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October 10, 2008

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC.
William States Lee III Nuclear Station - Docket Nos. 52-018 and 52-019
AP1000 Combined License Application for the
William States Lee III Nuclear Station Units 1 and 2
Response to Requests for Additional Information (RAI #446)
Ltr# WLG2008.10-05

References: Letter from Brian Hughes (NRC) to Peter Hastings (Duke Energy), *Request For Additional Information Letter No. 010 Related To SRP Section 2.3 for the William States Lee III Units 1 And 2 Combined License Application*, dated September 11, 2008

Letter from Brian Hughes (NRC) to Peter Hastings (Duke Energy), *RAI 447 Request For Additional Information Letter No. 011 Related To SRP Section 2.3.2 {sic} for the William States Lee III Units 1 And 2 Combined License Application*, dated September 12, 2008

This letter provides the Duke Energy response to the Nuclear Regulatory Commission's requests for additional information (RAIs) included in the referenced letters.

Responses to the NRC information requests described in the letter 010 are addressed in separate enclosures, which also identify associated changes, when appropriate, that will be made in a future revision of the Final Safety Analysis Report for the Lee Nuclear Station. Letter 011 repeats the questions presented in letter 010. While the responses in the enclosures are applicable to both letters, the RAI numbering convention utilized in letter 010 is followed.

If you have any questions or need any additional information, please contact Peter S. Hastings, Nuclear Plant Development Licensing Manager, at 980-373-7820.

Bryan J. Dolan
Vice President
Nuclear Plant Development

D093
NRO

Enclosures:

1) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-001
2) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-002
3) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-003
4) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-004
5) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-005
6) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-006
7) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-007
8) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-008
9) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-009
10) Duke Energy Response to Request for Additional Information Letter 010, RAI 02.03.01-010

AFFIDAVIT OF BRYAN J. DOLAN

Bryan J. Dolan, being duly sworn, states that he is Vice President, Nuclear Plant Development, Duke Energy Carolinas, LLC, that he is authorized on the part of said Company to sign and file with the U. S. Nuclear Regulatory Commission this supplement to the combined license application for the William States Lee III Nuclear Station and that all the matter and facts set forth herein are true and correct to the best of his knowledge.

Bryan J. Dolan

Subscribed and sworn to me on 10/10/2008

Notary Public

My commission expires: 9/27/2010

SEAL

xc (w/o enclosures):

Michael Johnson, Director, Office of New Reactors
Gary Holahan, Deputy Director, Office of New Reactors
David Matthews, Director, Division of New Reactor Licensing
Scott Flanders, Director, Site and Environmental Reviews
Glenn Tracy, Director, Division of Construction Inspection and Operational Programs
Charles Ader, Director, Division of Safety Systems and Risk Assessment
Michael Mayfield, Director, Division of Engineering
Luis Reyes, Regional Administrator, Region II
Loren Plisco, Deputy Regional Administrator, Region II
Thomas Bergman, Deputy Division Director, DNRL
Stephanie Coffin, Branch Chief, DNRL

xc (w/ enclosures):

Brian Hughes, Senior Project Manager, DNRL
Charles Cox, Branch Chief, RSAC

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.01-001

NRC RAI:

In accordance with NUREG-0800, Section 2.3.1, please identify the National Climatic Data Center's (NCDC) state climatic division for the proposed Lee site in FSAR Section 2.3.1.1, or justify a reasonable alternative.

Duke Energy Response:

Communication with the South Carolina State Climatologist indicates that Cherokee county is located within Climate Division 2 as shown on the South Carolina Climate Division map, below (Reference 1).

References:

1. National Weather Service Climate Prediction Center, Climate Divisions with Counties, South Carolina, Website, http://www.cpc.noaa.gov/products/analysis_monitoring/regional_monitoring/CLIM_DIVS/south_carolina.gif, accessed October 7, 2008.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsection 2.3.1.1

Attachments:

1) Revised FSAR Subsection 2.3.1.1

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 2.03.01-01

Mark-up of FSAR Subsection 2.3.1.1

COLA Part 2, FSAR. Chapter 2, Subsection 2.3.1.1, first paragraph, will be revised as follows:

2.3.1.1 General Climate

The most important factors controlling the local climate are the state's location in the northern mid-latitudes, its proximity to both the Atlantic Ocean and the Appalachian Mountains, and local elevation. South Carolina's geographic regions are shown on Figure 2.3-273. The Lee Nuclear Station site is located in the piedmont region of South Carolina. The Lee Nuclear Station is located in Cherokee County which is in South Carolina Climate Division 2. South Carolina's mid-latitude location allows for solar radiation to vary throughout the year, producing four distinct seasons.

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.01-002

NRC RAI:

Based on historical hurricane data (1899 - 2005) from NOAA's Coastal Services Center (http://maps.csc.noaa.gov/hurricanes/), the staff was unable to reproduce the same number of hurricanes that have affected North and South Carolina presented in FSAR Section 2.3.1.2.1. **Attachment 1** shows a comparison between the values presented in the FSAR and those obtained by the staff. Please review the accuracy of the hurricane statistics presented in FSAR Section 2.3.1.2.1.

Attachment 1:

STRENGTH	STAFF	APPLICANT
Category 5	0	0
Category 4	3	2
Category 3	3	12
Category 2	17	10
Category 1	24	20

*** NC: 28, SC: 14, NC & SC: 5**

Duke Energy Response:

The data presented in FSAR Subsection 2.3.1.2.1 is based on data provided by the National Oceanic and Atmospheric Administration (NOAA) Coastal Service Center and National Weather Service (NWS) in SR-206. There are several inconsistencies between the data reported in SR-206 and the data reported by NOAA's Coastal Service Center. Hurricane data provided by NOAA's Coastal Service Center counts hurricane occurrences impacting any portion of South Carolina and North Carolina, including a minimum buffer distance surrounding each state. This results in hurricanes which occur within the buffer distance being counted as making landfall in the state. Also, some storms listed in the NOAA data set are missing from the NWS data set. The evaluation of the data indicated that some of the hurricane categories did not agree. In these cases, the category was revised to use the most conservative category unless the category was obviously incorrect. A comparison of the data from these two sources is given in the following table:

South Carolina

NOAA Data							NWS Data				
YEAR	MONTH	DAY	STORM NAME	WIND SPEED (Knots)	PRESSURE (MB)	Category	Year	Month	Name	Category	States affected with category by each state
1899	10	31	NOTNAMED	95	0	H2	1899	OCT	-	2 [~~1~~]	SC 1
1904	9	14	NOTNAMED	70	0	H1	1904	SEP	-	1	SC 1
1906	9	17	NOTNAMED	80	977	H1	1906	SEP	-	3	SC 3
1911	8	28	NOTNAMED	85	972	H2	1911	AUG	-	2	SC 2
1913	10	8	NOTNAMED	65	0	H1	Not listed, but should be added				
1916	7	14	NOTNAMED	95	960	H2	1916	JUL	-	2 [~~1~~]	SC 1
1928	9	18	NOTNAMED	75	0	H1	1928	SEP	-	1 [~~4~~]	SC 1
1940	8	11	NOTNAMED	65	975	H1	1940	AUG	-	2	SC 2
1947	10	15	NOTNAMED	75	0	H1	1947	OCT	-	2	SC 2
1952	8	31	ABLE	90	0	H2	1952	AUG	Able	1	SC 1
1954	10	15	HAZEL	110	937	H3	1954	OCT	Hazel	4	SC 4
1959	7	9	CINDY	65	0	H1	1959	JUL	Cindy	1	SC 1
1959	9	29	GRACIE	120	950	H4	1959	SEP	Gracie	4 [~~3~~]	SC 3
1979	9	4	DAVID	80	970	H1	1979	SEP	David	2	SC 2
1985	7	25	BOB	65	1002	H1	1985	JUL	Bob	1	SC 1
1985	11	22	KATE	65	983	H1	Not listed, but should be added				
1989	9	22	HUGO	120	935	H4	1989	SEP	Hugo	4	SC 4
Not within 10 nautical miles of SC							~~2002~~	~~OCT~~	~~Kyle~~	~~1~~	~~SC 1~~
2004	8	14	CHARLEY	65	988	H1	Landfall in Florida then SC, should be listed				
2004	8	29	GASTON	65	986	H1	2004	AUG	Gaston	1	SC 1

