This Subsection contains information withheld under 10 CFR 2.390(a)(3)

2.7.4 Local Meteorology

Site-specific meteorological data, collected from the Tennessee Valley Authority (TVA) meteorological facility at the CRN Site during April 21, 2011 through July 9, 2013, are the primary basis for dispersion meteorology analyses and the description of local meteorological conditions. In addition to onsite measurements, data representative of the Clinch River Nuclear (CRN) Site or data indicative of CRN Site conditions were also obtained from climatological records for Oak Ridge National Weather Service (NWS) Station, Knoxville NWS Station, and from the TVA Watts Bar Nuclear Plant site.

2.7.4.1 Normal, Mean, and Extreme Values

Long-term meteorological data records were examined to determine if data collected at the CRN Site are consistent with regional conditions, both spatially and over time.

Comparisons of common CRN Site measurements for the different data periods over which data were collected are presented in Table 2.7.4-1. Common variables (except wind direction) are compared directly in the table. There is generally good agreement among the different data periods, especially the latter two data sets. Differences fall within the range of normally expected variations considering none of the data sets individually represent a long-term climatological period and also due to the difference in measurement locations onsite (see Table 2.7.4-16). In general, the average meteorological values calculated are similar. Therefore, it is assumed that meteorological characteristics for the CRN Site have not changed significantly over time.

Comparing data from nearby offsite locations helps to determine if the CRN Site is consistent with regional conditions. Data were examined for April 21, 2011 through June 30, 2013 (Table 2.7.4-1), which represents the primary onsite data set for the CRN project. There is good agreement between the CRN Site data and the offsite locations, especially the average values. Average values at the CRN Site fall between, or near, the Oak Ridge NWS Station and Watts Bar Nuclear values.

Figures 2.7.4-5 and 2.7.4-6 present composite wind roses from the CRN Site for the period of April 21, 2011 through June 30, 2013 at the 10-meters (m) and 60-m heights, respectively. The CRN wind roses show the effect of the regional southwest to northeast orientation of terrain. However, these wind roses also indicate the effects of more local terrain. This is most evident at the lower 10-m level where there is a stronger east, east-southeast, and west-northwest/northwest wind component. These local effects are discussed further in Subsection 2.7.4.2.

Comparisons presented above indicate that, for these variables, data from the CRN Site are consistent with meteorological conditions in the vicinity. Presumably, this is characteristic of the similarity in controlling synoptic influences throughout the region. Other meteorological

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parameters are assumed to be subject to the same synoptic controls. Meteorological data collected onsite and at nearby NWS stations are presented and evaluated in the following subsections in more detail.

2.7.4.1.1 Winds

Both 10-m and 60-m wind data were collected on the meteorological tower at the CRN Site. The meteorological facility generally met criteria for obtaining “data representative of the atmospheric conditions.” Two nearby obstructions were noted by TVA to exceed the 1-to-10 height-to-distance criteria specified in NRC RG 1.23, *Meteorological Monitoring Programs for Nuclear Power Plants*. These two obstructions included:

1. A power line transmission tower about 120 m northeast of the meteorological tower, and
2. Trees about 70 m southeast of the meteorological tower.

TVA meteorologists determined these obstructions would have minimal impact on data collected at the CRN Site based on the following: (1) the transmission tower is an open, lattice structure so that it presents no obstruction to wind flow observed at the meteorological tower and (2) the trees cover only a relatively small arc with respect to the meteorological tower. [ ] Exempted from Disclosure by Statute

Much of the following discussion considers the 10-m wind data because it is most representative of the local meteorological conditions closest to the ground where releases for dispersion modeling are expected. Local ground level conditions are most important in evaluating ground level releases, because maximum air concentrations from contaminants released into the atmosphere generally occur close to the release point.

Average Wind Direction and Wind Speed

Monthly wind roses for the 10-m level at the CRN Site, the 60-m level at the CRN Site, and Oak Ridge NWS are presented in Figure 2.7.4-1 (CRN 10-m), Figure 2.7.4-2 (CRN 60-m), and Figure 2.7.4-3 (Oak Ridge NWS). Figures 2.7.4-5 and 2.7.4-6 provide both 10-m and 60-m composite wind roses for the entire, approximate two year period that data were collected at the CRN Site, and Table 2.7.4-2 presents 10-m and 60-m wind speed and wind direction joint frequency distributions for the approximate two-year CRN Site sampling period. Figure 2.7.4-7 presents an annual wind rose for the Oak Ridge NWS.

Wind speeds at CRN during 2011 through 2013 were generally light with an average 10-m speed of 2.74 miles per hour (mph; summarized in Table 2.7.4-1). This is consistent with the 30 year (yr) normal wind speed of 2.9 mph for the Oak Ridge NWS (Reference 2.7.4-1). The maximum 10-m hourly average (scalar) speed was 15.1 mph (Table 2.7.4-1). 10-m winds were calm (less than 0.6 mph) for 458 hour (hr; 2.4 percent of observations). The prevailing wind

direction at 10-m is the west-southwest direction though there is also a strong west-northwesterly component (Figure 2.7.4-5). In general, west-southwesterly winds are prominent throughout most of the year.

At the 60-m level, the prevailing wind direction is west-southwest, with a prominent peak in the opposite direction from the northeast (Table 2.7.4-2 and Figure 2.7.4-6). The 60-m wind rose shows greater evidence of the southwest to northeast orientation of the region's topography, and the 10-m level reflects more of the local conditions associated with the area near the CRN Site. At the 60-m level, the maximum hourly average observed wind speed was 27.1 mph (Table 2.7.4-1) and calms occurred 0.14 percent of the time. The average 60-m level wind speed was 4.86 mph for the CRN Site meteorological sampling period.

Figure 2.7.4-7 shows the wind rose for the Oak Ridge NWS, which indicates winds consistent with the southwest to northeast orientation of the terrain in the region.

Wind Direction Persistence

Generally, the longer winds blow in the same direction, the lower the atmosphere's dilution potential because effluents mix less horizontally to the sides of the plume. Wind direction persistence is an indicator of the duration of atmospheric transport from a single sector (same sector, 22.5 degrees), three adjoining sectors (± 1 sector, 67.5 degrees), and five adjoining sectors (± 2 sectors, 112.5 degrees). For the CRN Site (Table 2.7.4-3), maximum wind persistence at 10-m is 19 hr from the W for one sector, 46 hr from the west-northwest (WNW)-north-northwest (NNW) for three adjoining sectors (± 1 sector), and 106 hr from the southwest (SW)-northwest (NW) for five adjoining sectors (± 2 sectors).

The 10-m wind data also show a consistent pattern with predominant winds from the west-southwest (WSW)-NW. There is little seasonal variation (Figure 2.7.4-4). Due to the combination of uniformly light winds speeds and surrounding terrain, transport from the CRN Site is expected to be limited.

2.7.4.1.2 Air Temperature

Temperature data for Knoxville and Oak Ridge are presented in Tables 2.7.4-4 and 2.7.4-5, respectively. Mean monthly temperatures range from the upper 30s (degrees Fahrenheit [°F]) in the winter to the upper 70s (°F) in the summer at both locations. Mean maxima ranged from about 47°F in mid-winter to about 88°F in mid-summer. The mean minima ranged from about 29°F in mid-winter to about 69°F in mid-summer. The extreme maxima recorded were 105°F (June and July 2012) at Knoxville and 105°F (July 1952 and June 2012) at Oak Ridge, and the extreme minima (during January 1985) were -24°F and -17°F, respectively.

Table 2.7.4-6 compares the mean monthly and annual temperatures from the CRN Site to the climatological average monthly and annual temperatures at the Oak Ridge NWS Station and

Knoxville NWS Station. These data indicate a consistency between the CRN Site temperatures with those at the NWS Stations. Average yearly dry-bulb temperatures are around 59°F. The maximum monthly average temperature is approximately 78°F (July) at each location. The minimum monthly average temperature ranges from around 38°F to 42°F (January) with the CRN Site having the slightly higher temperature. In general the monthly mean temperatures at the 10-m level for the site correspond well with the Oak Ridge NWS Station temperatures, with the greatest difference being in September and October (around 4°F).

During the approximately two year period of the most current data collection at the CRN Site, the maximum dry bulb temperature was 100.95°F at 60-m and 102.17°F at 10-m (both in June 2012), and the minima temperatures recorded were 17.36°F at 60-m (February 2012) and 17.18°F at 10-m (January 2012).

2.7.4.1.3 Atmospheric Moisture

Humidity

Long-term relative humidity and wet bulb temperatures for the Knoxville NWS Station and the Oak Ridge NWS Station are presented in Table 2.7.4-7, along with the short-term data based on 10-m measurements at the onsite meteorological tower.

CRN Site data trend well with the long-term data. The mean annual relative humidity is 75.02 percent at the CRN Site which compares well to the long-term mean annual relative humidity of 73 percent at Knoxville NWS Station. The CRN Site data ranges from 66.10 percent in March to 80.90 percent in September. The Knoxville NWS Station data range is 65 percent in April to 76 percent in August.

Wet-bulb temperature annual averages are 53.01°F at the CRN Site, 50.2°F at the Oak Ridge NWS Station, and 51.9°F at the Knoxville NWS Station (Reference 2.7.4-2; Reference 2.7.4-1). Maximum monthly mean wet-bulb temperatures are 71.91°F, 69.0°F, and 69.9°F at the CRN Site, Oak Ridge NWS Station, and Knoxville NWS Station during July. Minimum monthly mean wet bulb temperatures are recorded in January; these are 37.41°F, 31.0°F, and 33.5°F for the CRN Site, Oak Ridge NWS Station, and Knoxville NWS Station, respectively.

The maximum 5-day average of daily wet bulb temperatures at the CRN Site, for the period from April 21, 2011 through June 30, 2013, was 74.36°F at 60-m and 75.12°F at 10-m. The concurrent 5-day average of daily wet bulb temperatures at the Oak Ridge NWS Station was 75.41°F. For a 30-day period, the maximum average of daily wet bulb temperatures at the CRN Site was 72.61°F at 60-m and 73.34°F at 10- m, and the concurrent 30-day average wet bulb temperature at the Oak Ridge NWS Station was 73.96°F.

Concurrent mean monthly dew point temperatures and wet bulb temperatures are presented and compared for the CRN Site, the Oak Ridge NWS Station, and Watts Bar Nuclear Plant in Figures 2.7.4-8 and 2.7.4-9 for the period from April 2011 through June 2013. The plots indicate

good agreement between concurrent data. Average maximum and minimum monthly dew point temperatures are presented in Table 2.7.4-7 for the 10-m level at the CRN Site and Oak Ridge NWS Station. The data show that corresponding temperatures are generally within a degree or two of each other.

Precipitation

Valid reliable onsite precipitation observations are not available from the CRN Site. Hourly data collected at the Oak Ridge NWS Station (approximately 12 miles [mi] northeast of the CRN Site) are used in the absence of valid onsite data.

Precipitation data from the Oak Ridge NWS Station are presented in Table 2.7.4-8. Precipitation occurs an average of about 125 days per year, and the normal annual precipitation is nearly 51 in. The maximum monthly rainfall has ranged from about 7 in. to just over 19 in. The minimum monthly amount was a trace in October 1963. The maximum in 24 hr was 7.48 in. in August 1960. With the exception of late-summer/early-autumn (which are slightly dryer) precipitation is fairly uniformly distributed through the year. March and July are normally the wettest months of the year.

The Oak Ridge NWS Station precipitation data during the 2011 through 2013 CRN sampling period are presented in Table 2.7.4-9. The data show that the years 2011 and 2013 were much wetter than normal, and 2012 was slightly dryer though close to normal. Precipitation was approximately 22 in. greater than normal for the CRN sampling period.

Approximately 49 thunderstorms occur in a typical year (Table 2.7.4-8). Thunderstorm activity is greatest during the spring and summer months, and the maximum frequency of thunderstorm days is normally in July.

Table 2.7.4-10 shows composite 2011 through 2013 precipitation data based on the Oak Ridge NWS Station hourly precipitation and CRN wind directions. For lighter precipitation events, precipitation was primarily associated with wind directions from SW-NW with a secondary maximum for wind directions from NE-ENE. For periods of greatest precipitation intensity, winds were from the south-southeast (SSE), WNW or NW.

Snow

Appreciable snowfall is relatively infrequent in the area. Snowfall data are summarized in Table 2.7.4-11 for Knoxville NWS Station and Oak Ridge NWS Station. Mean annual snowfall has ranged from 6.5 in. at Knoxville NWS Station to about 11 in. at Oak Ridge NWS Station. The maximum normal monthly snowfall is 2.7 in. in January at Knoxville NWS Station and 4.0 in. at Oak Ridge NWS Station in January.

Generally, significant snowfall is limited to November through March. Respective 24-hr maximum snowfalls are 18.2 and 12.0 in. at Knoxville NWS Station and Oak Ridge NWS

Station. Recorded maximum monthly snowfalls are 23.3 in. (February 1960) at Knoxville NWS and 21.0 in. (March 1960) at Oak Ridge NWS Station.

Fog

The occurrence of heavy fog at Knoxville NWS Station and Oak Ridge NWS Station is summarized in Table 2.7.4-12. These data indicate that heavy fog (visibility ≤ 0.25 mi) occurs about 30 days per year at Knoxville NWS Station and 52 days per year at Oak Ridge NWS, with the autumn normally the foggiest season. Because the CRN Site is closer to the Oak Ridge NWS Station and due to both sites being located along the west side of the Appalachian Ridge and Valley Region, the CRN Site is likely to have conditions more similar to the Oak Ridge NWS Station than the Knoxville NWS Station.

2.7.4.1.4 Atmospheric Stability

Atmospheric stability is based on the temperature difference (ΔT interval) between the 60-m and 10-m levels from the CRN Site meteorological monitoring program. The frequency occurrence of Pasquill atmospheric stability classes (Classes A through G) is presented in Table 2.7.4-13. While neutral lapse conditions (Class D) occur most frequently of any one stability class (31.06 percent of the time), stable lapse conditions (classes E through G) occur almost 57 percent of the time. These stable conditions are indicative of ground level inversions, which can inhibit the dispersion of contaminants released into the atmosphere. The most common stable case is Stability Class E which occurs on the order of 23 percent of the time. The most stable class (class G) occurs 17 percent of the time. Unstable conditions which are associated with more rapid dispersion occur about 12 percent of the time.

Inversions

Table 2.7.4-14 summarizes the occurrence of consecutive hours of stability classes E, F, or G based on the CRN Site data collected from April 21, 2011 through June 30, 2013. The longest contiguous period of stable conditions, which are indicative of inversion conditions, is 19 hr. This occurred four times over the CRN Site data collection period.

Mixing Heights

Average morning and afternoon mixing heights for the region are based on data provided by Holzworth for the four seasons and annually (Reference 2.7.4-3). Mixing heights are presented in Table 2.7.4-15. Mixing height defines the vertical extent of the mixing layer. Generally, as the mixing layer height increases air contaminant concentrations decrease. Table 2.7.4-15 shows that average mixing heights in the region extend to almost 1900 m during summer afternoons. This is typical of summer afternoon conditions when the ground is heated by the sun, and the ground then heats the lower part of the atmosphere. This heating of the atmosphere (from the ground up) results in the building up of the mixing layer.

2.7.4.2 Topographic Description and Potential Modifications

The CRN Site elevation ranges from 745 feet (ft) above mean sea level (msl) to 940 ft msl on a peninsula formed by a meander in the Clinch River arm of the Watts Bar Reservoir. Terrain in the vicinity of the CRN Site (Figure 2.7.4-10) is characterized as alternating ridges and valleys oriented along a southwest-to-northeast axis. Nearby ridges reach an elevation of 1100 ft msl (approximately 300 ft above plant grade). There are significant gaps in the ridges to the east (Clinch River arm of the Watts Bar Reservoir flowing into the CRN Site), south-southeast (Caney Creek flowing into Clinch River arm of the Watts Bar Reservoir), and northwest (Clinch River arm of the Watts Bar Reservoir flowing away from the CRN Site).

Figure 2.7.4-12 provides line diagrams of the maximum elevation at the 16 compass directions radiating out from the CRN Site to a distance of 50 mi (80 kilometers).

The geographic orientation of the ridges and valleys generally aligns with the prevailing regional winds from the southwest, but the gaps in the ridges permit wind flow from other directions as well. The combination of high pressure associated with the Azores-Bermuda anti-cyclonic circulation and the nearby ridges result in generally light wind speeds. Average surface wind speeds for the site are 2.74 mph at the 10-m level and 4.86 mph at the 60-m level.

Meteorological measurements were made using three different meteorological towers on the CRN Site over different periods of time (Table 2.7.4-16). Data from the three meteorological towers were used to evaluate the impact of topography. The principal impact is on wind direction (Figure 2.7.4-11).

The predominant up-valley/down-valley flow is readily apparent at the three meteorological towers (Figure 2.7.4-11) that have collected data at the CRN Site. For the meteorological towers and all time periods, levels 25-m and higher have two peaks in the wind direction frequency; up-valley from the SW-WSW, and down-valley from the NE-ENE. This bimodal flow also exists at the 10-m levels for the three meteorological towers (Figure 2.7.4-11), though not as prominent as at the upper, 60-m level.

However, local effects are also apparent, due to the placement of the meteorological towers relative to surrounding terrain (see Table 2.7.4-16 for meteorological tower descriptions).

- The 10-m level on the supplemental Meteorological Tower (Ms) has a much greater frequency of winds from the ENE-E than the other towers, because it is more exposed to wind flow from the E. Clinch River arm of the Watts Bar Reservoir Gap. At the other meteorological towers, the flow through this gap tends to merge with the overall down-valley flow.
- The 10-m level on the primary Meteorological Tower (Mp) has a greater frequency of winds from the SSE than the other meteorological towers, because of wind flow from the Caney Creek Gap.

- The temporary Meteorological Tower (Mt) has a noticeable sharp peak at all levels for winds from the WNW, due to wind flow from the N. Clinch River arm of the Watts Bar Reservoir Gap, and the river orientation near the meteorological tower site. This sharp peak is not as apparent at the other meteorological towers (Figure 2.7.4-11).

2.7.4.3 Potential Influence of Plant and its Facilities on Local Air Meteorology

Larger structures onsite would influence wind conditions (wind speed, direction and turbulence), although these effects are not expected to be significant beyond 10 building/structure heights from the building or structure in question (NRC RG 1.23). Close in to the measuring location, added turbulence from building structures can enhance the near-field dispersion of air contaminants, thus reducing ambient concentrations.

The only facility systems which may have any noticeable effects on the local meteorology are cooling towers. There would also be some minor impacts on local air quality during construction.

Cooling tower impacts are addressed in Section 5.3. Construction impacts would be mitigated using construction best management practices according to TVA procedures.

2.7.4.4 Global Climate Change

The expected operating life time for the CR SMR Project is 40 to 60 yr dependent on extension requests. Historical long-term meteorological data are evaluated and used for consideration of the project's impact on the CRN Site's surroundings. Though global climate change, in both its magnitude effects, is uncertain, projected trends are discussed in relationship to current conditions. Consistent with NRC Interim Staff Guidance 026 (August 2014), the following considers the normal project life time and resources that may be impacted by climate change.

