 100-year snow pack value.

BLN RAI ID: 375

BLN RESPONSE:

The 10 inch snow depth is used since snow pack has a higher water equivalent than freshly fallen snow. As stated in FSAR section 2.3.1.2.2.1, freshly fallen snow has a snow density (the ratio of the volume of melted water to the original volume of snow) of 0.07 to 0.15. In determining the estimated weight of the 100-year return snowpack the water equivalent of snowpack was assumed to be 0.20 inches of water per inch of snowpack which conservatively bounds the density of fresh snow. The 12 inches of snow mentioned in section 2.3.1.2.2 is in reference to freshly fallen snow which would have a lower water equivalent.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

ATTACHMENTS/ENCLOSURES:

None

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-06

Please identify that portion of the 48-hour PMWP that could fall as frozen precipitation.

BLN RAI ID: 376

BLN RESPONSE:

The 48-hour PMWP estimated from data in HMR 53 is assumed to be liquid.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

ATTACHMENTS/ENCLOSURES:

None

NRC Letter Dated: May 20, 2008

NRC Review of Final Safety Analysis Report

NRC RAI NUMBER: 02.03.01-07

FSAR Section 2.3.1.3 states that it discusses BLN site and local area meteorological data that may impact design of safety-related heat removal systems. FSAR Section 2.3.1.3.1 then goes on to present the controlling meteorological parameters necessary for the analysis of cooling tower performance. However, the chosen reactor design (AP1000) does not use a cooling tower to release heat to the atmosphere following a loss-of-coolant accident (AP1000 DCD Tier 2 Section 6.3). Instead, a passive containment cooling system (PCS) would provide the safety-related UHS. (a) Please provide the meteorological data used to evaluate the PCS system. (b) Please identify all the cooling towers used to support plant operation and state whether they serve a safety-related function.

BLN RAI ID: 377

BLN RESPONSE:

(a) The data used in the design and evaluations of the PCS is given in the DCD and FSAR Table 2.0-201.

(b) The Circulating Water System (CWS) and the Service Water System (SWS) cooling towers are used to remove plant heat during normal operations only and serve no safety-related function. These systems are described in DCD Sections 10.4.5 and 9.2.1, respectively.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION REVISIONS:

None

ATTACHMENTS/ENCLOSURES:

None