North Carolina

NOAA Data							NWS Data				
YEAR	MONTH	DAY	STORM NAME	WIND SPEED (Knots)	PRESSURE (MB)	Category	Year	Month	Name	Category	States affected with category by each state
1899	8	17	NOTNAMED	105	0	H3	1899	AUG	-	3	NC 3
1899	10	31	NOTNAMED	95	0	H2	1899	OCT	-	2 [~~1~~]	NC 1
1901	7	11	NOTNAMED	70	0	H1	1901	JUL	-	1	NC 1
1904	9	14	NOTNAMED	70	0	H1	Landfall in SC then to NC				
Landfall in SC then entered NC							1906	SEP	-	3	NC 3
1908	7	31	NOTNAMED	70	0	H1	1908	JUL	-	1	NC 1
1913	9	3	NOTNAMED	75	976	H1	1913	SEP	-	1	NC 1
1918	8	24	NOTNAMED	65	0	H1	Not listed but should be added				
Not within 10 nautical miles of NC							~~1920~~	~~SEP~~	~~-~~	~~1~~	~~NC 1~~
1933	8	23	NOTNAMED	70	0	H1	1933	AUG	-	2	NC 2

North Carolina

NOAA Data							NWS Data				
YEAR	MONTH	DAY	STORM NAME	WIND SPEED (Knots)	PRESSURE (MB)	Category	Year	Month	Name	Category	States affected with category by each state
1933	9	16	NOTNAMED	90	0	H2	1933	SEP	-	3	NC 3
Not within 10 nautical miles of NC							~~1936~~	~~SEP~~	~~-~~	~~2~~	~~NC 2~~
1944	8	1	NOTNAMED	80	990	H1	1944	AUG	-	1	NC 1
1944	9	14	NOTNAMED	90	0	H2	1944	SEP	-	3	NC 3
No path through NC							~~1949~~	~~AUG~~	~~-~~	~~1~~	~~NC 1~~
1953	8	14	BARBARA	90	987	H2	1953	AUG	Barbara	2 [~~1~~]	NC 1
1954	8	31	CAROL	85	0	H2	1954	AUG	Carol	2 [~~3~~]	NC 2
1954	10	15	HAZEL	110	937	H3	1954	OCT	Hazel	4	NC 4
1955	8	12	CONNIE	80	0	H1	1955	AUG	Connie	3	NC 3
1955	8	17	DIANE	75	0	H1	1955	AUG	Diane	1	NC 1
1955	9	19	IONE	90	0	H2	1955	SEP	Ione	3	NC 3
~~1958~~	~~9~~	~~27~~	~~HELENE~~	~~115~~	~~943~~	~~H4~~	Did not strike coast				
1960	9	12	DONNA	95	958	H2	1960	SEP	Donna	3 [~~4~~]	NC 3
1964	10	16	ISBELL	65	994	H1	Not Listed, but should be added				
1971	9	30	GINGER	75	985	H1	1971	SEP	Ginger	1	NC 1
1984	9	13	DIANA	85	972	H2	1984	SEP	Diana	3	NC 3
1985	9	27	GLORIA	90	942	H2	1985	SEP	Gloria	3	NC 3
1986	8	17	CHARLEY	65	991	H1	1986	AUG	Charley	1	NC 1
1989	9	22	HUGO	85	952	H2	Landfall in SC then entered NC, should be added				
Not within 10 nautical miles of NC							~~1993~~	~~AUG~~	~~Emily~~	~~3~~	~~NC 3~~
1996	7	12	BERTHA	90	974	H2	1996	JUL	Bertha	2	NC 2
1996	9	5	FRAN	100	952	H3	1996	SEP	Fran	3	NC 3
1998	8	27	BONNIE	95	963	H2	1998	AUG	Bonnie	2	NC 2
1999	9	16	FLOYD	90	950	H2	1999	SEP	Floyd	2	NC 2
2003	9	18	ISABEL	90	956	H2	Not listed, but should be added				
~~2004~~	~~8~~	~~3~~	~~ALEX~~	~~85~~	~~974~~	~~H2~~	Did not strike NC coast				
2004	8	14	CHARLEY	65	988	H1	Landfall in FL and SC then entered NC, should be added				
Not within 10 nautical miles of NC							~~2005~~	~~SEP~~	~~Ophelia~~	~~1~~	~~NC 1~~

Combining the data from these two sources to list hurricanes that affected either North Carolina or South Carolina and excluding storms that did not make landfall in either state gives the following consolidated tables:

Composite Data
South Carolina

Year	Month	Name	Category
1899	OCT	-	2
1904	SEP	-	1
1906	SEP	-	3
1911	AUG	-	2
1913	OCT	-	1
1916	JUL	-	2
1928	SEP	-	1
1940	AUG	-	2
1947	OCT	-	2
1952	AUG	Able	1
1954	OCT	Hazel	4
1959	JUL	Cindy	1
1959	SEP	Gracie	4
1979	SEP	David	2
1985	JUL	Bob	1
1985	NOV	Kate	1
1989	SEP	Hugo	4
2004	AUG	Gaston	1
2004	AUG	Charley	1

Composite Data
North Carolina

Year	Month	Name	Category
1899	AUG	-	3
1899	OCT	-	2
1901	JUL	-	1
1904	SEP	-	1
1906	SEP	-	3
1908	JUL	-	1
1913	SEP	-	1
1918	AUG	-	1
1933	AUG	-	2
1933	SEP	-	3
1944	AUG	-	1
1944	SEP	-	3

Composite Data

North Carolina

Year	Month	Name	Category
1953	AUG	Barbara	2
1954	AUG	Carol	2
1954	OCT	Hazel	4
1955	AUG	Connie	3
1955	AUG	Diane	1
1955	SEP	Ione	3
1960	SEP	Donna	3
1964	OCT	Isbell	1
1971	SEP	Ginger	1
1984	SEP	Diana	3
1985	SEP	Gloria	3
1986	AUG	Charley	1
1989	SEP	Hugo	2
1996	JUL	Bertha	2
1996	SEP	Fran	3
1998	AUG	Bonnie	2
1999	SEP	Floyd	2
2003	SEP	Isabel	2
2004	AUG	Charley	1

The above composite data gives the following results:

Category	SC	NC	Total	Frequency (yr^{-1})	Return Interval (yr)*
4	3	1	4	3.7E-02	27
3	1	10	11	1.0E-01	10
2	6	9	15	1.4E-01	7
1	9	11	20	1.9E-01	5
Sum	19	31	50		

years of data = 107 *Rounded to whole number

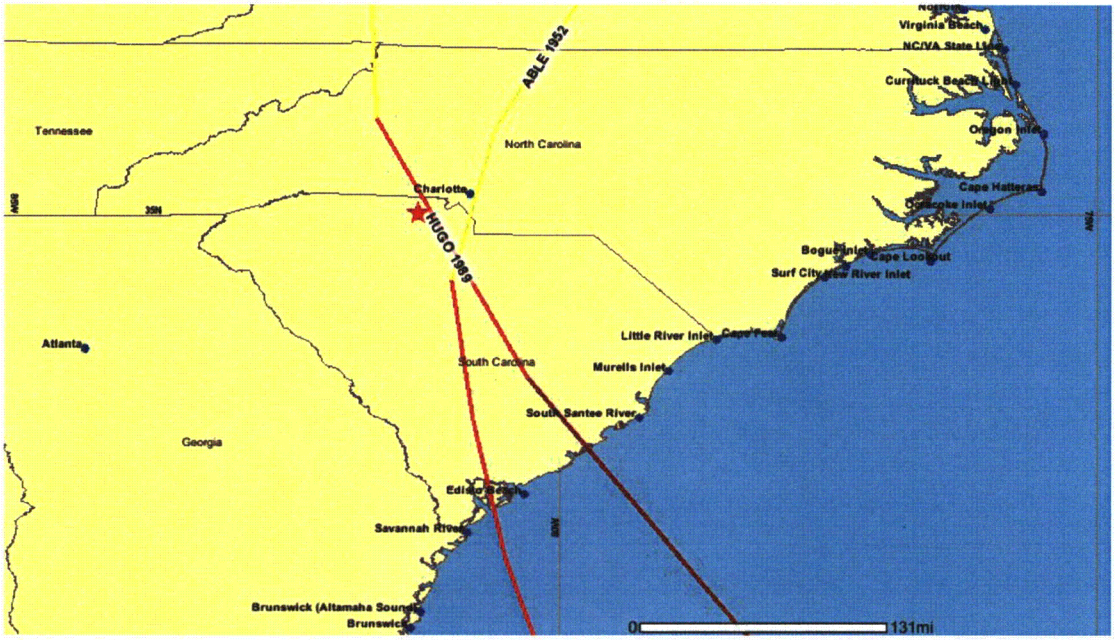
Comparison of the composite data results with the Staff and current FSAR results is provided below:

STRENGTH	STAFF	APPLICANT	Composite Data
Category 5	0	0	0
Category 4	3	2	4
Category 3	3	12	11
Category 2	17	10	15
Category 1	24	20	20
	47	**44**	**50**

The variance in the above data is not significant because hurricane data (frequency, return interval or intensity) is not used in the WLS design. In addition, the number of hurricanes within 65 statute miles of the WLS site, based on the NOAA data, is only two during the period from 1899 through 2005 as shown below:

Storms within 65 statute miles of WLS Site

YEAR	MONTH	DAY	STORM NAME	WIND SPEED (mph)	PRESSURE(MB)	CATEGORY
1952	8	31	ABLE	81	0	H1
1989	9	22	HUGO	98	952	H2



Because the use of a specific hurricane data base is not mandated, the data in the FSAR will be revised to use the above data.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsection 2.3.1.2.1, FSAR Table 2.3-202, FSAR Table 2.3-203, and FSAR Subsection 2.3.7

Attachments:

1) Revised FSAR Subsection 2.3.1.2.1
2) Replacement FSAR Table 2.3-202
3) Replacement Page 1 and Revised Page 2 of FSAR Table 2.3-203
4) Revised FSAR Subsection 2.3.7

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 2.03.01-002

Mark-up of FSAR Subsection 2.3.1.2.1

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.1, will be revised as follows:

2.3.1.2.1 Hurricanes

During the period 1899 to 2005 there were ~~44~~ 50 documented tropical cyclones that affected either North Carolina (~~30~~ 31 cyclones) or South Carolina (~~17~~ 19 cyclones)~~, with three cyclones affecting both states~~ (Reference 209, ~~and~~ Reference 210, and Reference 235). See Table 2.3-202. Of these ~~44~~ 50 cyclones, 20 (~~45~~ 40 percent) were Category 1, ~~10~~ 15 (~~2~~30 percent) were Category 2, ~~and 12~~ 11 (~~27~~ 22 percent) were Category 3, and ~~2~~ 4 (~~5~~ 8 percent) were Category 4 hurricanes. The storm category cited is the category observed ~~at~~ as the cyclone entered either ~~landfall in~~ North Carolina ~~and~~ or South Carolina. Table 2.3-203 presents a monthly breakdown of the ~~44~~ 50 cyclones and provides a definition of the storm categories. Tropical cyclones, including hurricanes, lose strength as they move inland from the coast and the greatest concern for an inland site is possible flooding due to excessive rainfall. The maximum one day rainfall at Ninety-Nine Islands for the years 1949-2005 was 7.16 inches on 8/17/1985 resulting from hurricane Danny which was a tropical depression when it passed through this part of South Carolina~~.~~ (Reference 203).

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 2 to RAI 2.03.01-002

Replacement FSAR Table 2.3-202

WLS COL
2.3-1

TABLE 2.3-202 (Sheet 1 of 2)
HURRICANES IN NORTH CAROLINA AND SOUTH CAROLINA 1899 - 2005

North Carolina

Year	Month	Name	Category
1899	AUG	-	3
1899	OCT	-	2
1901	JUL	-	1
1904	SEP	-	1
1906	SEP	-	3
1908	JUL	-	1
1913	SEP	-	1
1918	AUG	-	1
1933	AUG	-	2
1933	SEP	-	3
1944	AUG	-	1
1944	SEP	-	3
1953	AUG	Barbara	2
1954	AUG	Carol	2
1954	OCT	Hazel	4
1955	AUG	Connie	3
1955	AUG	Diane	1
1955	SEP	Ione	3
1960	SEP	Donna	3
1964	OCT	Isbell	1
1971	SEP	Ginger	1
1984	SEP	Diana	3
1985	SEP	Gloria	3
1986	AUG	Charley	1
1989	SEP	Hugo	2
1996	JUL	Bertha	2
1996	SEP	Fran	3
1998	AUG	Bonnie	2
1999	SEP	Floyd	2
2003	SEP	Isabel	2
2004	AUG	Charley	1

WLS COL
2.3-1

TABLE 2.3-202 (Sheet 2 of 2)
HURRICANES IN NORTH CAROLINA AND SOUTH CAROLINA 1899 - 2005

South Carolina			
Year	Month	Name	Category
1899	OCT	-	2
1904	SEP	-	1
1906	SEP	-	3
1911	AUG	-	2
1913	OCT	-	1
1916	JUL	-	2
1928	SEP	-	1
1940	AUG	-	2
1947	OCT	-	2
1952	AUG	Able	1
1954	OCT	Hazel	4
1959	JUL	Cindy	1
1959	SEP	Gracie	4
1979	SEP	David	2
1985	JUL	Bob	1
1985	NOV	Kate	1
1989	SEP	Hugo	4
2004	AUG	Gaston	1
2004	AUG	Charley	1

NOTES:

1. Data is from "Atlantic Tropical Storms And Hurricanes Affecting The United States:1899-2002," NOAA Technical Memorandum NWS SR-206 (Updated through 2002).