The National Climate Assessment (NCA) Report provides detailed information related to the potential effects of climate change on the United States by region. The CRN Site is located in the southeast region as defined by the report. In general the NCA Report states that the southeast region is "vulnerable to sea level rise, extreme heat events, hurricanes, and decreased water availability". (Reference 2.7.4-4)

The NCA Report found that over the last 100 yr, the southeast has experienced the following cycles of extended warm and cool periods:

- Warm temperatures peaked during the 1930s and 1940s
- Cooler temperatures occurred during the 1960s and 1970s
- Warmer temperatures have occurred from the 1970s until present (with an average increase of 2°F) (Reference 2.7.4-4)

Further, there have been an increasing number of days that exceed 95°F, nights that exceed 75°F, and a decrease in the number of “extremely cold” days since the 1970s (Reference 2.7.4-4).

The report projects that southeast region temperatures are expected to increase from 4°F to 8°F by the year 2100 (Reference 2.7.4-4). These are probabilistic predictions; however, if these numbers are simply interpolated for the next 50 yr, results indicate an approximate increase of 2°F to 4°F for the operating life time of the CR SMR Project. With these increased temperatures, the report also finds that the number of days that exceed 95°F would increase and there is likely to be a decrease in days with freezing temperatures (Reference 2.7.4-4).

The NCA report states that precipitation pattern projections for the southeast “are less certain than projections for temperature increases” in the southeast. This is primarily due to the southeast being located in a “transition zone” between the southwestern United States, which is dryer and the Northern United States, which is wetter. Model predictions therefore only show “small changes relative to natural variations.” Though precipitation patterns are uncertain, the NCA Report finds that reduced water availability is expected from increased evaporation due to higher temperatures in the southeast. (Reference 2.7.4-4)

The NCA has investigated severe weather events including hurricane and tornadoes. The NCA Report states that warmer temperature projections would result in a decrease in tropical storms globally, however, those that develop would be of greater intensity (Reference 2.7.4-4). The CRN Site is generally too far inland to experience the most severe impacts of hurricanes. For tornadoes, the study reports that the number of major tornadoes has increased in the past 50 yr, however, there is “no statistically significant trend.” The study indicates that the increase in the number of tornadoes reported may be attributable to expanded and better reporting of tornadoes. (Reference 2.7.4-4)

Projections indicate sea levels are expected to rise around coastal areas of the southeast Threats associated with these conditions would not have a direct effect on the CRN Site due to its inland location and significant elevation above sea level.

Based on the NCA Report, the greatest potential effects of climate change are increased temperatures and reduced water availability for the CRN Site and its surroundings. As the models used to develop these projections are based on future estimates of population growth, land use, energy consumption, emissions patterns, etc., there is a level of uncertainty associated with the events and meteorological conditions predicted. The CR SMR Project is required to continuously monitor meteorological and environmental conditions throughout the life cycle of the project to ensure it remains within its allowable licensed limits of operation.

2.7.4.5 References

Reference 2.7.4-1. National Oceanic and Atmospheric Administration, 2013 Local Climatological Data Annual Summary with Comparative Data - Oak Ridge, Tennessee, Website: http://www.ncdc.noaa.gov/IPS/lcd/lcd.html, 2015.

Reference 2.7.4-2. National Oceanic and Atmospheric Administration, 2013 Local Climatological Data Annual Summary with Comparative Data - Knoxville, Tennessee, Website: http://www.ncdc.noaa.gov/IPS/lcd/lcd.html, 2015.

Reference 2.7.4-3. U.S. Environmental Protection Agency, "Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States-Table B-1," January, 1972.

Reference 2.7.4-4. U.S. Global Change Research Program, "Climate Change Impacts in the United States - Chapter 17 Southeast and the Caribbean," October, 2014.

Reference 2.7.4-5. National Oceanic and Atmospheric Administration, 2011 Local Climatological Data - Oak Ridge, Tennessee, Website: http://www.ncdc.noaa.gov/IPS/lcd/lcd.html, April, 2011.

Reference 2.7.4-6. National Oceanic and Atmospheric Administration, 1998 Local Climatological Data Annual Summary with Comparative Data - Oak Ridge, Tennessee, Website: http://www.ncdc.noaa.gov/IPS/lcd/lcd.html, 2015.

Reference 2.7.4-7. National Oceanic and Atmospheric Administration, 2012 Local Climatological Data Annual Summary with Comparative Data - Oak Ridge, Tennessee, Website: http://www.ncdc.noaa.gov/IPS/lcd/lcd.html, 2015.

Reference 2.7.4-8. National Oceanic and Atmospheric Administration, 2011 Local Climatological Data Annual Summary with Comparative Data - Oak Ridge, Tennessee, Website: http://www.ncdc.noaa.gov/IPS/lcd/lcd.html, 2015.

Table 2.7.4-1
Comparisons of Meteorological Tower Measurements

a. Historical Primary Tower Measurements

Variable	February 16, 1977 to March 6, 1978			March 25, 1982 to November 4, 1983			April 21, 2011 to June 30, 2013		
	Min	**Avg**	Max	Min	**Avg**	Max	Min	**Avg**	Max
60-m Average (scalar) Wind Speed (mph)	0.0	**5.70**	33.0	0.1	**4.90**	32.8	0.3	**4.88**	27.1
10-m Average (scalar) Wind Speed (mph)	0.0	**3.45**	19.6	0.1	**2.80**	19.2	0.2	**2.75**	15.1
60-m Temperature (°F)	4.60	**55.64**	92.70	16.38	**60.81**	98.12	17.36	**60.03**	100.95
10-m Temperature (°F)	4.60	**54.92**	93.90	16.93	**60.06**	99.44	17.18	**59.11**	102.17
10-m Dewpoint (°F)	-13.1	**46.19**	76.90	-5.13	**52.12**	79.19	-3.43	**50.05**	78.19
Solar Radiation (langley/min)	0.00	**0.23**	1.43	0.00	**0.26**	1.48	0.00	**0.27**	1.51
60-10 Stability (from ΔT)	% Occurrence			% Occurrence			% Occurrence		
Unstable (Classes A-C)	7.88			13.02			13.69		
Neutral (Class D)	36.63			33.10			30.05		
Stable (Class E-G)	55.49			53.88			56.26		

b. Comparison of 10-meter CRN Site with Offsite Locations[1]

Variable	CRN 10-meters			Oak Ridge NWS[2]			Watts Bar Nuclear 10-meters		
	Min	**Avg**	Max	Min	**Avg**	Max	Min	**Avg**	Max
Wind Speed (mph)	0.2	**2.75**	15.1	0	**2.31**	26	0.00	**3.46**	17.3
Temperature (°F)	17.18	**59.11**	102.17	17	**60.79**	105	17.71	**60.70**	102.77
Dewpoint (°F)	-3.43	**50.05**	78.19	-10	**49.44**	77	-3.05	**50.28**	78.30

[1] Data Period: April 21, 2011 to June 30, 2013.
[2] 2011 – 2013 Oak Ridge LCDs (Reference 2.7.4-5)

c. Average CRN 10-meter wind speeds (2011 through 2013)

		Average 10-meter Wind Speed (mph)
2011	2nd quarter	2.74
	3rd quarter	2.29
	4th quarter	2.59
2012	1st quarter	3.30
	2nd quarter	2.49
	3rd quarter	2.07
	4th quarter	2.77
2013	1st quarter	3.72
	2nd quarter	2.79
OVERALL		**2.74**

Table 2.7.4-2 (Sheet 1 of 2)
CRN Site 10-Meter Joint Frequency Distribution by Wind Speed and Direction for All Stability Classes
(April 21, 2011 through July 9, 2013)

a. CRN Site 10-Meter Joint Frequency Distribution by Wind Speed and Direction for All Stability Classes (April 21, 2011 through July 9, 2013)

Wind Direction	Wind Speed (mph)									
	Calm	0.6 - 1.4	1.5 - 3.4	3.5 - 5.4	5.5 - 7.4	7.5 - 12.4	12.5 - 18.4	18.5 - 24.4	>=24.5	Total
N	0.110	1.788	1.348	0.467	0.156	0.005	0.000	0.000	0.000	3.873
NNE	0.112	1.576	1.617	0.752	0.073	0.000	0.000	0.000	0.000	4.129
NE	0.141	1.690	2.343	1.529	0.389	0.036	0.000	0.000	0.000	6.128
ENE	0.153	2.265	2.125	1.037	0.347	0.083	0.000	0.000	0.000	6.011
E	0.186	3.732	1.591	0.451	0.057	0.000	0.000	0.000	0.000	6.017
ESE	0.219	4.904	1.353	0.259	0.021	0.000	0.000	0.000	0.000	6.755
SE	0.191	4.095	1.384	0.197	0.005	0.010	0.000	0.000	0.000	5.883
SSE	0.116	2.208	1.125	0.347	0.114	0.119	0.000	0.000	0.000	4.030
S	0.102	1.337	1.571	0.793	0.378	0.311	0.026	0.000	0.000	4.518
SSW	0.091	0.974	1.643	0.793	0.244	0.026	0.000	0.000	0.000	3.772
SW	0.110	0.985	2.151	1.757	0.695	0.187	0.000	0.000	0.000	5.884
WSW	0.155	1.368	3.079	3.317	1.643	0.674	0.005	0.000	0.000	10.242
W	0.192	2.089	3.400	2.265	0.695	0.555	0.067	0.000	0.000	9.263
WNW	0.211	2.960	3.079	1.700	1.223	0.917	0.041	0.000	0.000	10.132
NW	0.178	2.877	2.213	1.591	1.218	1.166	0.010	0.000	0.000	9.254
NNW	0.108	1.856	1.244	0.565	0.249	0.088	0.000	0.000	0.000	4.110
Subtotal	2.374	36.704	31.267	17.821	7.506	4.178	0.150	0.000	0.000	100.000

Total Hours Of Valid Wind Observations:	19292	Meteorological Facility: CRN Site
Total Hours Of Observations:	19464	Wind Speed and Direction Measured at 9.78 Meter Level
Recoverability Percentage:	99.1	Mean Wind Speed = 2.74
Total Hours Calm:	458	

Note: Totals and subtotals are obtained from unrounded numbers.

Table 2.7.4-2 (Sheet 2 of 2)
CRN Site 60-Meter Joint Frequency Distribution by Wind Speed and Direction for All Stability Classes
(April 21, 2011 through July 9, 2013)

b. CRN Site 60-Meter Joint Frequency Distribution by Wind Speed and Direction for All Stability Classes (April 21, 2011 through July 9, 2013)

Wind Direction	Wind Speed (mph)									
	Calm	0.6 - 1.4	1.5 - 3.4	3.5 - 5.4	5.5 - 7.4	7.5 - 12.4	12.5 - 18.4	18.5 - 24.4	>=24.5	Total
N	0.007	0.832	1.302	0.481	0.279	0.269	0.000	0.000	0.000	3.169
NNE	0.009	0.744	2.005	0.925	0.537	0.258	0.021	0.000	0.000	4.499
NE	0.010	0.785	2.382	1.829	1.468	1.679	0.109	0.005	0.005	8.273
ENE	0.012	0.775	2.899	1.674	1.147	0.801	0.026	0.000	0.000	7.334
E	0.009	0.816	2.046	0.868	0.341	0.114	0.010	0.000	0.000	4.205
ESE	0.007	0.827	1.390	0.372	0.114	0.078	0.010	0.000	0.000	2.797
SE	0.006	0.682	1.359	0.289	0.145	0.031	0.016	0.005	0.000	2.533
SSE	0.005	0.455	1.095	0.372	0.155	0.145	0.041	0.005	0.000	2.273
S	0.005	0.470	1.266	0.770	0.553	0.760	0.372	0.072	0.000	4.269
SSW	0.007	0.450	1.798	1.731	1.178	0.723	0.021	0.000	0.000	5.908
SW	0.008	0.481	2.212	2.723	2.186	2.088	0.176	0.000	0.000	9.873
WSW	0.013	0.729	3.271	3.473	2.666	2.377	0.563	0.052	0.000	13.143
W	0.014	1.044	3.566	2.356	1.504	1.690	0.584	0.284	0.026	11.068
WNW	0.012	1.049	2.687	1.359	1.256	2.336	1.080	0.103	0.005	9.887
NW	0.010	0.956	2.181	1.142	0.956	1.824	0.661	0.031	0.000	7.761
NNW	0.006	0.847	1.111	0.455	0.315	0.248	0.026	0.000	0.000	3.008
Subtotal	0.140	11.942	32.570	20.820	14.800	15.420	3.715	0.558	0.036	100.000

Total Hours Of Valid Wind Observations:	19352
Total Hours Of Observations:	19464
Recoverability Percentage:	99.4
Total Hours Calm:	27

Meteorological Facility: CRN Site
Wind Speed and Direction Measured at 60.11 Meter Level
Mean Wind Speed = 4.86

Note: Totals and subtotals are obtained from unrounded numbers.

Table 2.7.4-3
10-Meter Wind Direction (WD) Persistence for CRN[1]

	Maximum Hours of WD Persistence		
	Same Sector	**Three Adjoining Sectors (± 1 sector)**	**Five Adjoining Sectors (± 2 sectors)**
N	6	15	59
NNE	7	15	35
NE	10	29	39
ENE	8	26	32
E	6	17	31
ESE	6	17	26
SE	6	13	25
SSE	10	17	25
S	8	14	23
SSW	4	14	39
SW	7	33	44
WSW	15	36	55
W	19	36	106
WNW	11	43	86
NW	15	46	67
NNW	7	45	69

[1] Data Period: April 21, 2011 through June 30, 2013

Note: Shading indicates maximum value.

Table 2.7.4-4

Air Temperatures for the Knoxville NWS Station

	Normal Daily Maximum (°F)	Normal Dry Bulb (°F)	Normal Daily Minimum (°F)	Extreme Daily Maximum (°F)	Extreme Daily Minimum (°F)
Period of Record (yrs)	30[1]	30[1]	30[1]	72[2]	72[2]
January	47.3	38.2	29.2	77	-24[4]
February	52.3	42.4	32.4	83	-8
March	61.4	50.3	39.2	86	1
April	70.3	58.8	47.3	92	22
May	78.1	67.2	56.2	96	32
June	85.4	75.0	64.7	105[3]	43
July	88.2	78.4	68.7	105[3]	49
August	87.8	77.8	67.8	102	49
September	81.8	71.1	60.4	103	36
October	71.2	59.9	48.5	91	25
November	60.4	49.7	39.0	84	5
December	49.8	40.8	31.7	80	-6
Annual[5]	69.5	59.1	48.8	105[3]	-24[4]

[1] 1981 to 2010

[2] Precise dates unavailable

[3] June 2012 and July 2012

[4] January 1985

[5] Annual average for “Normal” data columns and extreme value over period of record in the two right most “Extreme” data columns.

Source: (Reference 2.7.4-2)

Table 2.7.4-5

Air Temperatures for the Oak Ridge NWS Station

	Normal Daily Maximum (°F)	Normal Dry Bulb (°F)	Normal Daily Minimum (°F)	Extreme Daily Maximum (°F)	Extreme Daily Minimum (°F)
Period of Record (yrs)	*30*[1]	*30*[1]	*30*[1]	*66*[2]	*66*[2]
January	46.6	37.7	28.9	76	-17[4]
February	51.9	41.8	31.7	79	-13
March	61.4	50.4	39.3	86	1
April	70.6	58.8	46.9	92	20
May	78.3	66.8	55.2	95	30
June	85.7	75.1	64.5	105[3]	39
July	88.4	78.5	68.6	105[3]	49
August	88.0	77.6	67.2	103	50
September	81.7	70.7	59.7	102	33
October	71.1	59.5	48.0	90	21
November	59.6	48.9	38.3	83	0
December	49.6	40.3	31.1	78	-7
Annual[5]	69.4	58.8	48.3	105[3]	-17[4]

[1] 1981 to 2010

[2] Precise dates unavailable

[3] July 1952 and June 2012

[4] January 1985

[5] Annual average for “Normal” data columns and extreme value over period of record in the two right most “Extreme” data columns.

Source: (Reference 2.7.4-1)

Table 2.7.4-6
CRN Site, Oak Ridge and Knoxville Mean Monthly Dry Bulb Temperatures

	CRN Site[1]		NWS Stations[2]	
	60-Meter Mean Dry-Bulb Temperature (°F)	10-Meter Mean Dry-Bulb Temperature (°F)	Oak Ridge Normal Dry-Bulb Temperature (°F)	Knoxville Normal Dry-Bulb Temperature (°F)
Jan	41.80	40.98	37.7	38.2
Feb	43.53	42.68	41.8	42.4
Mar	51.64	50.86	50.4	50.3
Apr	59.92	59.15	58.8	58.8
May	66.78	65.96	66.8	67.2
Jun	73.94	73.07	75.1	75.0
Jul	78.27	77.67	78.5	78.4
Aug	75.35	74.30	77.6	77.8
Sep	67.40	66.58	70.7	71.1
Oct	56.34	55.41	59.5	59.9
Nov	48.77	47.09	48.9	49.7
Dec	45.12	43.97	40.3	40.8
Annual Average	59.07	58.14	58.8	59.1

[1] Data Period: April 21, 2011 through June 30, 2013
[2] (Reference 2.7.4-2; Reference 2.7.4-1)

Table 2.7.4-7
Relative Humidity and Wet Bulb Temperatures for CRN Site (10-Meters), Oak Ridge NWS Station, and Knoxville NWS Station

	Mean Relative Humidity (%)		Mean Wet Bulb Temperatures (°F)		
	CRN Site 10-meters[1]	Knoxville[2]	CRN Site 10-meters[1]	Oak Ridge[3]	Knoxville[2]
Jan	74.30	74	37.41	31.0	33.5
Feb	69.10	70	38.29	32.8	36.0
Mar	66.10	66	44.90	40.2	43.0
Apr	68.45	65	51.74	48.8	50.4
May	76.83	73	60.46	58.3	59.6
Jun	75.70	75	66.69	65.2	66.6
Jul	79.00	75	71.91	69.0	69.9
Aug	76.50	76	67.92	68.3	69.1
Sep	80.90	75	62.10	62.0	63.2
Oct	77.30	75	50.86	51.2	52.6
Nov	76.35	74	42.97	41.0	43.0
Dec	79.65	75	40.89	34.1	36.1
Annual	75.02	73	53.01	50.2	51.9

[1] Data from CRN Site April 2011 through June 2013
[2] 30 years of data (Reference 2.7.4-2)
[3] Relative humidity not available. 14 years of data. (Reference 2.7.4-1)

CRN Site (10-Meter) and Oak Ridge NWS Station Average Maximum and Minimum Monthly Dew Point Temperatures

	CRN Site (10-meters)		Oak Ridge NWS Station	
	Average Maximum Dew Point Temperature (°F)	Average Minimum Dew Point Temperature (°F)	Average Maximum Dew Point Temperature (°F)	Average Minimum Dew Point Temperature (°F)
Jan	33.80	30.67	32.34	31.58
Feb	35.05	26.65	34.30	28.40
Mar	45.89	31.03	45.89	29.55
Apr	54.65	44.09	54.59	42.93
May	60.11	54.95	59.66	54.78
Jun	65.82	59.96	65.59	58.81
Jul	70.47	68.90	70.54	68.68
Aug	65.30	64.75	65.42	64.51
Sep	59.80	59.49	59.66	59.24
Oct	47.88	46.45	46.99	46.02
Nov	41.96	35.13	41.33	33.04
Dec	37.92	36.90	37.05	36.54
Annual	55.24	43.33	55.17	42.37

Note: Data from CRN Site April 2011 through June 2013

Table 2.7.4-8
Historical Precipitation Data for the Oak Ridge NWS Station

	Normal Monthly (in.)	Maximum Monthly (in.)	Minimum Monthly (in.)	Maximum in 24 hours (in.)	Days with Precipitation (≥ 0.01 inch)	Days with Thunderstorms[1]
Period of Record (yrs)	*30*[2]	*66*[3]	*66*[3]	*66*[3]	*30*[2]	*17*[3]
January	4.54	13.27	0.93	4.25	10.9	0.7
February	4.57	12.78	0.84	5.18	10.1	1.7
March	5.06	12.24	2.13	4.74	11.2	2.5
April	4.18	14.03	0.88	6.24	10.4	4.0
May	4.29	10.70	0.80	4.41	11.9	7.0
June	4.28	11.14	0.53	3.70	10.8	7.6
July	5.27	19.27[4]	1.23	4.91	13.0	10.4
August	2.76	10.46	0.54	7.48[6]	8.9	8.7
September	3.69	10.14	0.41	6.54	8.4	3.3
October	2.92	6.95	T[5]	2.66	8.3	1.3
November	4.49	12.22	1.14	5.29	9.3	1.1
December	4.86	12.64	0.67	5.12	11.3	0.8
Annual[7]	50.91	19.27[4]	T[5]	7.48[6]	124.5	49.1

[1] From 1998 Annual Oak Ridge Local Climatological Data
[2] 1981 to 2010
[3] Precise dates unavailable
[4] July 1967
[5] October 1963 (T=Trace)
[6] August 1960
[7] Values in columns “Normal Monthly”, “Days with Precipitation (≥ 0.01 inch)”, and “Days with Thunderstorms” are total over the 12 months. Other columns provide the extreme monthly value.