2. Additional data from National Oceanic and Atmospheric Administration (NOAA) Coastal Service Center, years 1899 – 2005.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 3 to RAI 2.03.01-002

Replacement Page 1 and Revised Page 2 of FSAR Table 2.3-203

WLS COL
2.3-1

TABLE 2.3-203 (SHEET 1 OF 2)
FREQUENCY OF TROPICAL CYCLONES (BY MONTH) FOR THE STATES OF SOUTH CAROLINA AND NORTH CAROLINA

	Category of Storm 1899 – 2005 (Saffir-Simpson Scale)							
	1	2	3	4	5	Monthly Total	Annual Frequency	
	(No.)	(No.)	(No.)	(No.)	(No.)	(No.)	(yr^{-1})	% of Total
Jun	0	0	0	0	0	0	0.00	0%
Jul	4	2	0	0	0	6	0.06	12%
Aug	8	6	2	0	0	16	0.15	32%
Sep	5	4	9	2	0	20	0.19	40%
Oct	2	3	0	2	0	7	0.07	14%
Nov	1	0	0	0	0	1	0.01	2%
Total	20	15	11	4	0	50	0.47	100%

Note: Storm Category is the category of the storm entering either North Carolina or South Carolina.

TABLE 2.3-203 (SHEET 2 OF 2)
FREQUENCY OF TROPICAL CYCLONES (BY MONTH) FOR THE STATES OF SOUTH CAROLINA AND NORTH CAROLINA

	Number of Hurricanes: 1899 - 2005 Saffir/Simpson Category Number						Landfall Frequency (storms per year)	Return Period (years)
Area	1	2	3	4	5	Total		
North Carolina (NC)	11~~2~~	9~~6~~	10~~11~~	1	0	31~~0~~	0.29~~8~~	3.45~~57~~
South Carolina (SC)	9	6~~4~~	1~~2~~	3~~2~~	0	19~~7~~	0.18~~6~~	5.63~~6.29~~

Where the definition of Storm Category is as follows:

Storm Category (Saffir-Simpson Scale)	Wind Speed (mph)	Storm Surge (ft. above normal)
1	74 to 95	4 to 5
2	96 to 110	6 to 8
3	111 to 130	9 to 12
4	131 to 155	13 to 18
5	Greater than 155	Greater than 18

NOTES:

~~1. Three storms affected both North and South Carolina. These storms were included in the above totals for each state.~~

1~~2~~. Data is from "Atlantic Tropical Storms And Hurricanes Affecting The United States:1899-2002," NOAA Technical Memorandum NWS SR-206 (Updated through 2002), and NOAA Technical Memorandum NWS TPC-4 for data through 2004.

~~3. Data for 2004 and 2005 from South Carolina Climatology Office, .~~

2. Additional data from National Oceanic and Atmospheric Administration (NOAA) Costal Services Center, years 1899 – 2005.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 4 to RAI 2.03.01-002

Mark-up of FSAR Subsection 2.3.7

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.7, will be revised as follows:

235. National Oceanic and Atmospheric Administration (NOAA) Coastal Service Center, Hurricane data for years 1899 – 2005.

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): RAI 02.03.01-003

NRC RAI:

AP1000 DCD, Rev. 16, Tier 1 Table 5.0-1 lists Tornado Maximum Pressure Differential as a Tier 1 Site Parameter. Please include this site parameter and a corresponding site characteristic in FSAR Table 2.0-201 and Subsection 2.3.1.2.2.

Duke Energy Response:

FSAR Table 2.0-201 will be revised to include the pressure differential as requested. FSAR Subsection 2.3.1.2.2 already provides this information as shown below.

2.3.1.2.2 Tornadoes (FSAR pg. 2.3-10 excerpt)

... Regulatory Guide 1.76, Revision 1, provides design basis tornado characteristics, depending on the proposed site location in the country. Based on these criteria, the best estimated exceedance frequency is 10-7 per year. The design basis tornado characteristics defined for Lee Nuclear Station, which is in Region I, are based on the guidance in Regulatory Guide 1.76. The below listed characteristics are associated with a Region I site.

Design Basis Tornado Characteristics

	Region I
Maximum wind speed, mph	230
Rotational speed, mph	184
Maximum Translational speed, mph	46
Radius of maximum rotational speed, ft	150
Pressure drop, psi	1.2
Rate of pressure drop, psi/sec	0.5

The Lee Nuclear Station site characteristic Tornado Maximum Pressure Differential of 1.2 psi is less than the AP1000 DCD Site Parameter of 2.0 psi, and is therefore acceptable.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Table 2.0-201

Attachments:

1) Revised FSAR Table 2.0-201

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 02.03.01-003

Mark-up of FSAR Table 2.0-201

TABLE 2.0-201 (Sheet 1 of 6)
COMPARISON OF AP1000 DCD SITE PARAMETERS AND LEE NUCLEAR STATION UNITS 1 & 2 SITE CHARACTERISTICS

		AP 1000 DCD Site Parameters	WLS Site Characteristic	WLS FSAR Reference	WLS Within Site Parameter
WLS SUP 2.0-1	**Air Temperature**				
	Maximum Safety(a)	115°F dry bulb / 80°F coincident wet bulb	93°F dry bulb/ 74°F coincident wet bulb(0.4% exceedance)	Table 2.3-293	Yes
		85.5°F wet bulb (noncoincident)	77°F (0.4% exceedance)	Table 2.3-293	Yes
	Minimum Safety(a)	-40°F	19°F (0.4% exceedance)	Table 2.3-293	Yes
	Maximum Normal(b)	100°F dry bulb / 80.1°F coincident wet bulb	91°F dry bulb / 74°F coincident wet bulb (1% exceedance)	Table 2.3-293	Yes
		80.1°F wet bulb (noncoincident)(c)	76°F wet bulb (1% exceedance)	Table 2.3-293	Yes
	Minimum Normal(b)	-10°F	23°F (1% exceedance)	Table 2.3-293	Yes
	Wind Speed				
	Operating Basis	145 mph (3 second gust); importance factor 1.15 (safety), 1.0 (nonsafety); exposure C; topographic factor 1.0	96 mph (3 second gust) (110 mph with 1.15 importance factor); exposure C; topographic factor 1.0	Subsection 2.3.1.2.8	Yes
	Tornado	300 mph	230 mph	Subsection 2.3.1.2.2	Yes
	Maximum Pressure Differential	2.0 lb/in^2	1.2 lb/in^2	Subsection 2.3.1.2.2	Yes

Lee Nuclear Station Response to Request for Additional Information (RAI)