Sources:
(Reference 2.7.4-1; Reference 2.7.4-6)

Table 2.7.4-9
Precipitation at the Oak Ridge NWS Station During CRN Meteorological Sampling Period

Year	Month	Monthly Observed[1] (in.)	Annual[1] (in.)	Monthly Normal[2] (in.)	Annual[2] (in.)
2011	January	3.99	71.26	4.54	50.91
	February	5.70		4.57	
	March	6.65		5.06	
	April	9.13		4.18	
	May	2.14		4.29	
	June	7.30		4.28	
	July	4.80		5.27	
	August	0.91		2.76	
	September	10.14		3.69	
	October	4.59		2.92	
	November	10.89		4.49	
	December	5.02		4.86	
2012	January	6.52	48.49	4.54	50.91
	February	3.76		4.57	
	March	5.59		5.06	
	April	3.10		4.18	
	May	2.84		4.29	
	June	1.40		4.28	
	July	5.84		5.27	
	August	2.89		2.76	
	September	7.17		3.69	
	October	1.66		2.92	
	November	1.14		4.49	
	December	6.58		4.86	
2013	January	10.51	67.39	4.54	50.91
	February	2.32		4.57	
	March	5.72		5.06	
	April	6.37		4.18	
	May	5.33		4.29	
	June	7.92		4.28	
	July	8.04		5.27	
	August	4.61		2.76	
	September	3.38		3.69	
	October	0.72		2.92	
	November	4.43		4.49	
	December	8.04		4.86	
CRN Sampling Period (May 2011 to June 2013):		132.45		110.39	
Total Period (2011 to 2013):			**187.14**		152.73

[1] (Reference 2.7.4-7; Reference 2.7.4-8; Reference 2.7.4-1)

[2] (Reference 2.7.4-1)

Note: Shaded area indicates CRN Site meteorological monitoring data collection period.

Table 2.7.4-10
Oak Ridge NWS Station Precipitation by CRN Wind Direction

CRN Wind Direction (blowing from)	Percent Occurrence of Oak Ridge Precipitation				
	All Precipitation	Precip. > 0.10 in.	Precip. > 0.25 in.	Precip. > 0.50 in.	Precip. > 1.00 in.
N	3.81	5.03	10.17	6.45	0.00
NNE	3.81	3.66	3.39	6.45	0.00
NE	7.99	9.38	6.78	3.23	0.00
ENE	6.93	9.15	5.93	0.00	0.00
E	4.91	5.49	5.08	0.00	0.00
ESE	3.73	4.12	5.08	3.23	0.00
SE	2.80	2.75	2.54	3.23	0.00
SSE	3.04	2.97	4.24	9.68	33.33
S	4.58	3.66	5.93	0.00	0.00
SSW	3.65	4.12	6.78	12.90	0.00
SW	6.16	7.09	11.02	12.90	0.00
WSW	12.49	9.38	7.63	16.13	0.00
W	11.64	11.67	8.47	3.23	0.00
WNW	11.35	7.78	5.08	6.45	33.33
NW	8.56	8.24	3.39	3.23	33.33
NNW	4.54	5.49	8.47	12.90	0.00

Note: Data Period: April 21, 2011 to June 30, 2013

Table 2.7.4-11
Historical Snowfall (Inches) for the Knoxville and Oak Ridge NWS Stations

	Normal Monthly	Maximum Monthly	Maximum in 24 hours	Maximum Snow Depth (in.)	Normal Number of Days with Snowfall ≥ 1.0 in.
Knoxville					
Period of Record (yrs)	*30*[1]	*69*[2]	*69*[2]	*62*[2]	*30*[1]
January	2.7	15.1	12.0	10	1.0
February	1.6	23.3[3]	17.5	15[5]	0.6
March	0.9	20.2	14.1	15[5]	0.2
April	0.5	10.7	10.7	7	0.1
May thru October	0.0	T	T	0	0.0
November	0.0	18.2	18.2[4]	10	0.0
December	0.8	12.2	8.9	6	0.3
Annual	6.5	23.3[3]	18.2[4]	15[5]	2.2
Oak Ridge					
Period of Record (yrs)	*30*[5]	*51*[2]	*51*[2]	*33*[2]	*30*[5]
January	4.0	9.6	8.3	8	1.4
February	3.8	17.2	11.3	6	1.3
March	0.8	21.0[7]	12.0[7]	3	0.2
April	0.2	5.9	5.4	3	0.1
May thru October	0.0	T	T	0	0.0
November	0.1	6.5	6.5	1	0.0
December	2.2	14.8	10.8	10[8]	0.6
Annual	11.1	21.0[7]	12.0[7]	10[8]	3.6

[1] 1981 to 2010
[2] Precise dates unavailable
[3] February 1960
[4] November 1952
[5] February 1960 and March 1993
[6] 1961 to 1990
[7] March 1960
[8] December 1963

Note:
T = Trace

Sources: (Reference 2.7.4-2; Reference 2.7.4-6)

Table 2.7.4-12
Fog Occurrence for the Knoxville and Oak Ridge NWS Stations

	Number of Days with Heavy Fog (visibility ≤ 1/4 mile)	
	Knoxville	**Oak Ridge**
Period of Record (yrs)	*50*[1]	*14*[1]
January	2.6	2.2
February	1.8	1.4
March	1.6	1.7
April	1.3	2.3
May	2.2	5.4
June	1.7	4.5
July	2.0	5.5
August	3.3	5.3
September	3.7	7.5
October	4.2	7.5
November	2.9	5.0
December	2.4	3.6
Total Annual	29.7	51.9

[1] Precise dates unavailable

Sources: (Reference 2.7.4-2; Reference 2.7.4-1)

Table 2.7.4-13
Pasquill Atmospheric Stabilities for CRN Site

Stability Class	***Percent***
A	2.83
B	3.51
C	6.01
D	31.06
E	23.23
F	16.34
G	17.01
Unstable (A through C)	12.35
Neutral (D)	31.06
Stable (E through G)	56.59

Note: Atmospheric Stability Class based on 60-10 meter ΔTemperature Difference for June 1, 2011 to May 31, 2013.

Table 2.7.4-14
Frequency Distribution of Consecutive Hours of Inversion Conditions[1]

Number of Consecutive Hours	All Inversion Conditions (Stability Classes E, F or G)
2	847
3	763
4	713
5	672
6	653
7	630
8	601
9	573
10	548
11	518
12	481
13	392
14	268
15	170
16	97
17	51
18	20
19	4
20	0

[1] CRN Site Data for Period: April 21, 2011 through June 30, 2013

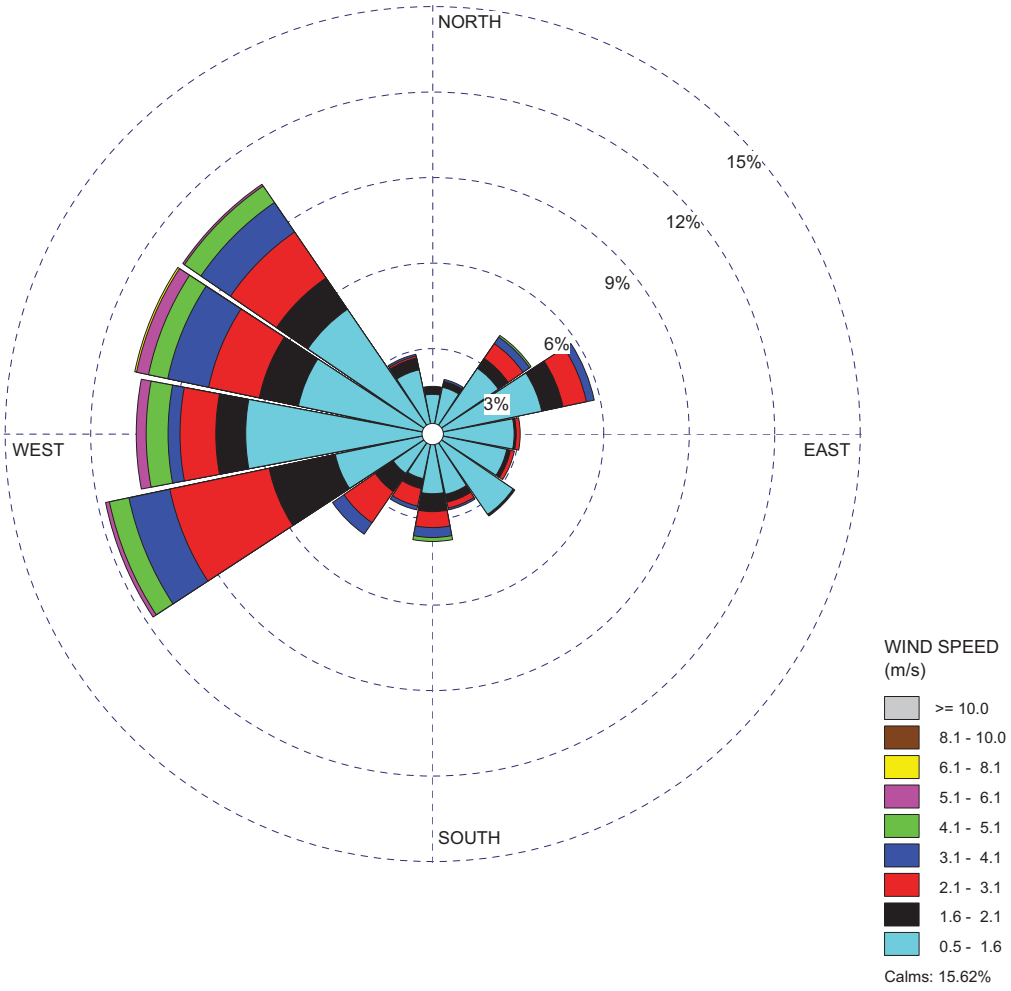
Table 2.7.4-15
Average Mixing Height Data[1]

	Morning Mixing Height (meters)	Afternoon Mixing Height (meters)
Winter	563	1123
Spring	606	1783
Summer	441	1874
Autumn	357	1473
Annual	492	1563

[1] Based on data for Nashville, TN. (Reference 2.7.4-3)

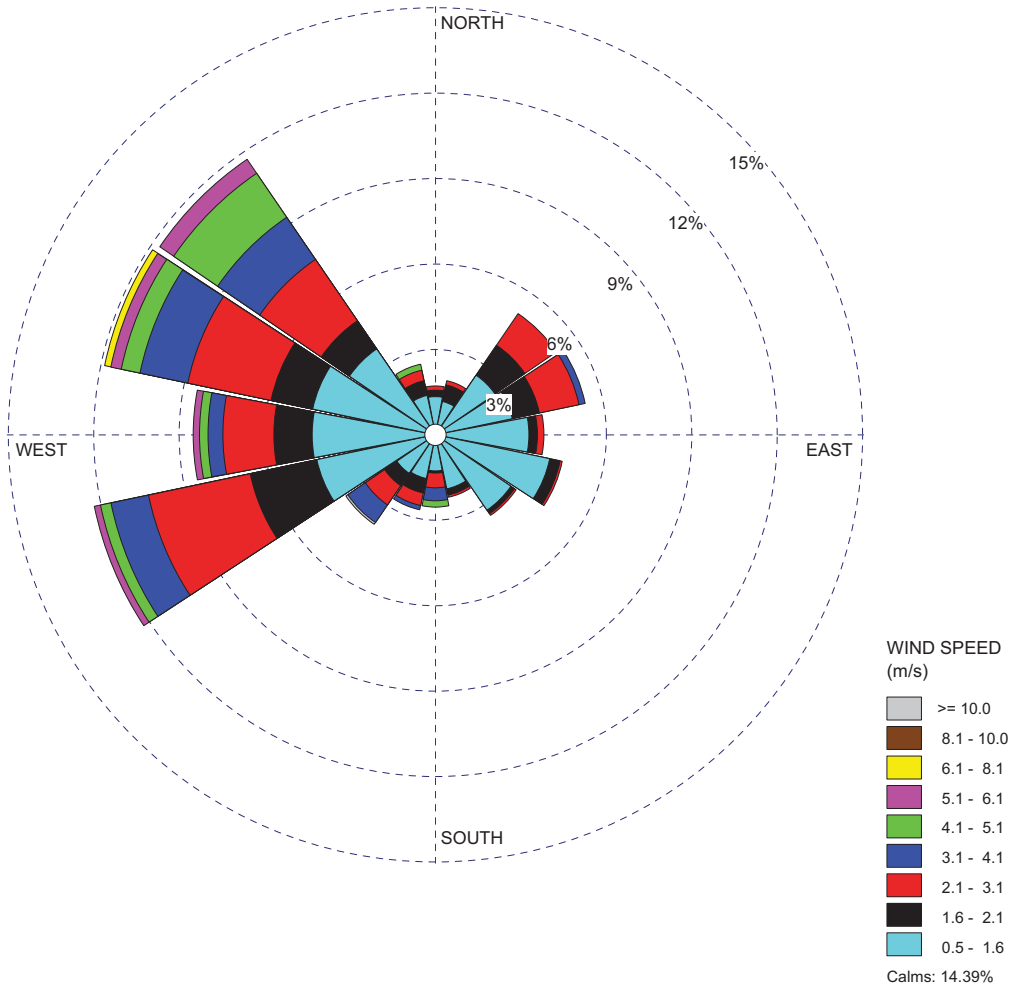
Table 2.7.4-16
CRN Site Historical Meteorological Towers

Tower	Location	Data Collected	Data Collection Period
Clinch River Breeder Reactor Project (CRBRP)			
[Mt] Temporary	Latitude: 35° 53' 20" N Longitude: 84° 23' 10" W Elevation: 772.5 ft-msl UTM: Zone 16 Northing = 3974.58 km Easting = 735.95 km	60-, 25-m Wind 60-, 25-m Temperature	April 11, 1973 to April 2, 1974
		60-, 25-, 10-m Wind 60-, 25-, 10-m Temperature 10-m Dewpoint (1975+)	April 3, 1974 to March 2, 1978
[Mp] Primary	Latitude: 35° 53' 07" N Longitude: 84° 22' 33" W Elevation: 800.1 ft-msl UTM: Zone 16 Northing = 3974.21 km Easting = 736.88 km	110-, 60-, 10-m Wind 110-, 60-, 10-m Temperature 10-m Dewpoint Rainfall Atmospheric Pressure Solar Radiation	February 16, 1977 to March 6, 1978
		110-, 60-, 10-m Wind 110-, 60-, 10-m Temperature 10-m Dewpoint Rainfall Solar Radiation	March 25, 1982 to November 4, 1983
[Ms] Supplemental	Latitude: 35° 53' 43" N Longitude: 84° 22' 56" W Elevation: 851.9 ft-msl UTM: Zone 16 Northing = 3975.31 km Easting = 736.28 km	10-m Wind	February 16, 1977 to March 6, 1978
		10-m Wind	March 25, 1982 to November 4, 1983
CRN Site			
[Mp] Primary	**Same as CRBRP Primary** Latitude: 35° 53' 07" N Longitude: 84° 22' 33" W Elevation: 800.1 ft-msl UTM: Zone 16 Northing = 3974.21 km Easting = 736.88 km	60-, 10-m Wind 60-, 10-m Temperature 60-, 10-m Dewpoint Rainfall Atmospheric Pressure Solar Radiation	April 21, 2011 to July 9, 2013



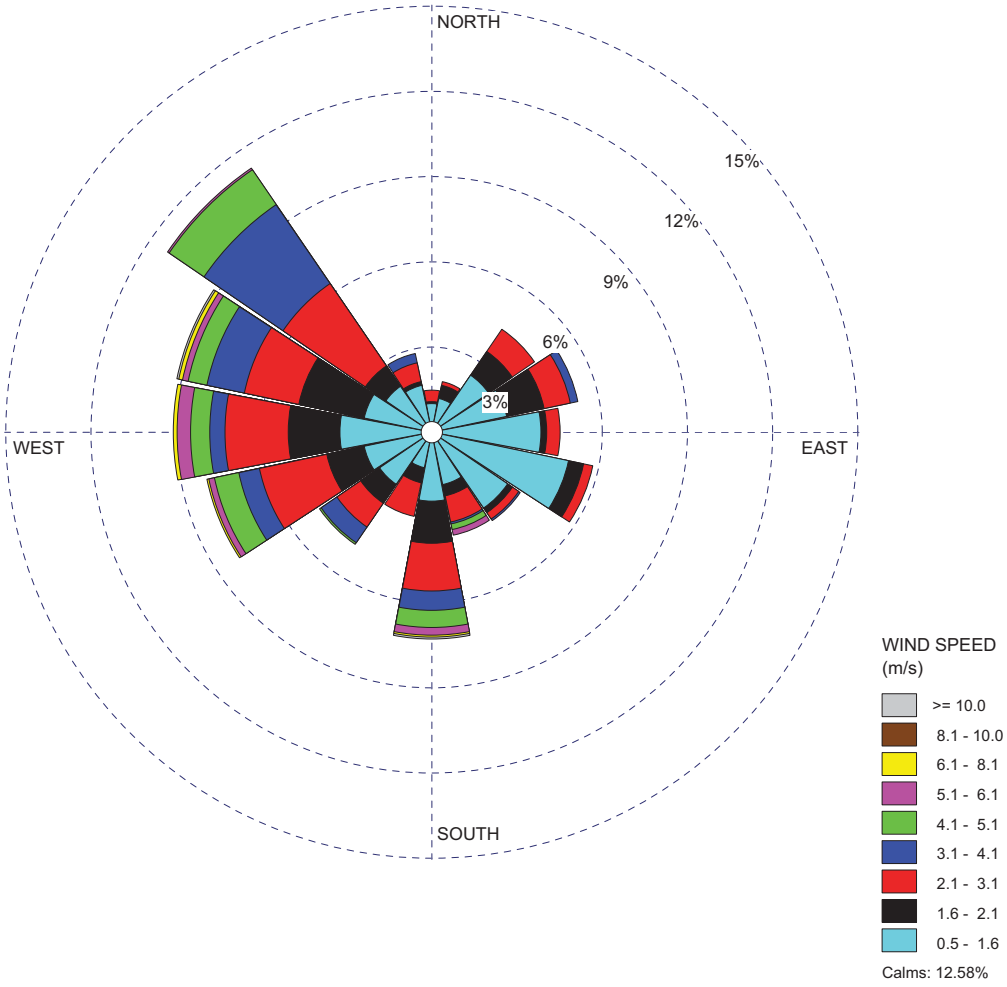
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 1 of 12) Wind Rose CRN Site 10-meter January



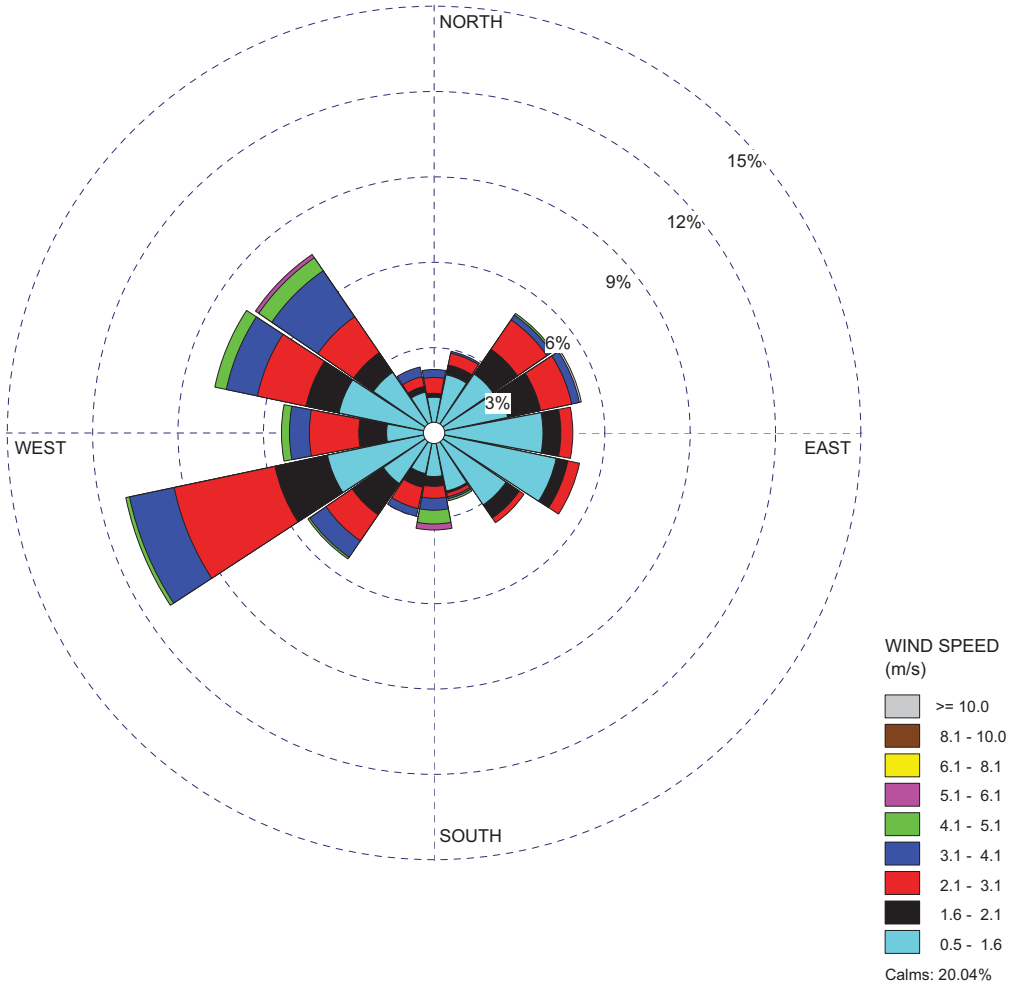
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 2 of 12) Wind Rose CRN Site 10-meter February



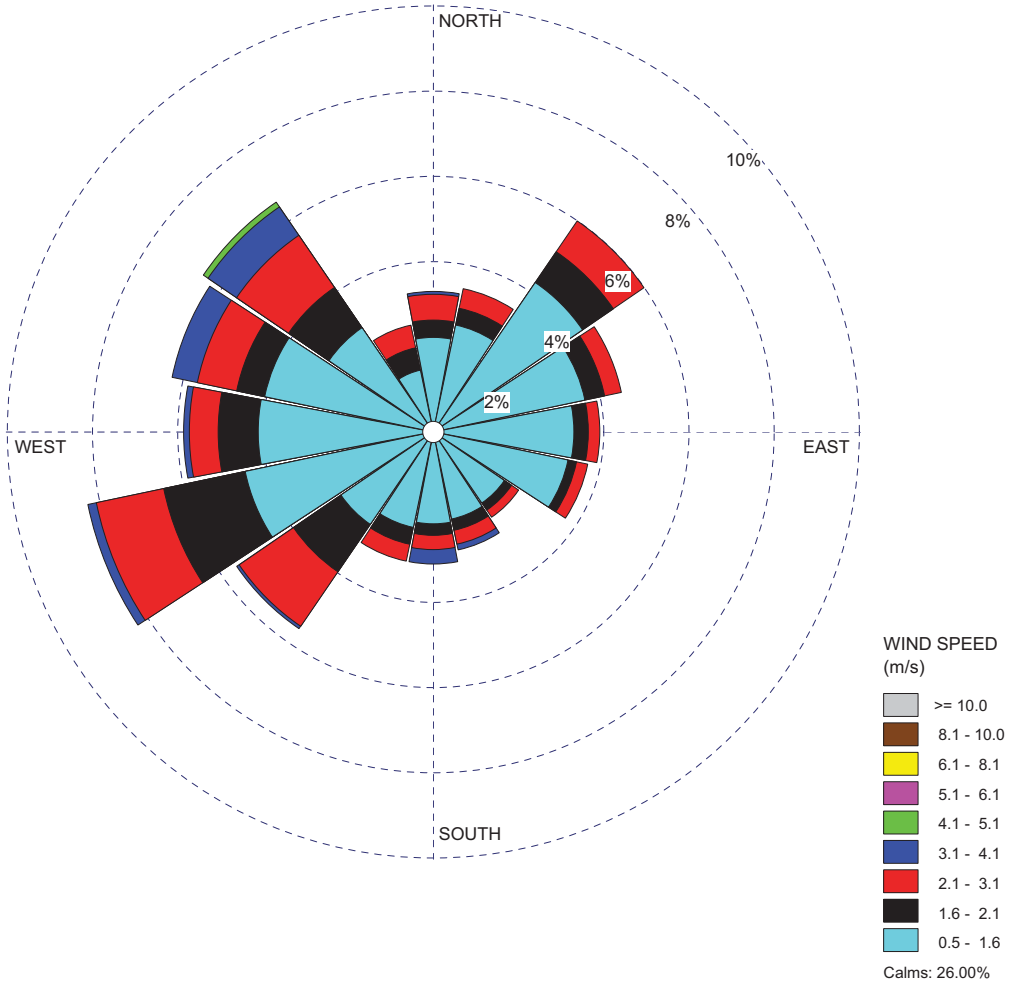
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 3 of 12) Wind Rose CRN Site 10-meter March



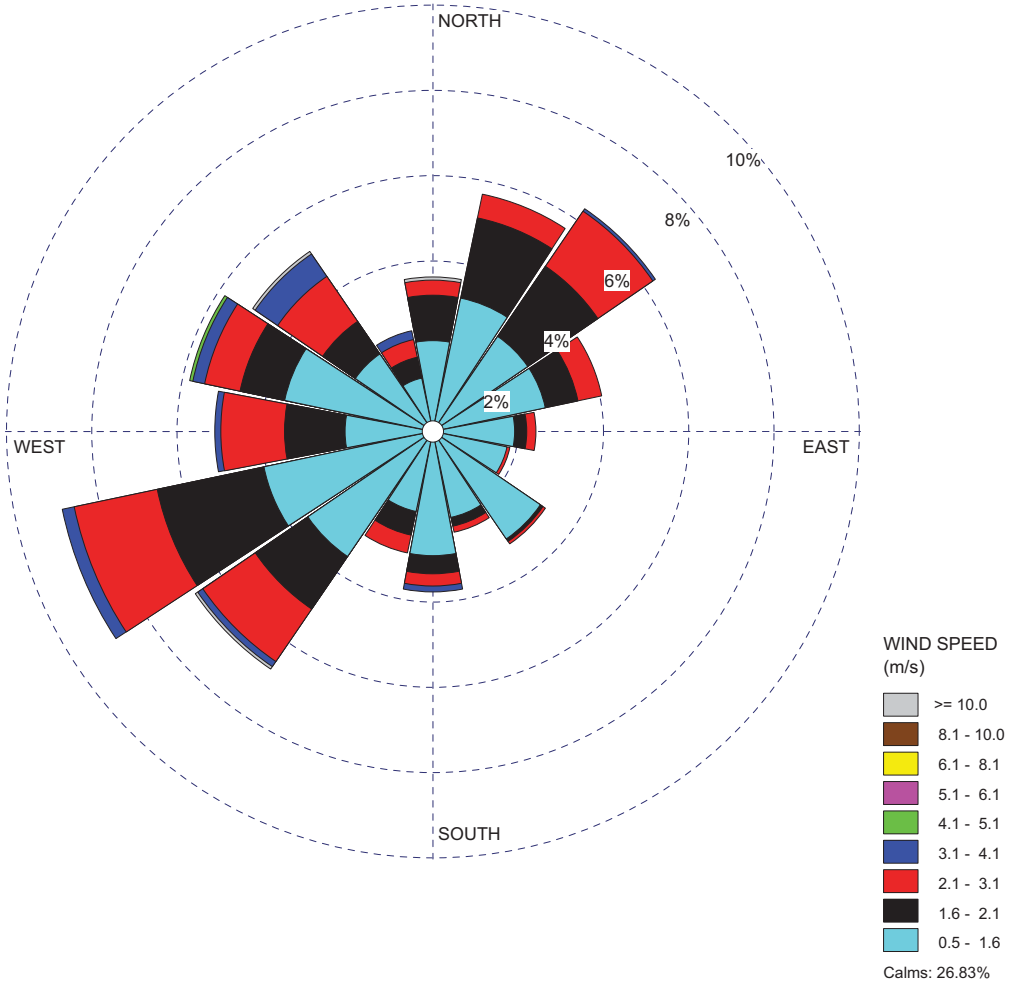
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 4 of 12) Wind Rose CRN Site 10-meter April



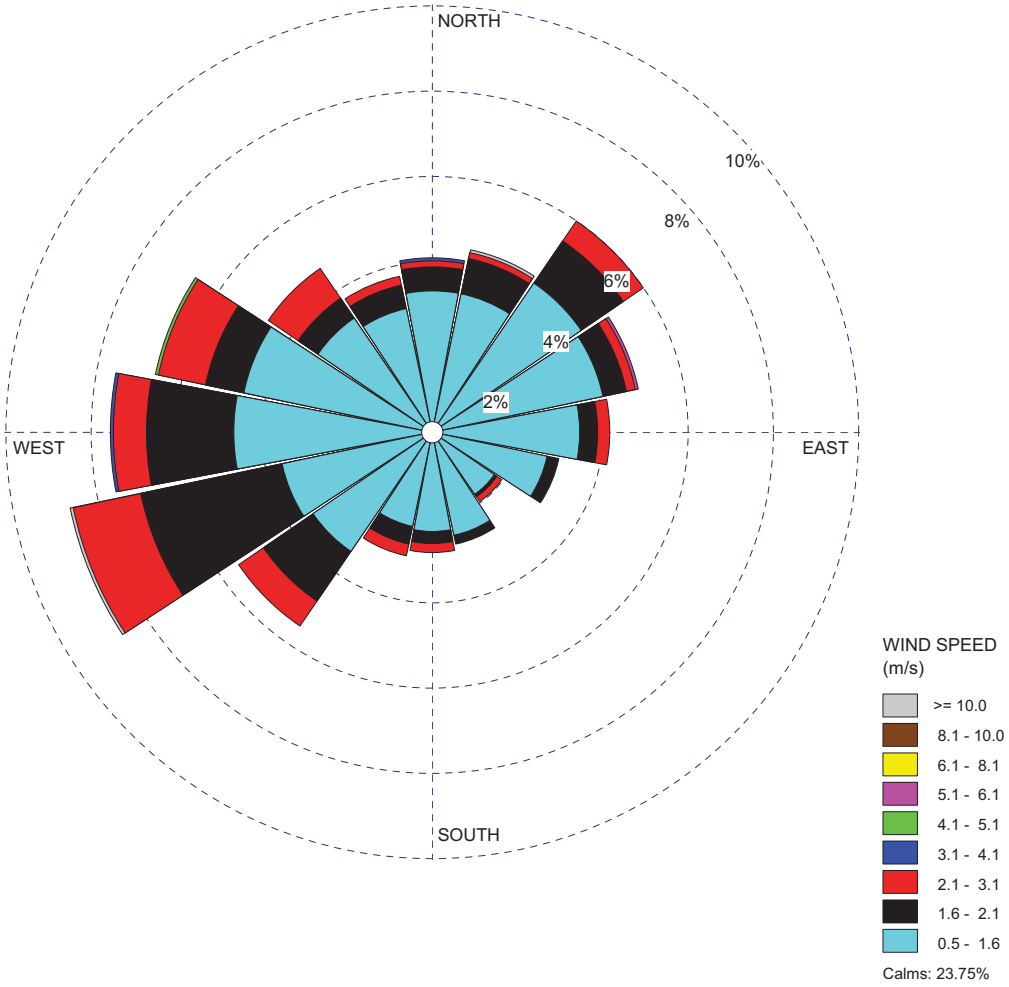
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 5 of 12) Wind Rose CRN Site 10-meter May



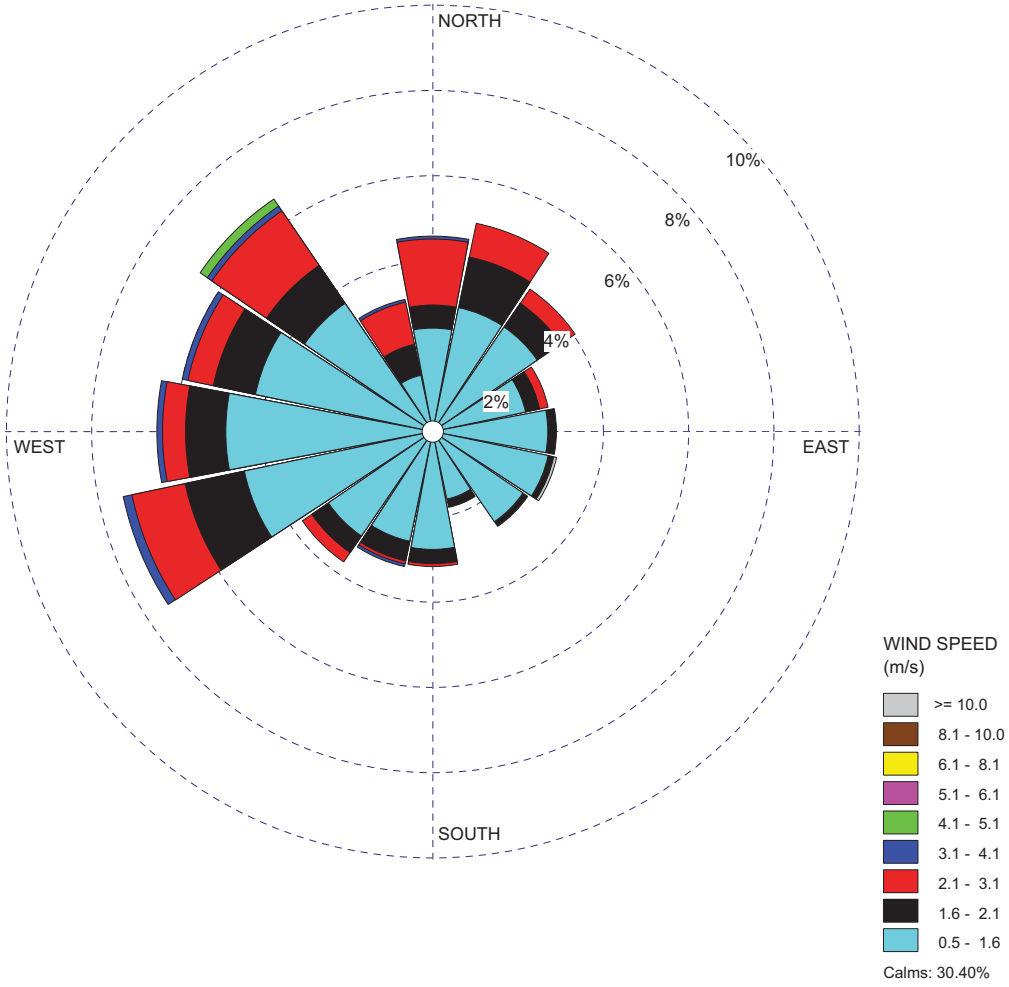
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 6 of 12) Wind Rose CRN Site 10-meter June