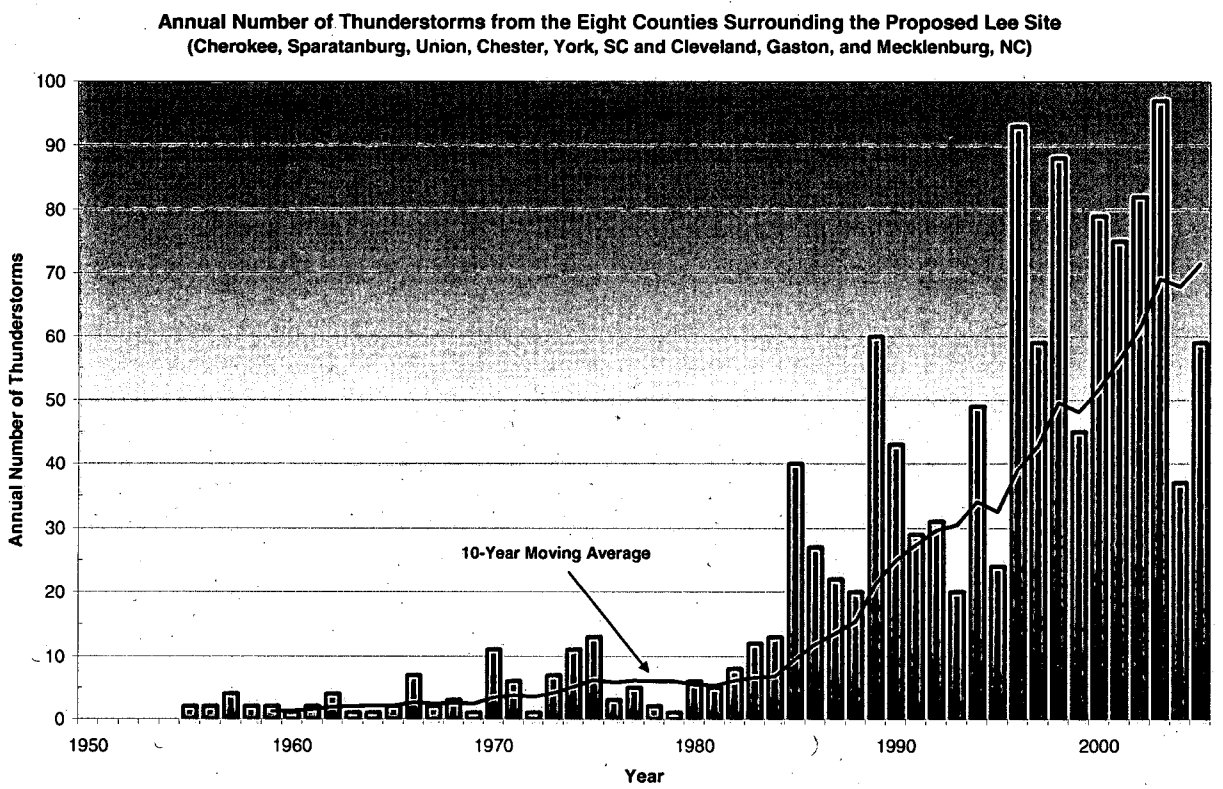
RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): RAI 02.03.01-004

NRC RAI:

The staff cautions against the use of the NCDC Storm Events Database because many severe weather reports are often incomplete or missing as the period of record considered increases. The following graph in Attachment 1 shows the annual number of thunderstorm events that have occurred in the region. Note the increase in the number of reported events. It appears that the data becomes more consistent after 1996. Please revise FSAR Section 2.3.1.2.3 to account for this data, or justify another alternative. Also, please include a reference to an annual NCDC LCD summary for any nearby first order observing stations.



Duke Energy Response:

The increasing trend in thunderstorm frequency reported above appears to be a result of better and more complete reporting rather than an actual trend. As a result, this data will not be used in the FSAR. Instead, the thunderstorm frequency evaluation will be based on the National

Climatic Data Center (NCDC) Local Climatic Data (LCD) from Greenville–Spartanburg (GREER), South Carolina (Station ID GSP) and Charlotte, North Carolina (Station ID CLT).

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsections 2.3.1.2.3 and 2.3.7, FSAR Table 2.3-205

Attachments:

1) Revised FSAR Subsections 2.3.1.2.3 and 2.3.7
2) Replacement FSAR Table 2.3-205

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 02.03.01-004

Mark-up of FSAR Subsections 2.3.1.2.3 and 2.3.7

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.3, third paragraph, will be revised as follows:

2.3.1.2.3 Thunderstorms

Thunderstorms occur an average of approximately 41.6 days a year based on the National Climatic Data Center (NCDC) Local Climatic Data (LCD) when data from Greenville–Spartanburg (Greer), South Carolina (Station ID GSP) and Charlotte, North Carolina (Station ID CLT) are combined for the years 1963 through 2007 and 1948 through 2007, respectively. Table 2.3-205 presents the thunderstorm data for Greer and Charlotte for the years 1962 through 2007 and 1948 through 2007, respectively. Approximately 57 percent of the thunderstorms in this area occur during the warm months (June-August), indicating that the majority are warm-air-mass thunderstorms. As shown in Table 2.3-205, the highest occurrence of thunderstorm days is in July with an average of approximately 10 days per year (Reference 236).

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.7 will be revised as follows:

2.3.7 References

236. National Climatic Data Center (NCDC) Local Climatic Data (LCD), data for Greenville–Spartanburg (Greer), South Carolina (Station ID GSP) and Charlotte, North Carolina (Station ID CLT), 2007.

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 2 to RAI 02.03.01-004

Replacement FSAR Table 2.3-205

WLS COL
2.3-1

TABLE 2.3-205
THUNDERSTORMS
Greenville-Spartanburg, SC and Charlotte, NC

Number of Days with Thunderstorms

Station	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
GSP[1]	0.8	0.9	2.4	3.2	6.1	7.4	9.8	6.9	3.3	0.8	0.8	0.6	43.0
CLT[2]	0.6	1.0	2.1	3.4	5.3	7.1	9.1	6.9	2.5	1.1	0.7	0.4	40.2
Average	0.7	1.0	2.3	3.3	5.7	7.3	9.5	6.9	2.9	1.0	0.8	0.5	41.6

NOTES:

1. 2007 Local Climatological Data Annual Summary with Comparative Data for Greenville–Spartanburg (Greer), South Carolina (Station ID GSP), data for years 1963 through 2007, National Climatic Data Center (NCDC).
2. 2007 Local Climatological Data Annual Summary with Comparative Data for Charlotte, North Carolina (Station ID KCLT), data for years 1948 through 2007, National Climatic Data Center (NCDC).

Lee Nuclear Station Response to Request for Additional Information (RAI)

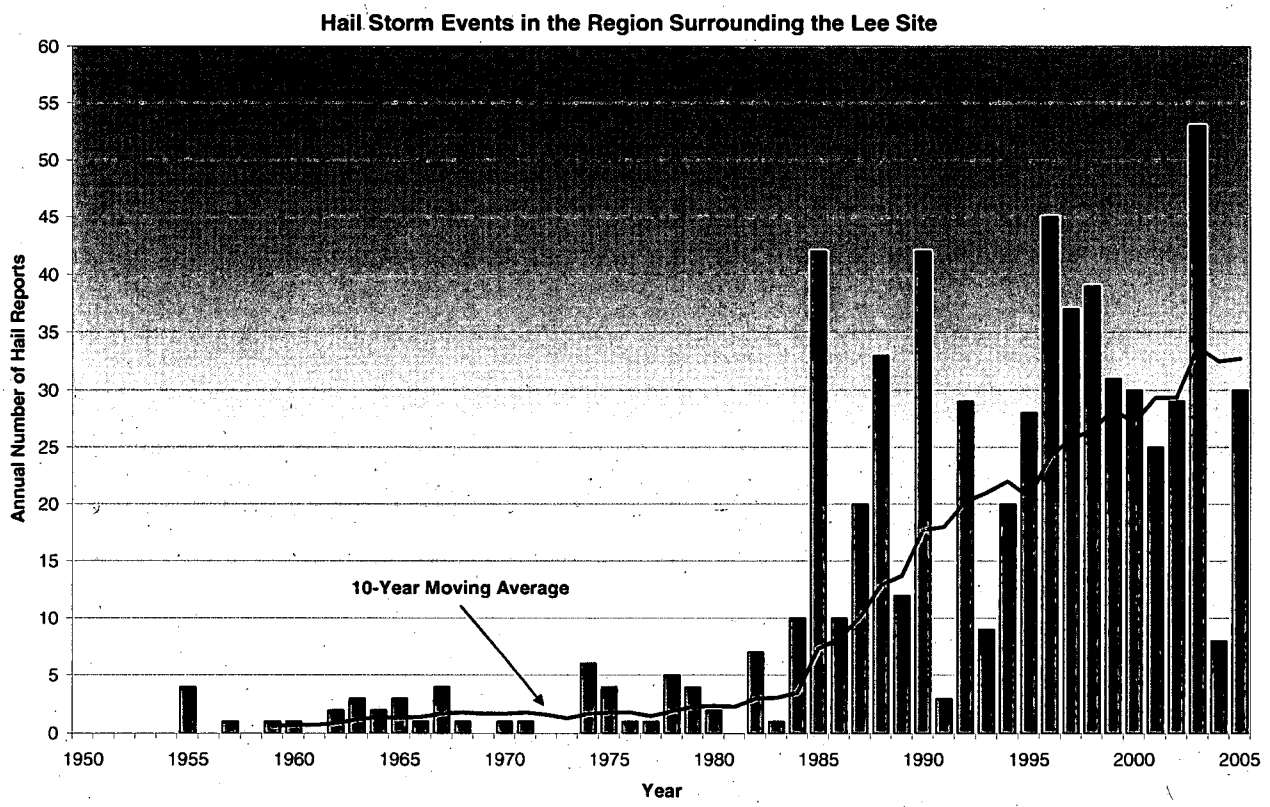
RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): RAI 02.03.01-005

NRC RAI:

The staff cautions against the use of the NCDC Storm Events Database because many severe weather reports are often incomplete or missing as the period of record considered increases. The following graph in Attachment 1 shows the annual number of hail events that occurred in the region. Note the increase in the number of reported events. It appears that the data becomes more consistent after 1984. Please revise FSAR Section 2.3.1.2.5 to account for this data, or justify another alternative.



Duke Energy Response:

Because there is no National Climatic Data Center Local Climatic Data to replace this data, the data used from the NCDC Storm Events Database will be limited to the years 1995 through 2006.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsection 2.3.1.2.5 and FSAR Table 2.3-206

Attachments:

1) Revised FSAR Subsection 2.3.1.2.5
2) Revised FSAR Table 2.3-206

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 02.03.01-005

Mark-up of FSAR Subsection 2.3.1.2.5

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.5, third paragraph, will be revised as follows:

2.3.1.2.5 Hail

From ~~1950 – 2005~~January 1, 1995 through May 31, 2006, ~~670~~ 432 hailstorms occurred in the region annually with Cherokee County receiving approximately ~~nine~~ ten percent, as shown in Table 2.3-206. For this table, each occurrence of hail was counted as an individual event, even if two counties recorded hail simultaneously. The most probable months of hail occurrence are May and June in Cherokee County. The average number of hailstorms in Cherokee County is ~~slightly more than one~~ approximately 3.5 per year. The maximum hail size reported was 2.75 inch diameter and the average size was slightly more than 1 inch diameter. Property damage occurs infrequently, with ~~3~~ no recorded events in Cherokee County, South Carolina in this ~~56~~12-year period~~. The maximum hail diameter reported between 01/01/1950 and 5/31/2006 was 2.75 inches~~ (Reference 207).

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 2 to RAI 02.03.01-005

Mark-up of FSAR Table 2.3-206

WLS COL 2.3-1

TABLE 2.3-206
HAIL STORM EVENTS
CHEROKEE, SPARTANBURG, UNION, CHESTER, AND YORK COUNTIES, SOUTH CAROLINA
CLEVELAND, GASTON, AND MECKLENBURG COUNTIES, NORTH CAROLINA

County	Number of Events	Percentage	Events with Property Damage
Cherokee, SC	42~~58~~	10~~9~~%	0~~3~~
Spartanburg, SC	91~~157~~	21~~23~~%	5~~7~~
Union, SC	42~~52~~	10~~8~~%	0~~1~~
Chester, SC	28~~42~~	6%	0
York, SC	53~~67~~	12~~10~~%	2
Cleveland, NC	55~~71~~	13~~11~~%	0
Gaston, NC	49~~85~~	11~~13~~%	1
Mecklenburg, NC	72~~138~~	17~~21~~%	1
Total	432~~670~~	100%	9~~15~~

Number per year = 36~~12~~

NOTES:

1. Data from NOAA's Satellite & Information System - NCDC Storm Events Database, ~~1950 – 2005~~January 1, 1995 through May 31, 2005, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
2. For this table, each occurrence of hail was counted as an individual event, even if two counties recorded hail simultaneously.

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.01-006

NRC RAI:

FSAR Section 2.3.1.2.7 stated that the equivalent ice thickness due to freezing rain with concurrent 3-second gust speeds for a 100-year mean recurrence interval is approximately 0.75 inches for the north central South Carolina area. Based on the stated reference, "Extreme Ice Thicknesses from Freezing Rain," the staff found 0.75 inches to be the 50-year value. A conversion factor of 1.25 is recommended to convert from a 50-year recurrence interval to a 100-year. Please verify the accuracy of the current estimate.

Duke Energy Response:

Appendix A, page 2 of "Extreme Ice Thicknesses from Freezing Rain," (Ref. 1) gives a 50-yr return equivalent ice thickness of 0.75 in with concurrent 30 mph 3-sec gust wind speed. Page 7 of Appendix A gives a 100-yr return thickness of 0.75 in with a concurrent 30 mph 3-sec gust wind speed. Because the 100-year and 50-year return equivalent ice thickness is the same for the site location, no conversion factor is necessary.

Reference:

1. "Extreme Ice Thicknesses from Freezing Rain," American Lifelines Alliance, September 2004, http://www.americanlifelinesalliance.org/pdf/ALAIceLoadFinalReport092804.pdf

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.01-007

NRC RAI:

Based on data from the South Carolina State Climate Office, the staff found the following maximum 24-hour winter precipitation amounts at three nearby stations:

Ninety-Nine Islands: 3.37 inches, 12/28/1958

Gaffney 6 E: 3.76 inches, 02/21/1961

Greenville/Spartanburg: 3.80 inches, 03/05/1963

Based on these precipitation amounts, please justify the 48-hour probable maximum winter precipitation value for the proposed Lee site of 3.54 inches. Also, please consider changing the wording of "probable maximum winter precipitation" for the 3.54 inch estimate, or provide an explanation in FSAR Section 2.3.1.2.7.2 why the PMWP for the Ninety-Nine Islands station is 3.54 inches, while the PMWP estimate based on NOAA's HMR-53 report is 30.5 inches.