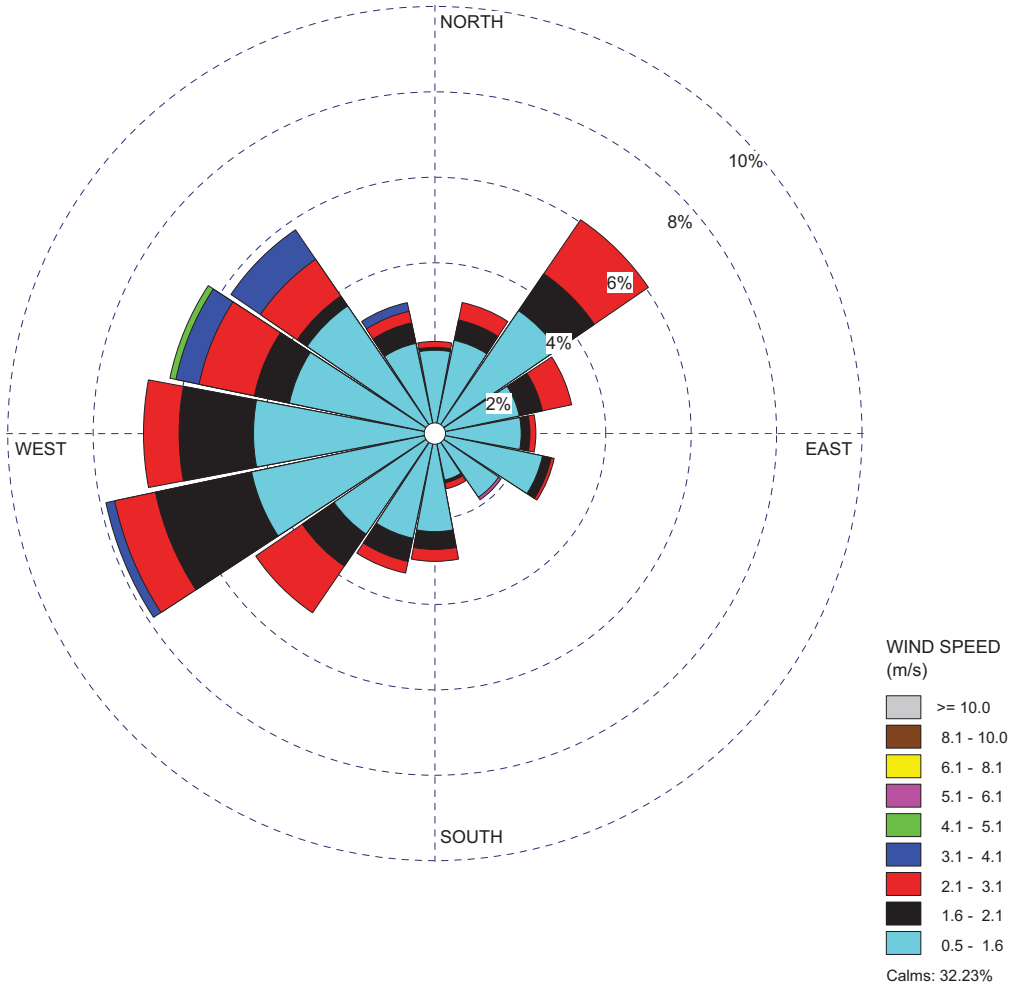
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 7 of 12) Wind Rose CRN Site 10-meter July



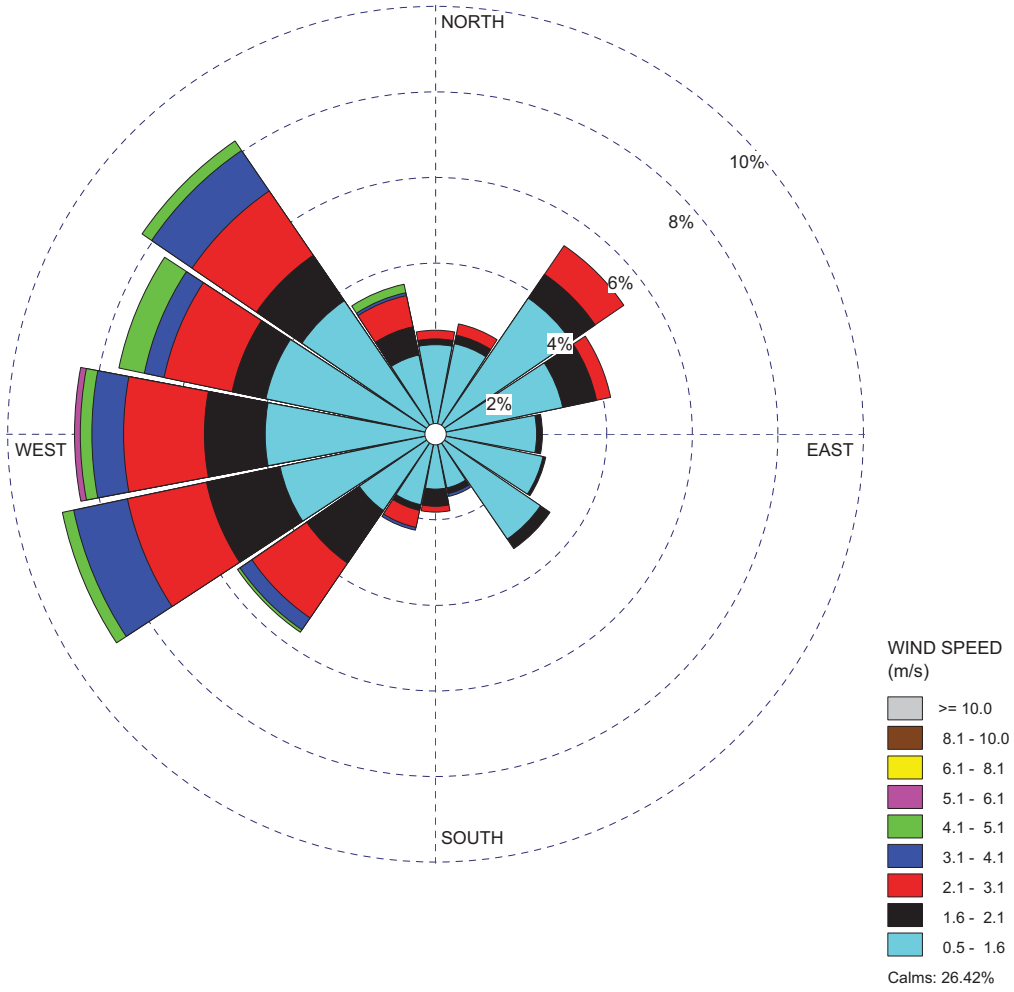
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 8 of 12) Wind Rose CRN Site 10-meter August



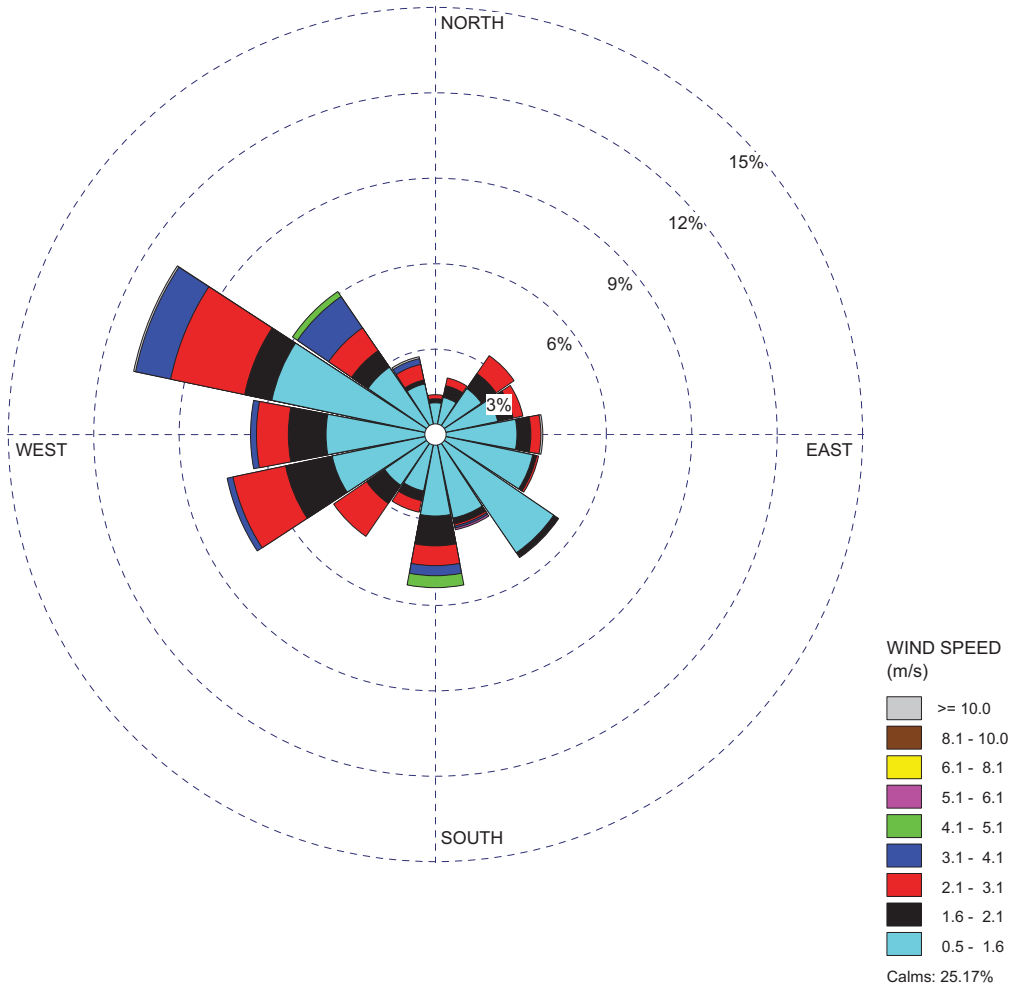
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 9 of 12) Wind Rose CRN Site 10-meter September



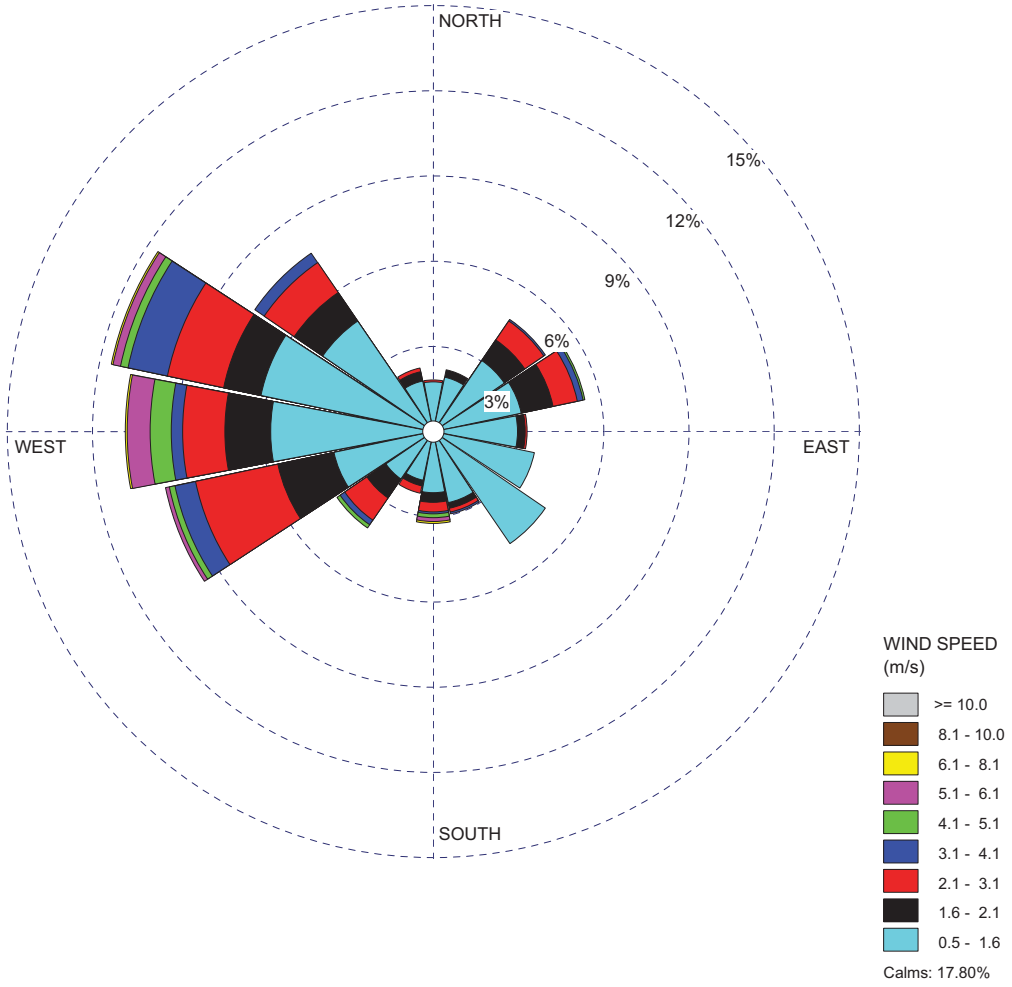
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 10 of 12) Wind Rose CRN Site 10-meter October



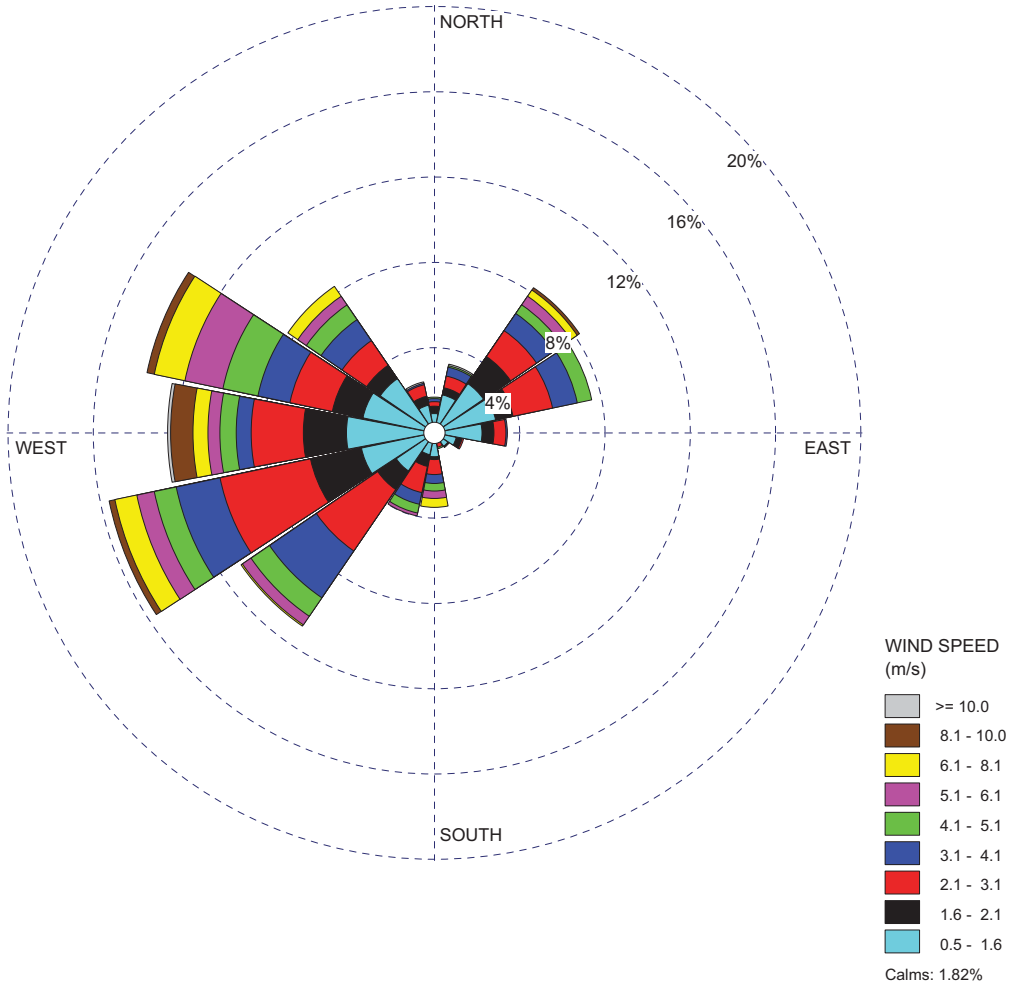
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 11 of 12) Wind Rose CRN Site 10-meter November



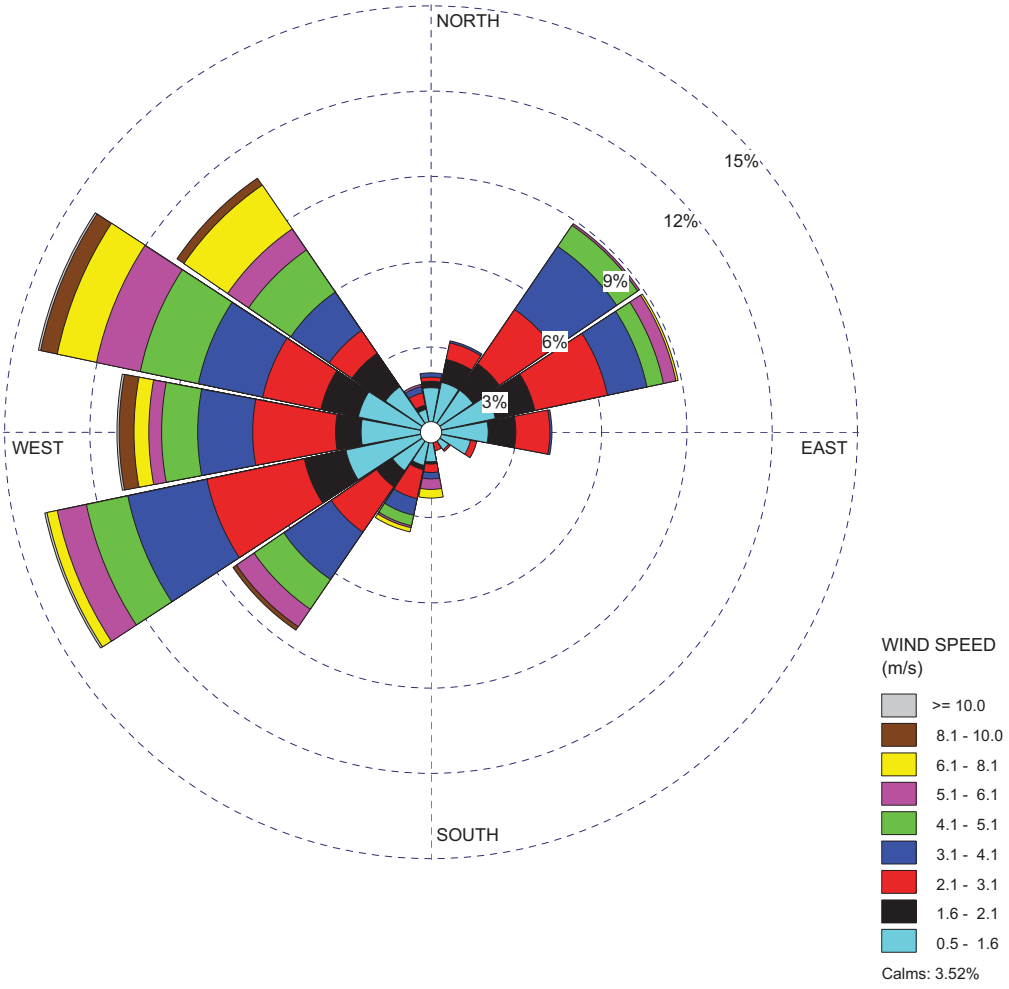
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-1. (Sheet 12 of 12) Wind Rose CRN Site 10-meter December