Duke Energy Response:

Data from the Ninety-Nine Islands weather station is most representative of site conditions due to its location on the Broad River and close proximity to the site; however, the data from this location does not provide a bounding value for design conditions. As stated in FSAR Subsection 2.3.1.2.7.2, the probable maximum winter precipitation (PMWP) is established by NOAA's HMR-53 report at 30.5 inches. The wording in FSAR Subsections 2.3.1.2.7 relating to the 3.54 inch rainfall value will be changed to indicate that this is a maximum recorded value.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsections 2.3.1.2.7 and 2.3.1.2.7.2

Attachments:

1) Revised FSAR Subsections 2.3.1.2.7 and 2.3.1.2.7.2

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 02.03.01-07

Mark-up of FSAR Subsections 2.3.1.2.7 and 2.3.1.2.7.2

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.7, third paragraph, will be revised as follows:

The 48-hour ~~probable~~ maximum recorded winter precipitation ~~at the Lee Nuclear Station site is~~ based on the data for the Greenville-Spartanburg NWS (GSP) at Greer, ~~SC. Based on this data,~~ covering the time period of 1997-2005, ~~the maximum 48-hour probable maximum winter precipitation~~ is 3.54 inches~~. The maximum one-day rainfall in Ninety-Nine Islands for the years 1949-2005 was 7.16 inches~~ (Reference 224).

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.7.2, first paragraph, will be revised as follows:

~~As discussed above, the 48-hour probable maximum winter precipitation (PMWP) at the Ninety-Nine Islands weather station site is estimated to be 3.54 inches.~~ The 48-hour PMWP based on HMR 53 (Reference 234) is 30.5 inches. The rain load is considered separately from the snow and ice roof load. The roofs of the nuclear island have no lips around the edges, therefore, water and snow melt build up on the roofs of the nuclear island are negligible. The Shield Building roof is sloped with no lips around the edge of the roof to allow water build up. The PCS tank is flat with no lip; however, there is the central hole that can allow water to drain down in between the Shield wall and the SCV, but not to accumulate on the roof area. The Auxiliary Building has sloped roofs with three varying elevations (high points given); Area 1&2 155'-6", Area 3&4 163'-0", and Area 5&6 180'-9" (elevations are above plant grade). The south side (directions are relative to called North in the DCD) of the nuclear island wall 1 is above the Radwaste Building roof elevation 136'-4". The east side of the nuclear island, wall 1, is below the Annex Building roof elevation 183'-4.25", but the Auxiliary Building roof is sloped so that areas 3&4 drain on to areas 1&2 roof, which is sloped from east to west. There are no lips on the roof of the Auxiliary Bldg. that could prevent the flow of water. The North side of the nuclear island is also below the Turbine Building roof elevation 246'-3", but again Areas 1&2 are sloped such that the run-off will flow off the west side. As a result of the nuclear island roof design there is no loading from the PMWP.

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No. 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): 02.03.01-008

NRC RAI:

Based on NCDC Snow Climatology database (http://www.ncdc.noaa.gov/ussc/index.jsp), the staff found that the highest observed maximum snowfall amount, maximum snow depth, and 100-year estimate of snowfall for Cherokee County, SC occurred at the Gaffney 6E observation station. The 100-year snowfall amount for Gaffney 6E, based on data from 1894 through 2006, was 16.3 inches, the maximum snow depth was 17.0 inches, and the observed maximum snowfall was 17.0 inches. Please justify why the more conservative estimate of 17.0 inches is not used to estimate the weight of the 100-year return snowpack.

Duke Energy Response:

Per interim NRC staff guidance on PMWP (COL/DC-ISG-7 "Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures", ML081980084, issued for comment), "the highest of the 100-year return period snowpack, the historical maximum snowpack, the 100-year return period snowfall event, or the historical maximum snowfall in the site region should be used in identifying a site characteristic." The 100-year return period snowpack from Ninety-Nine Islands is the maximum of these values and is closer and more representative of site conditions than the Gaffney 6E data; however, the Gaffney data is more conservative and will be used in the PMWP evaluation.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsections 2.3.1.2.7.1, 2.3.1.2.7.3, and 2.3.7

Attachments:

1) Revised FSAR Subsections 2.3.1.2.7.1, 2.3.1.2.7.3, and 2.3.7

Lee Nuclear Station Response to Request for Additional Information (RAI)

Attachment 1 to RAI 02.03.01-008

Mark-up of FSAR Subsections 2.3.1.2.7.1, 2.3.1.2.7.3, and 2.3.7

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.7.1, will be revised as follows:

2.3.1.2.7.1 Estimated Weight of the 100-year Return Snowpack

Snowpack, as used in this section, is defined as a layer of snow and/or ice on the ground surface and is usually reported daily in inches by the NWS at all first order weather stations.

The density of the snowpack varies with age and the conditions to which it has been subjected. Thus, the depth of the snowpack is not a true indication of the pressure the snowpack exerts on the surface it covers. Due to the variable density in snowpack, a more useful statistic for estimating the snowpack pressure is the water equivalent (in inches) of the snowpack.

South Carolina is not a heavy snow load region. ANSI/ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures," identifies that the ground snowload for the Greenville-Spartanburg area is 7 lbf/ft^2 based on a 50-yr recurrence. This is converted to a 100-yr recurrence weight of 8.54 lbf/ft^2 (psf) using a factor of 1.22 (1 / 0.82) taken from ANSI/ASCE 7-05 Table C7-3. Local snow measurements support this ANSI/ASCE 7-05 (Reference 220) value.

To estimate the weight of the 100-year snowpack at the Lee Nuclear Station site, the maximum reported snow and/or ice depths at Ninety-Nine Islands, South Carolina, was determined. The current NCDC storm event database (Reference 207) indicates the greatest snow depth in the data period (8/1/1948 to 12/31/2005) occurred on January 7, 1988. The snow depth recorded on this date was 13 inches. The 100-year recurrence snow depth is 15.2 inches based on 57 years of data back to 1948. Based on NCDC Snow Climatology database, the highest observed maximum snowfall amount, maximum snow depth, and 100-year estimate of snowfall for Cherokee County, SC occurred at the Gaffney 6E observation station. The 100-year snowfall for Gaffney 6E, based on data from 1894 through 2006, was 16.3 inches, the maximum snow depth was 17.0 inches, and the observed maximum snowfall was 17.0 inches. The 100-year snow depth of 17.0 inches will be used in determining the snow load (Reference 237).

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, and glacial ice formed from compacted snow has a maximum density of 0.91 (Reference 221). In the Lee Nuclear Station site area, snow melts and/or evaporates quickly, usually within 48 hours, and before additional snow is added; thus, the water equivalent of the snowpack can be considered equal to the water equivalent of the falling snow as reported hourly during the snowfall. A conservative estimate of the water equivalent of snowpack in the Lee Nuclear Station site area would be 0.20 inches of water per inch of snowpack. Then, the water equivalent of the 100-year return snowpack would be ~~15.2~~17.0 inches snowpack x 0.2 inches water equivalent/inch snowpack = 3.~~0~~4 inches of water.

Because one cubic inch of water is approximately 0.0361 pounds in weight, a one inch water equivalent snowpack would exert a pressure of 5.20 pounds per square foot (0.0361 lb/cu in/in x 144 sq in/sq ft).

For the 100-year return snowpack, the water equivalent would exert a pressure of ~~15.8~~17.7 pounds per square foot (5.2 lbm/sq ft/inch x 3.~~0~~4 inches).