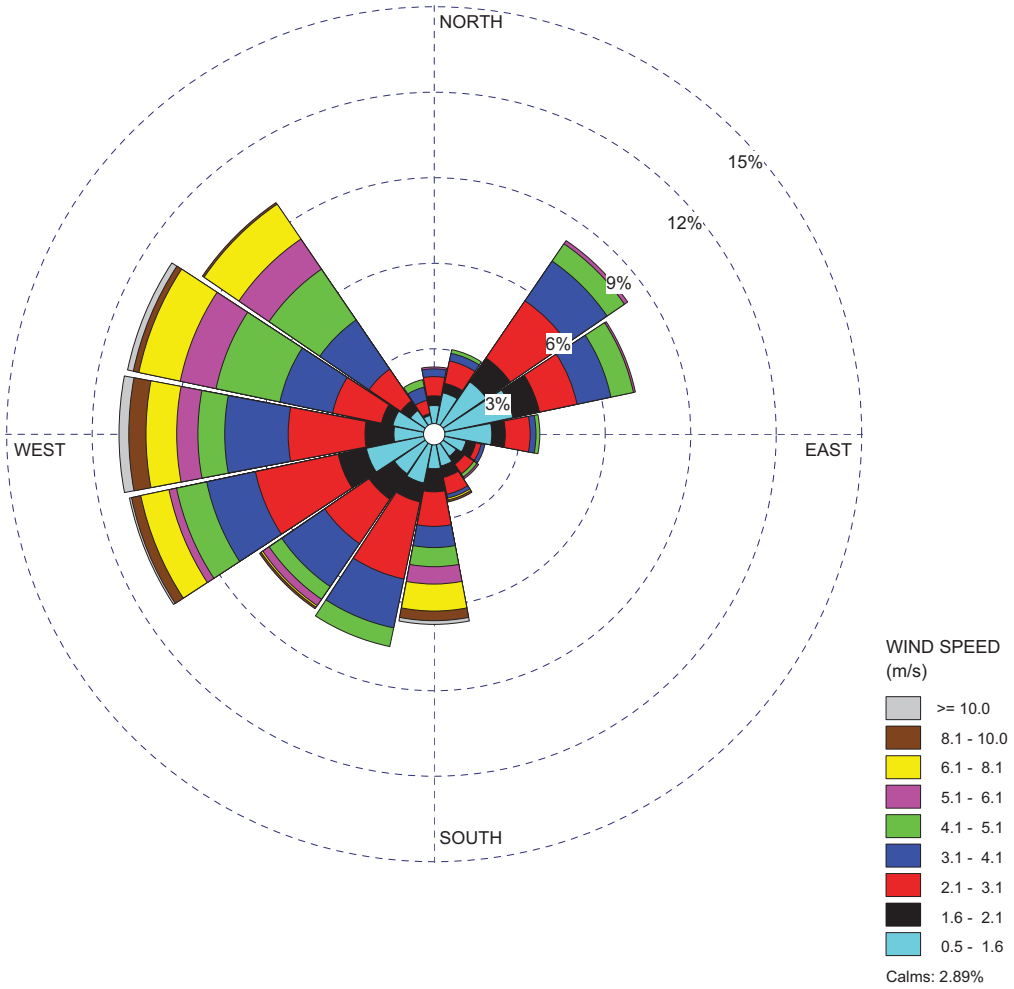
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 1 of 12) Wind Rose CRN Site 60-meter January



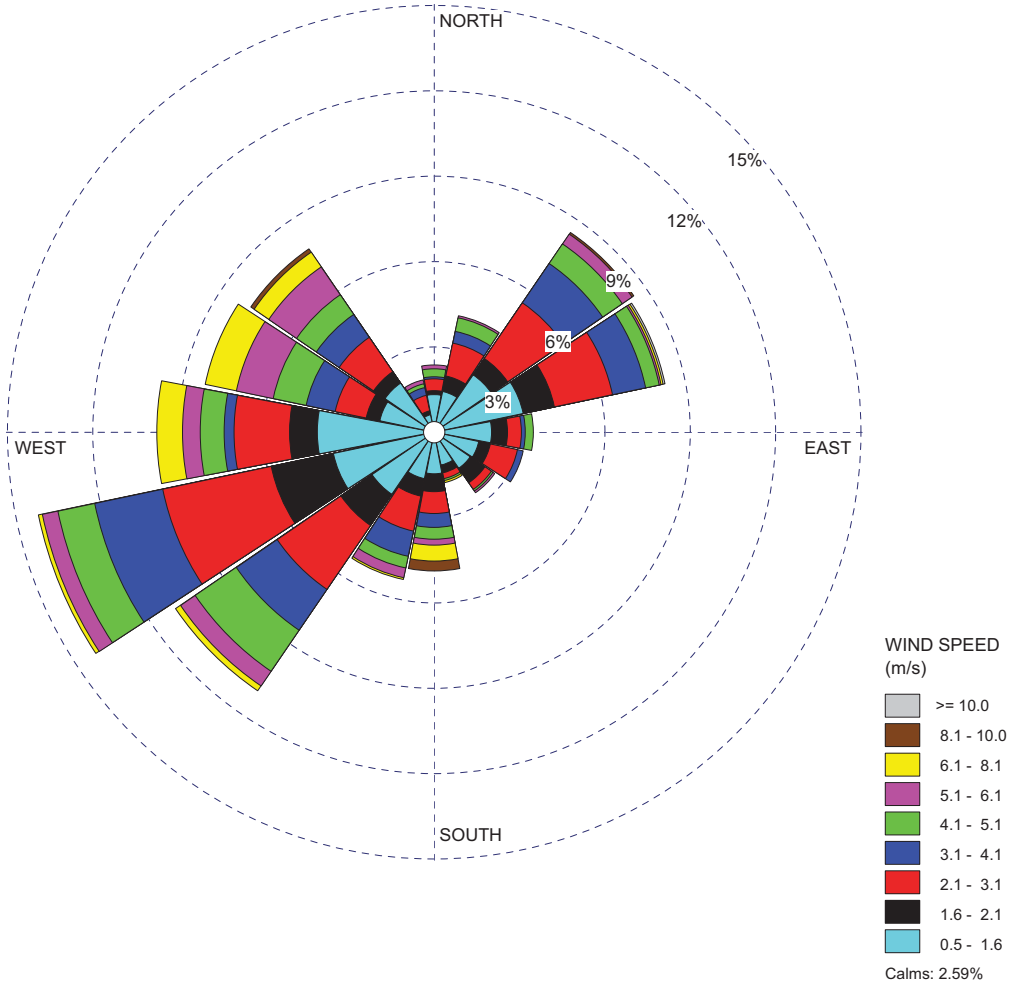
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 2 of 12) Wind Rose CRN Site 60-meter February



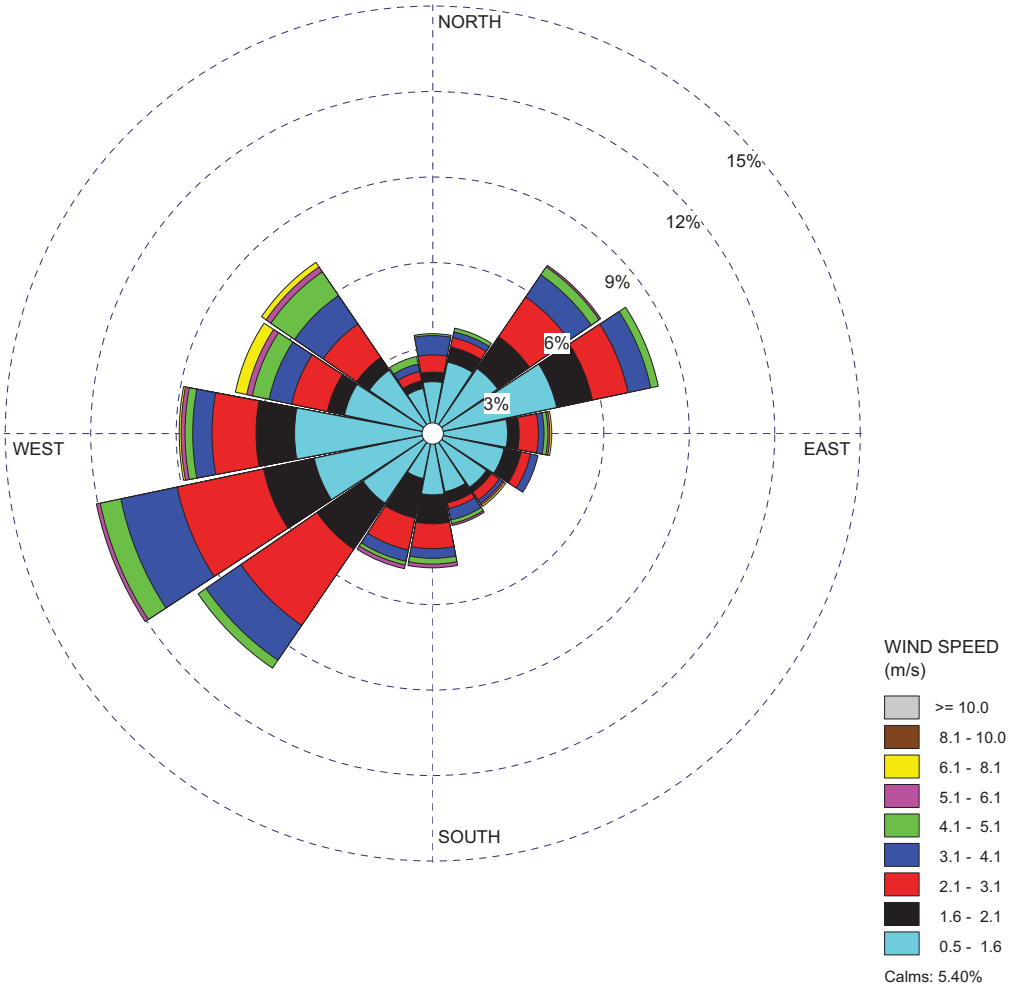
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 3 of 12) Wind Rose CRN Site 60-meter March



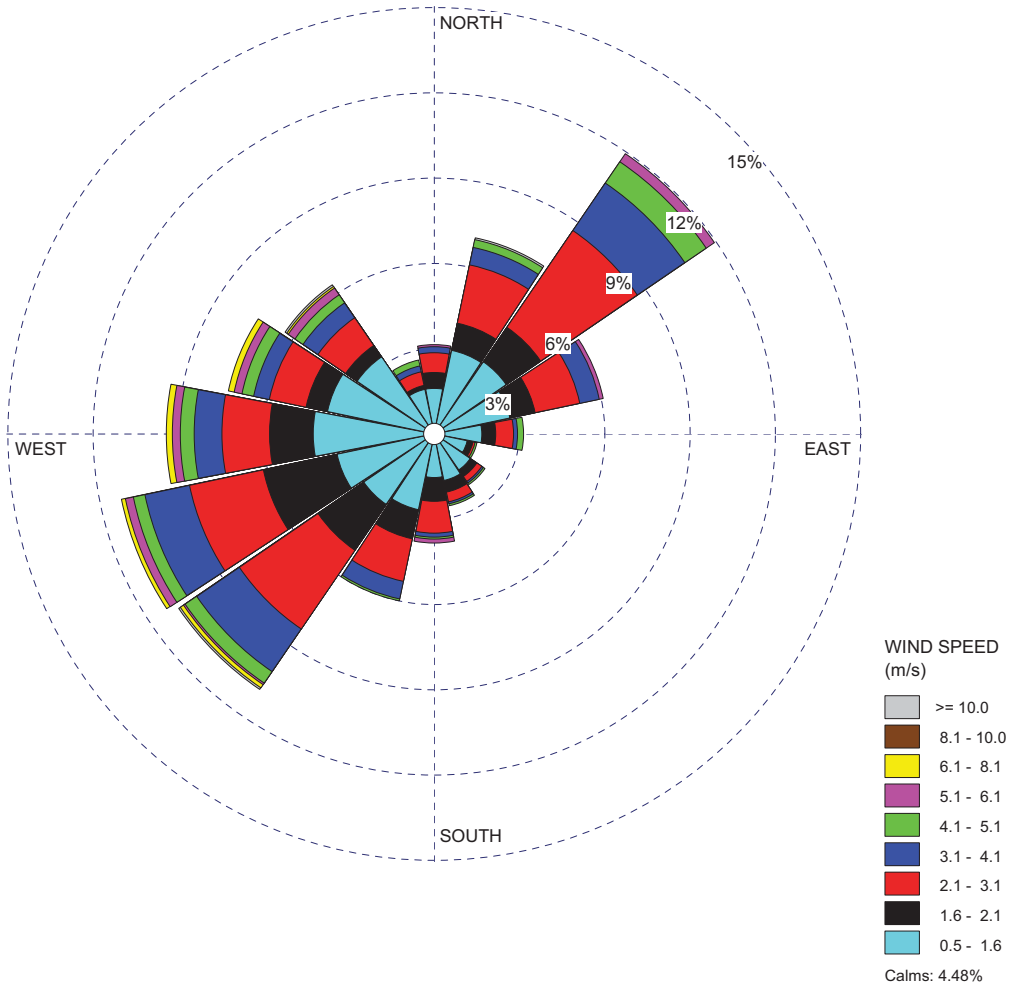
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 4 of 12) Wind Rose CRN Site 60-meter April



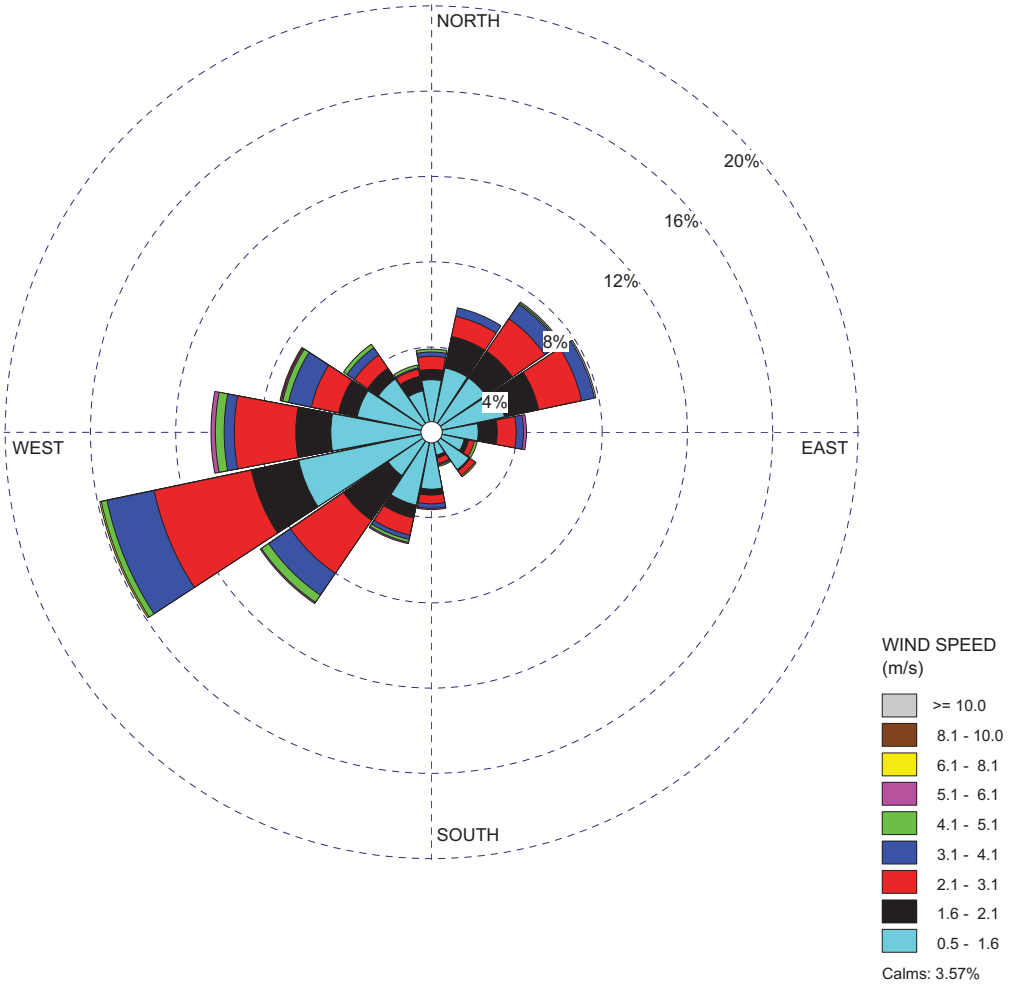
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 5 of 12) Wind Rose CRN Site 60-meter May



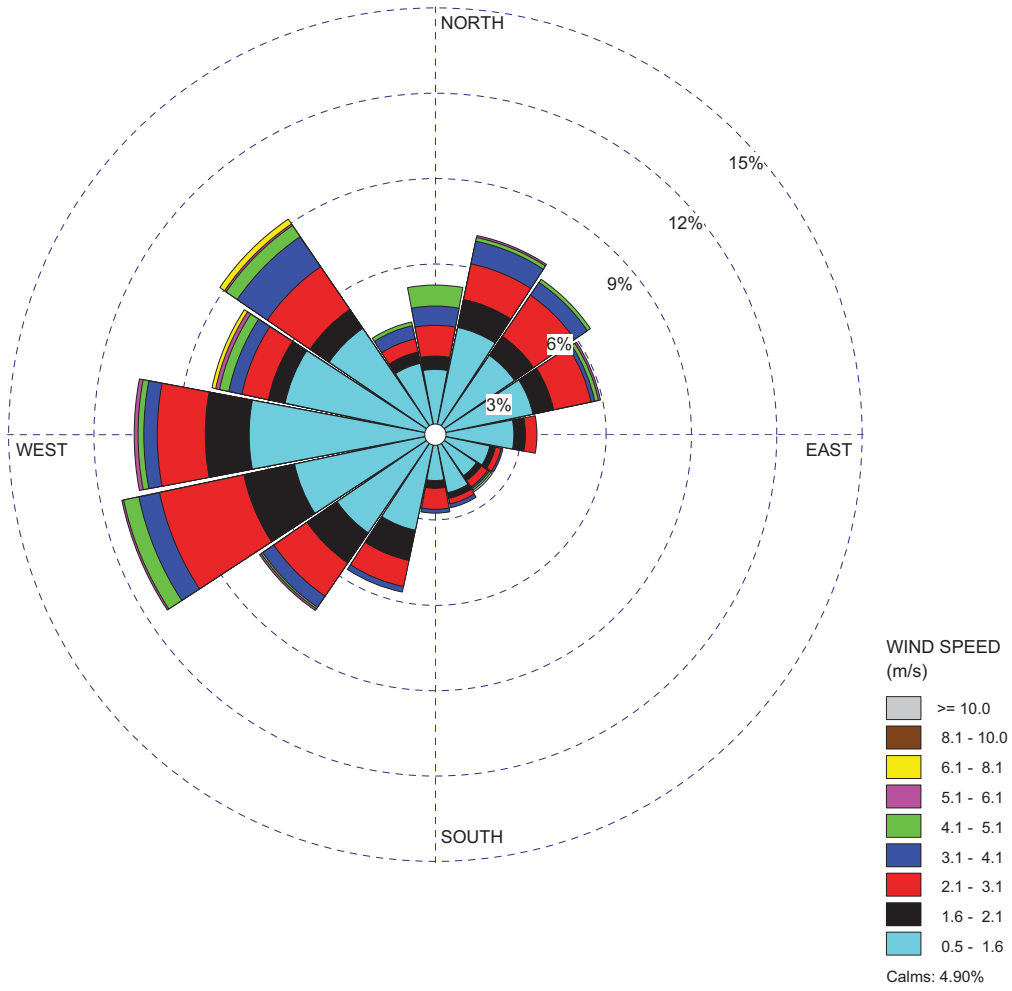
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 6 of 12) Wind Rose CRN Site 60-meter June



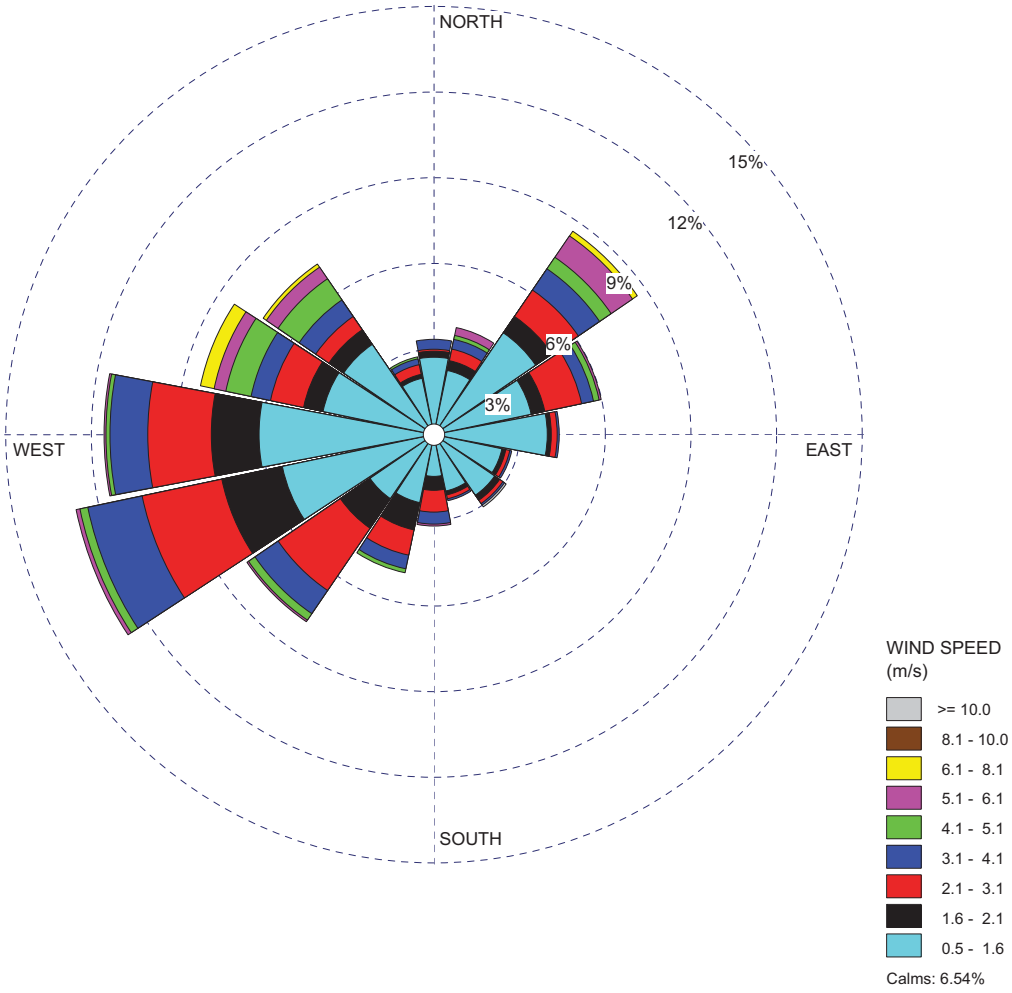
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 7 of 12) Wind Rose CRN Site 60-meter July



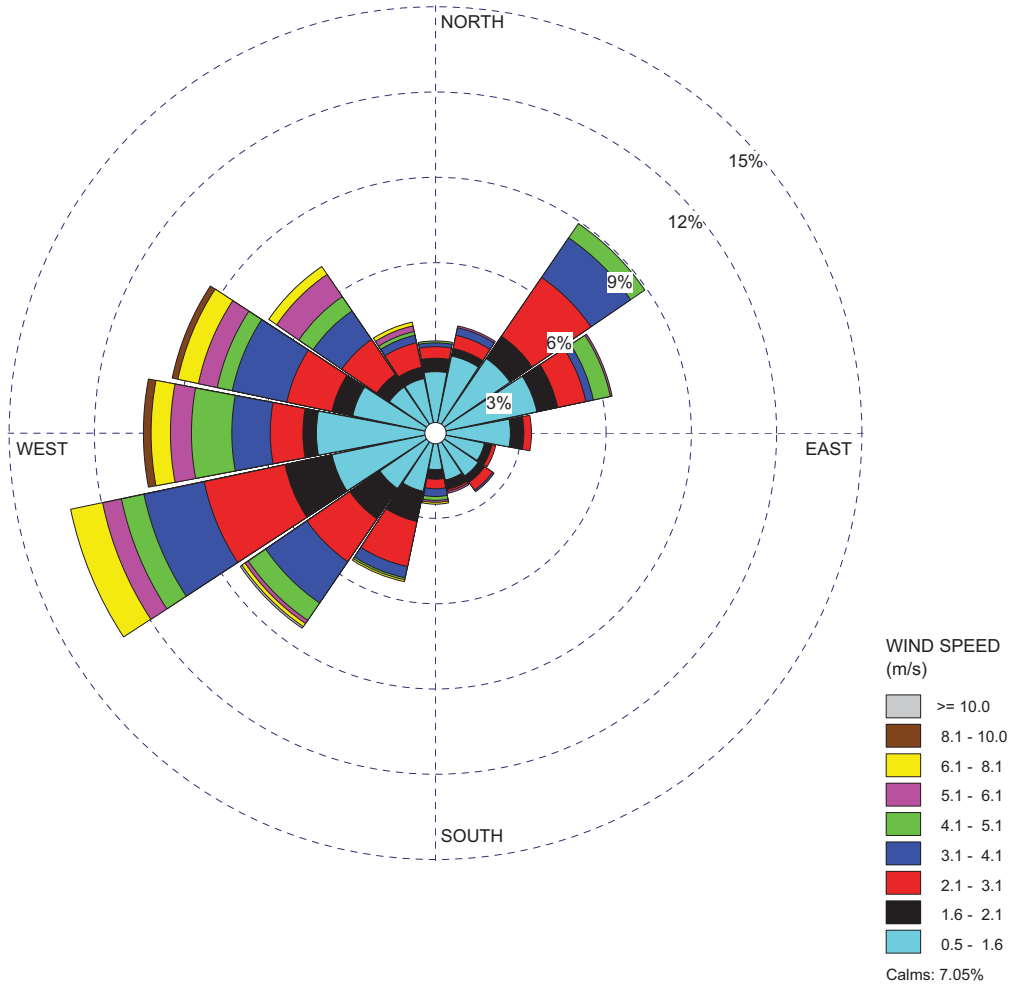
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 8 of 12) Wind Rose CRN Site 60-meter August



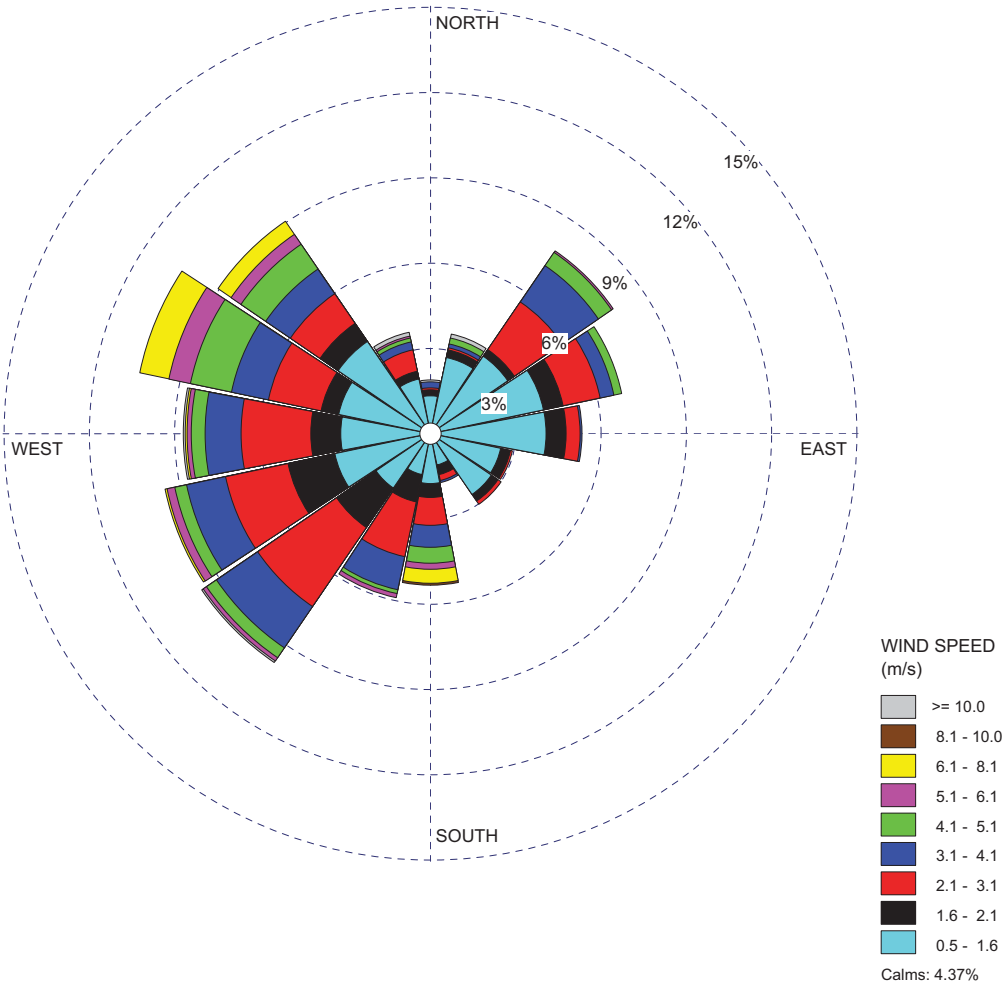
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 9 of 12) Wind Rose CRN Site 60-meter September



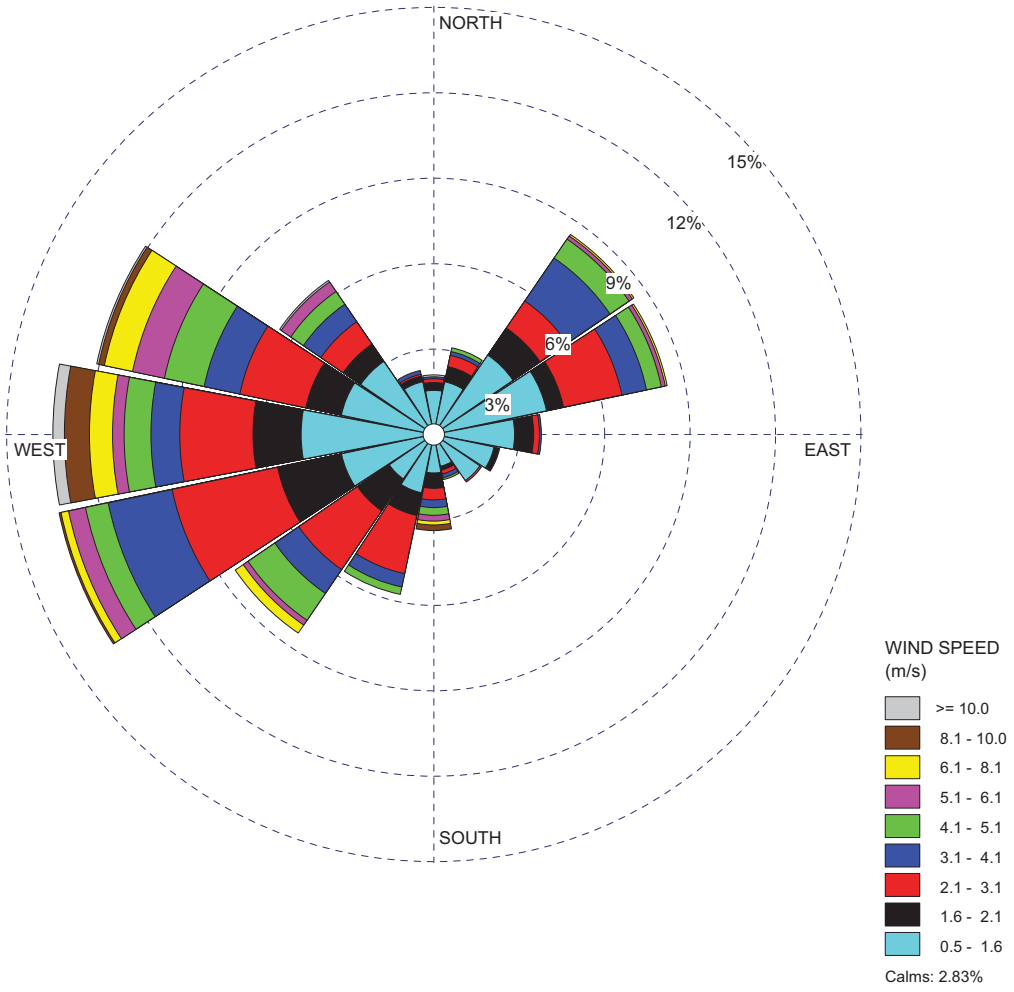
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 10 of 12) Wind Rose CRN Site 60-meter October



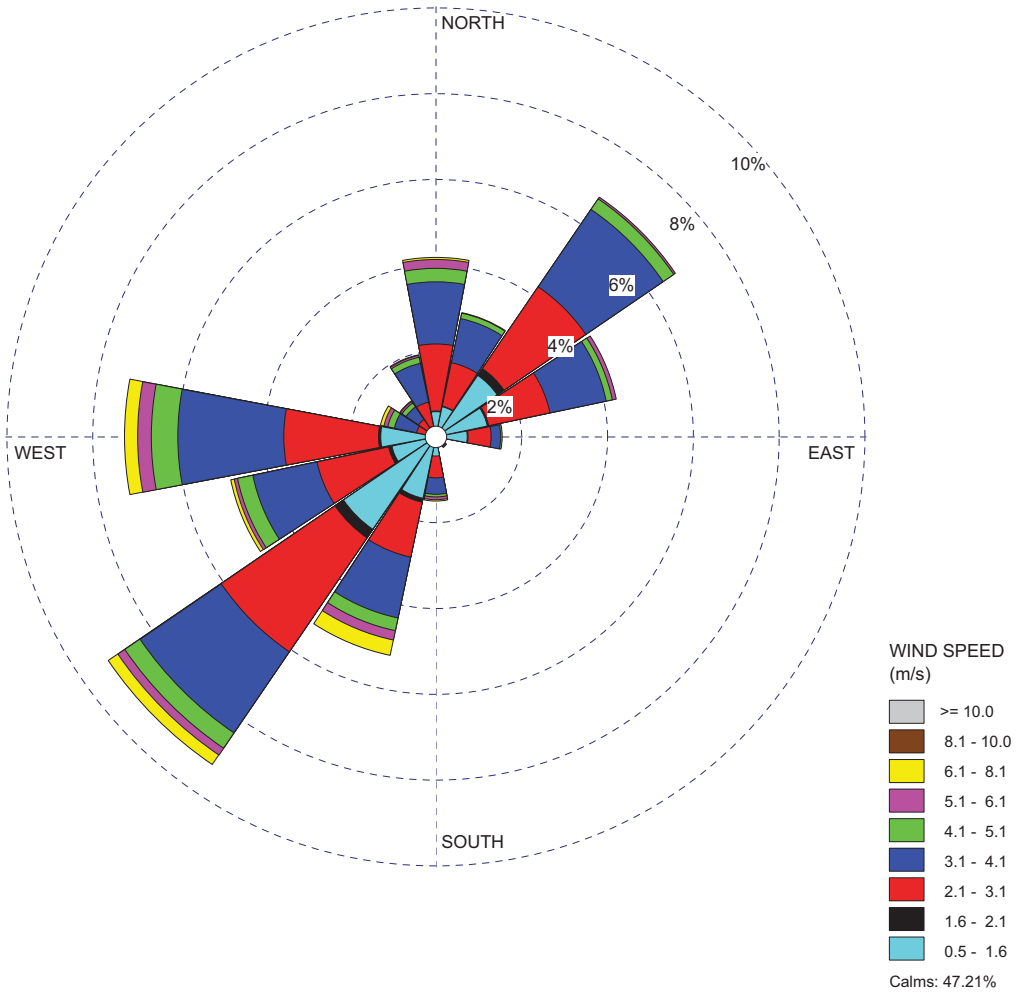
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 11 of 12) Wind Rose CRN Site 60-meter November