COLA Part 2, FSAR, Chapter 2, Subsection 2.3.1.2.7.3, second paragraph, will be revised as follows:

Because the plant site is subjected to a subtropical climate with mild winters, prolonged snowfalls or large accumulations of snow or ice on the ground and structures are not anticipated. The estimated depth of the 100-year return snowpack is ~~15.2~~17.0 inches, or 3.~~04~~ inches of water equivalent, as discussed above. The safety-related structures at the Lee Nuclear Station would be designed to withstand ~~15.8~~17.7 pounds per square foot snow load. No damage from snow or ice loading on structures is expected because the DCD design loading is 75 pounds per square foot (see Table 2.0-201).

COLA Part 2, FSAR. Chapter 2, Subsection 2.3.7, will be revised as follows:

237. National Climatic Data Center (NCDC), "Extreme Snowfall Amount Corresponding to 4 Return Periods (plus Observed Extreme)," Gaffney 6 E, South Carolina, last updated 2007.

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No: 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): RAI 02.03.01-009

NRC RAI:

Please describe the additional resulting weight from the 48-hour probable maximum precipitation (PMWP) on the roof of the PCS tank if the central hole is blocked by a pre-existing 100-year snowpack. Also, please estimate the additional weight if at least part of the 48-hour PMWP falls as frozen precipitation.

Duke Energy Response:

As stated in FSAR Subsection 2.3.1.2.7.2, the roofs of the nuclear island have no lips around the edges, therefore, water and snow melt build up on the roofs of the Nuclear Island are negligible. The Shield Building roof is sloped with no lips around the edge of the roof that would allow water buildup. The PCS tank is flat with no lip that would allow water build up. Additionally, there is the central hole that can allow water to drain down in between the Shield wall and the SCV, reducing possible accumulation on the PCS roof area. Blockage of the central PCS tank hole by a pre-existing 100-year snowpack would not prevent water or snow melt runoff from the edges of the PCD tank roof. The safety related roofs are constructed of 15" thick reinforced concrete supported by steel beams. The roofs will not deflect enough to hold water under the snow load; therefore, ponding of rain water with pre-existing snow pack conditions will not occur. The NRC requested an evaluation of the potential for ice blockage of the chimney area during an accident as water vapor flowing up the chimney comes in contact with cold grating in RAI-TR143-SPCV-03. As stated in the AP1000 response, protection from ice blockage will be provided for the air inlet structures and the gratings in the chimney. Non-safety electrical heaters will be used to keep these structures free of ice and snow buildup. For a design basis accident, these heaters are assumed to not be operational. Heat transferred from the reactor containment during normal operation and during accident scenarios will help keep the gratings in the chimney free from ice buildup since the flow of heated air or air/water vapor is always upward through the gratings.

Guidance on the additional roof load necessary to account for rain on snow is provided in American Society of Civil Engineers (ASCE) Standard No. 7-05 (Ref. 1). This standard states that if the ground snow load is greater than 20 lb/ft^2, it is assumed that the full rain-on-snow effect has been measured and a separate rain-on-snow surcharge is not needed. The 100-yr return snow-depth at the WLS site is 17 inches which gives a ground snow load of 17.7 lb/ft^2 (17 in-snow * 0.2 in-water/in-snow * 5.2 lb/ft^2/in-water); therefore, a rain-on-snow surcharge is appropriate. The only additional roof load from the PMWP is due to water soaking into the snowpack (i.e., the rain-on-snow surcharge). The remaining PMWP runs off due to the roof design. A rain-on-snow flat roof surcharge of 5.0 lb/ft^2, given in ASCE 7-05, is conservatively applied to the WLS roof load. This roof load of 5 lb/ft^2 is equivalent to a ground loading of 7.2 lb/ft^2 (assuming thermal, exposure and importance factors equal 1) which gives a total ground

loading of 24.9 lb/ft^2. As described in DCD Appendix 3H, Section 3H.3.3, the AP1000 roof is designed for a uniform snow load of 63 lb/ft^2 calculated in accordance with ASCE 7, corresponding to a ground snow load of 75 lb/ft^2, exposure factor of 1.0, thermal factor of 1.0, and an importance factor of 1.2. Since the ground snow load used in AP1000 design is significantly more than the WLS site ground snow loading, including rain-on-snow surcharges, the AP1000 roof design is acceptable for the WLS site.

Reference:

1. ASCE Standard No. 7-05, "Minimum Design Loads for Buildings and Other Structures," ASCE/SEI 7-05, American Society of Civil Engineers, 2006.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter No.: 010

NRC Technical Review Branch: Siting and Accident Consequences Branch (RSAC)

Reference NRC RAI Number(s): RAI 02.03.01-010

NRC RAI:

10 CFR 52.79(a)(iii) requires a COL applicant to identify the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated. In addition, NUREG-0800, Section 2.3.1, states the applicability of data on severe weather phenomena to represent site conditions during the expected period of reactor operation should be substantiated.

Duke Energy Response:

General Design Criterion (GDC) 2 in Appendix A to 10 CFR Part 50 requires "consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated."

Certified climatological data obtained from the U.S. National Climatic Data Center (NCDC) was used for the severe weather phenomena evaluations. The selection and retrieval of this data was in accordance with NRC Regulatory Guide 1.27 Section C.1.a and Standard Review Plan 2.3.1. This data selection supports accurate severe weather phenomena projections for the area in the vicinity of the WLS site. This extensive historic data record provides the historical climatic trends and severe natural phenomena to be included in the site characterization. Dry-bulb, coincident wet-bulb, and non-coincident wet-bulb temperatures represent significant site characteristics because this data is used in demonstrating that the AP1000 DCD site parameters are bounding (i.e., more conservative) than the WLS site characteristics. The WLS site characteristic temperatures were developed by considering both 100-year return temperatures and 0% exceedance temperatures. These values were calculated using a 31-year (1977-2007) sequential hourly meteorological data set for Greer Greenville-Spartanburg Airport, South Carolina, Station No. 03870, National Weather Service (NWS) station. Because the 100-year return period methodology is based on extrapolated values and does not produce a completely conservative set of values, the maximum safety and minimum safety wet-bulb and dry-bulb temperature site characteristics are calculated using the 0% exceedance methodology. As illustrated in FSAR Table 2.0-201, the difference between the WLS site characteristics and the DCD site parameters, used for design, provide additional margin to the selected WLS site characteristic maximum safety temperatures. This margin accounts for any limitations to the accuracy, quantity, and period of time in which the historical data have been accumulated.

General predictions on potential global or U.S. climatic changes and, in particular, on severe weather phenomena during the period of reactor operation are uncertain and are only possible on a macroclimatic scale. Since the maximum data span available (that is representative of the

actual microclimate near the WLS site) was used in the severe weather analysis for the Lee site, accurate severe weather phenomena projections have been provided based on best-available historic data. Projection of future severe weather conditions at the WLS site are speculative at best, based on current understanding and modeling of global climate change.

The WLS site characteristics are based on an extensive record of readily available and well-documented climatological observations. This data record incorporates historical climatic trends and severe natural phenomena, which were included in the WLS site characterization. The margin between the WLS site characteristics and the DCD site parameters accounts for any limitations to the accuracy, quantity, and period of time in which the historical data have been accumulated. The site parameters presented in the DCD are predicted to be bounding for the expected period of reactor operation.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None