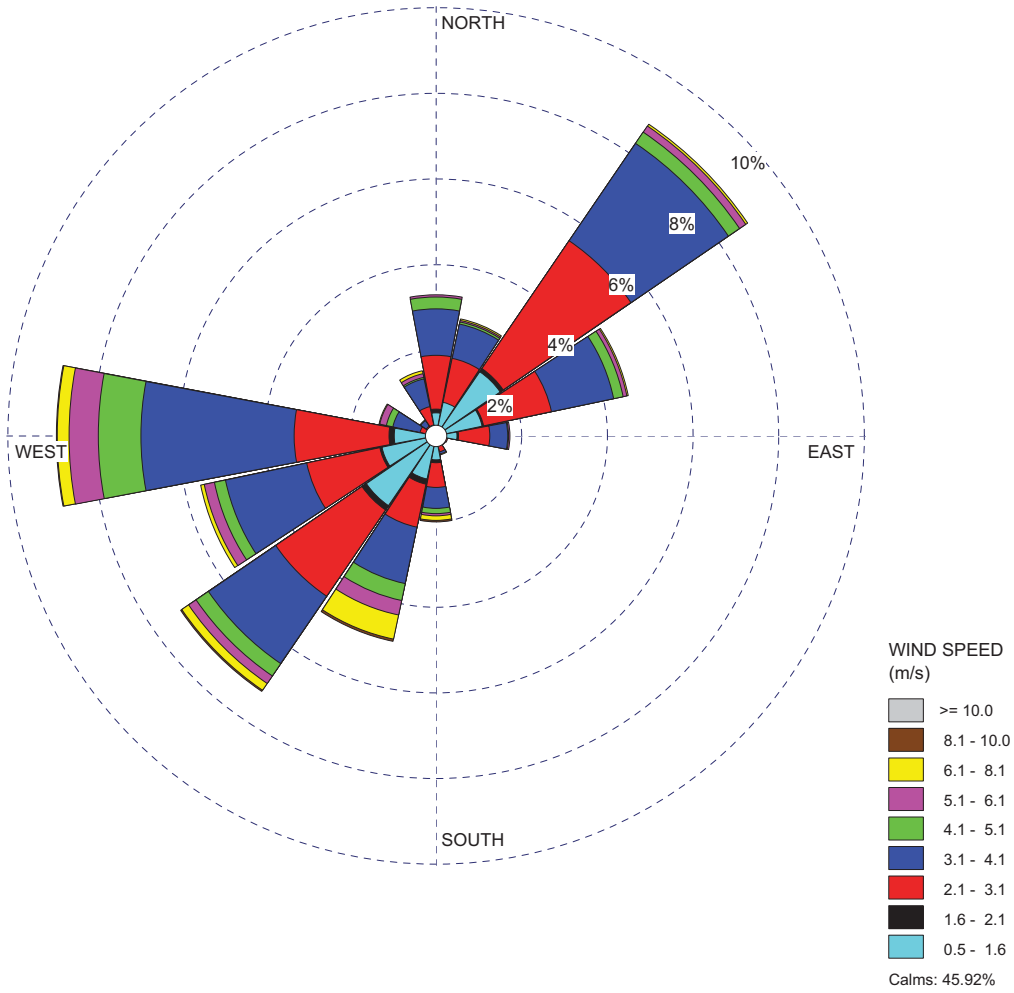
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-2. (Sheet 12 of 12) Wind Rose CRN Site 60-meter December



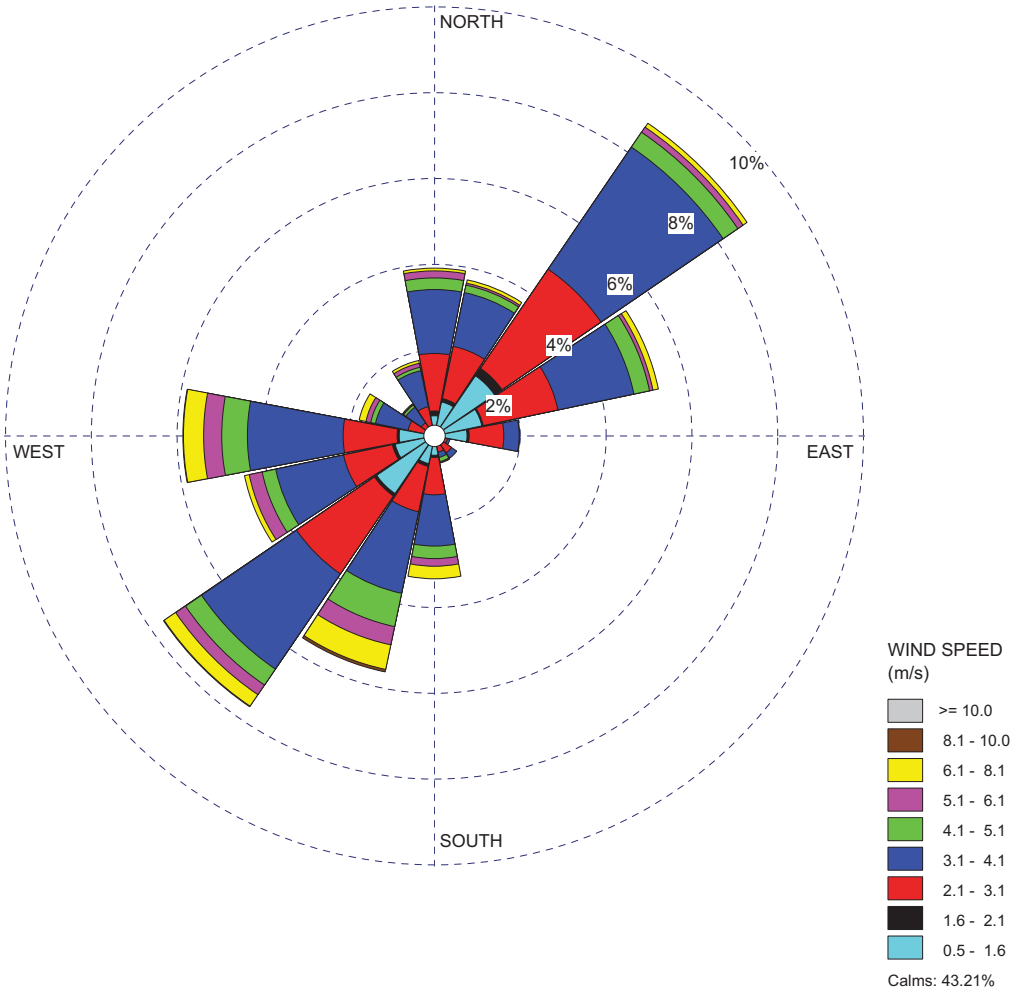
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 1 of 12) Wind Rose Oak Ridge NWS 10 Years January



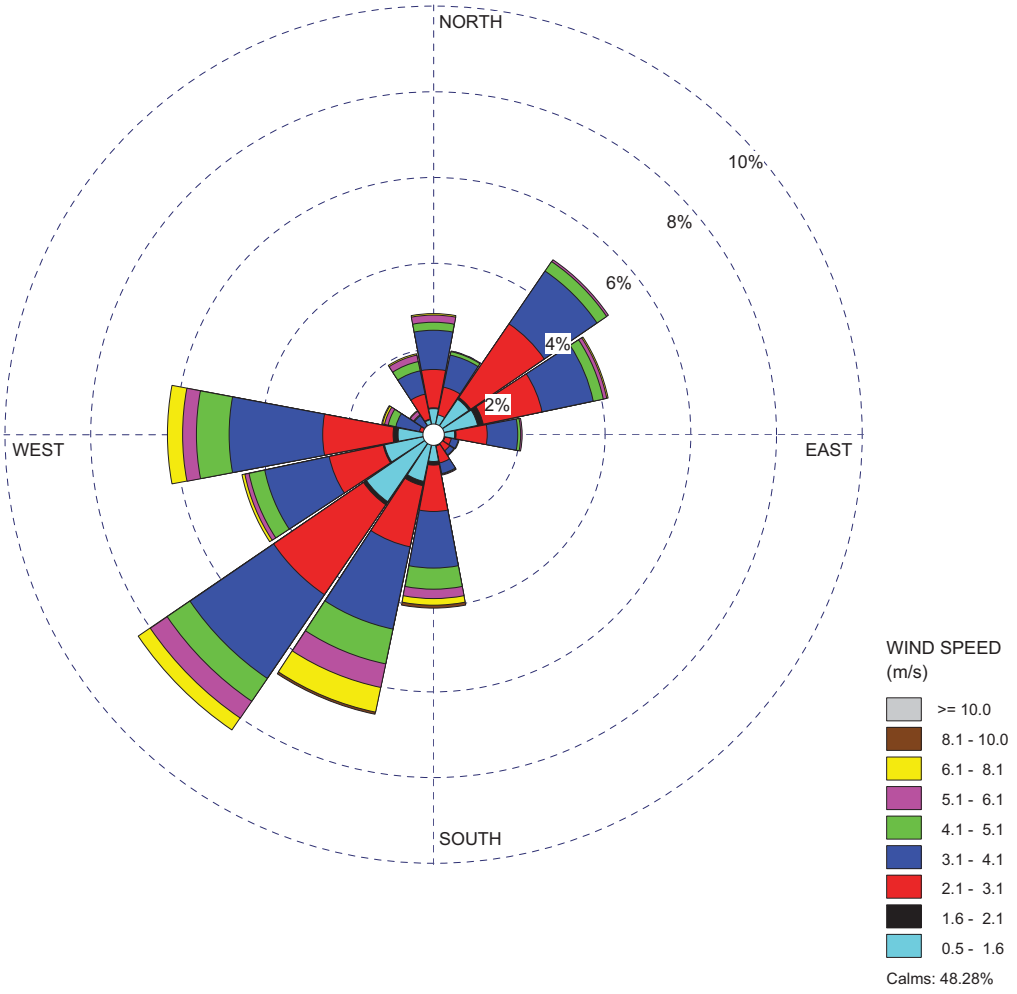
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 2 of 12) Wind Rose Oak Ridge NWS 10 Years February



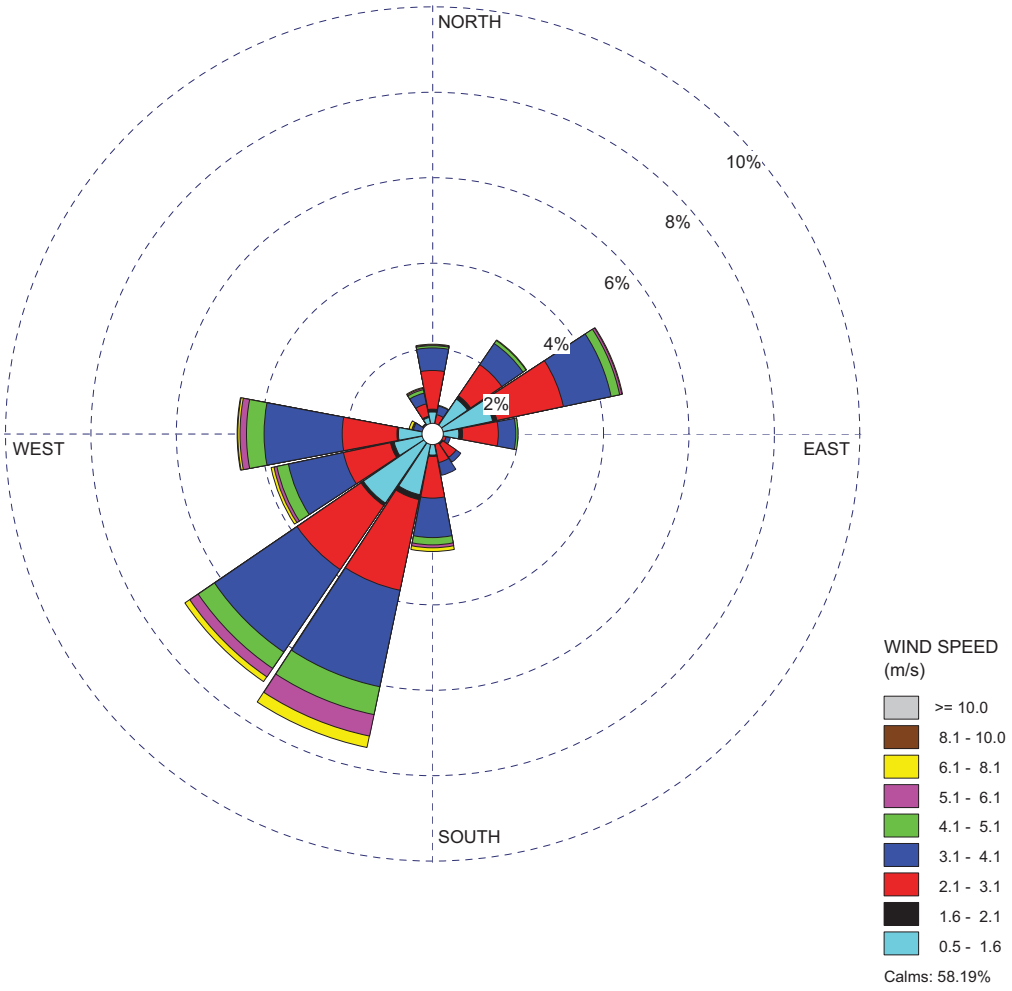
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 3 of 12) Wind Rose Oak Ridge NWS 10 Years March



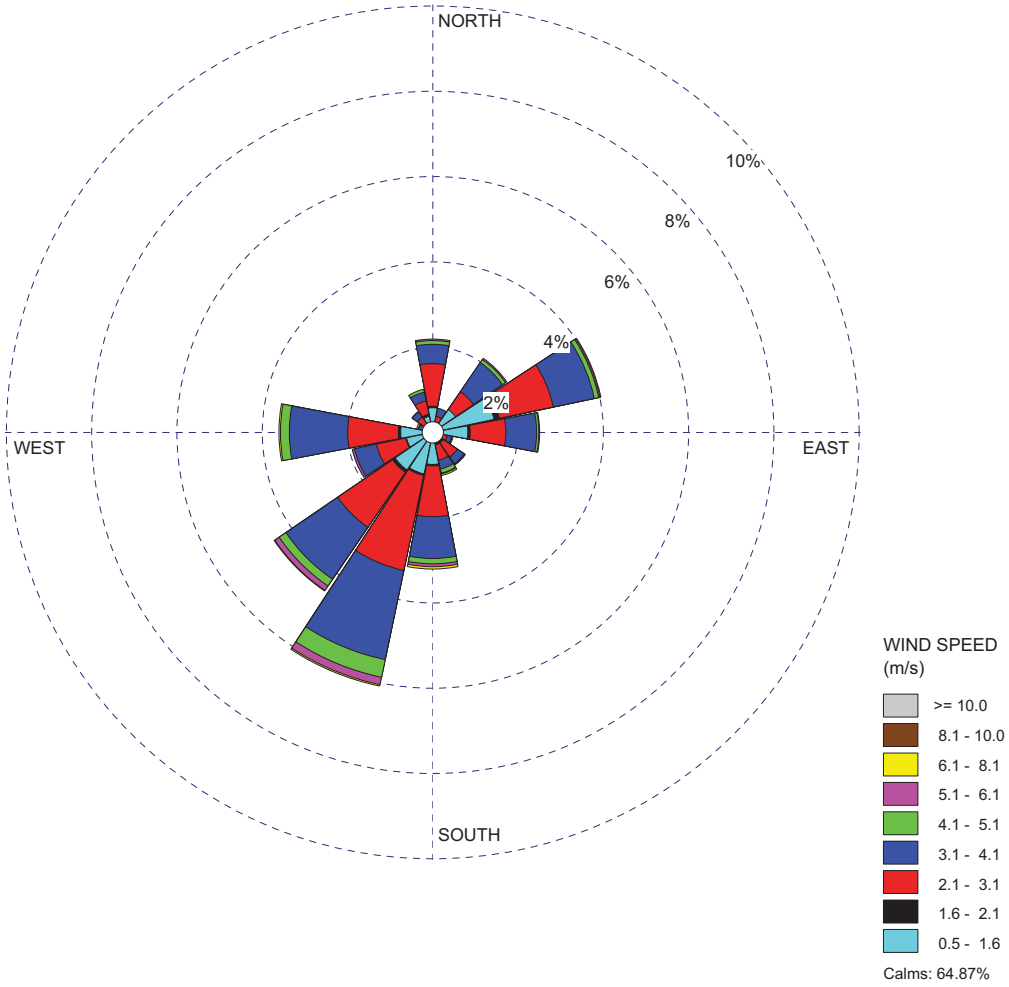
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 4 of 12) Wind Rose Oak Ridge NWS 10 Years April



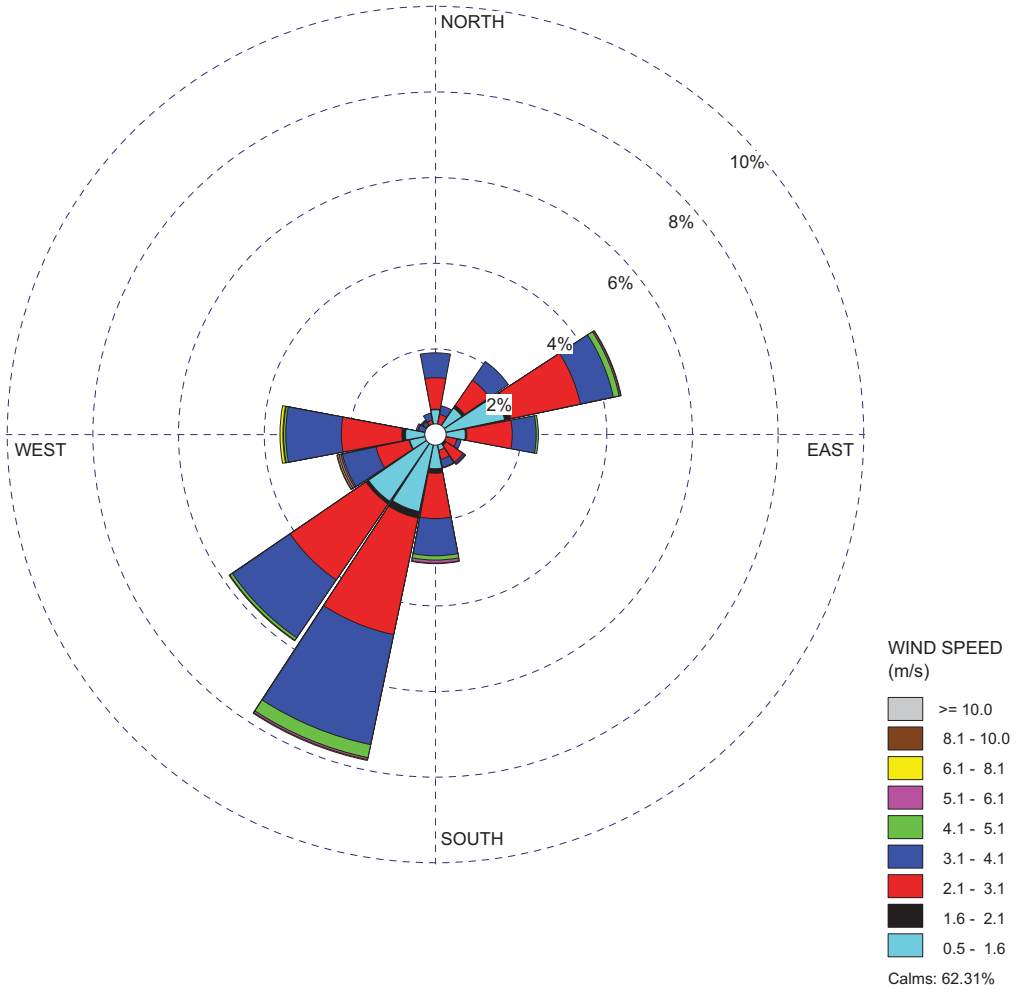
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 5 of 12) Wind Rose Oak Ridge NWS 10 Years May



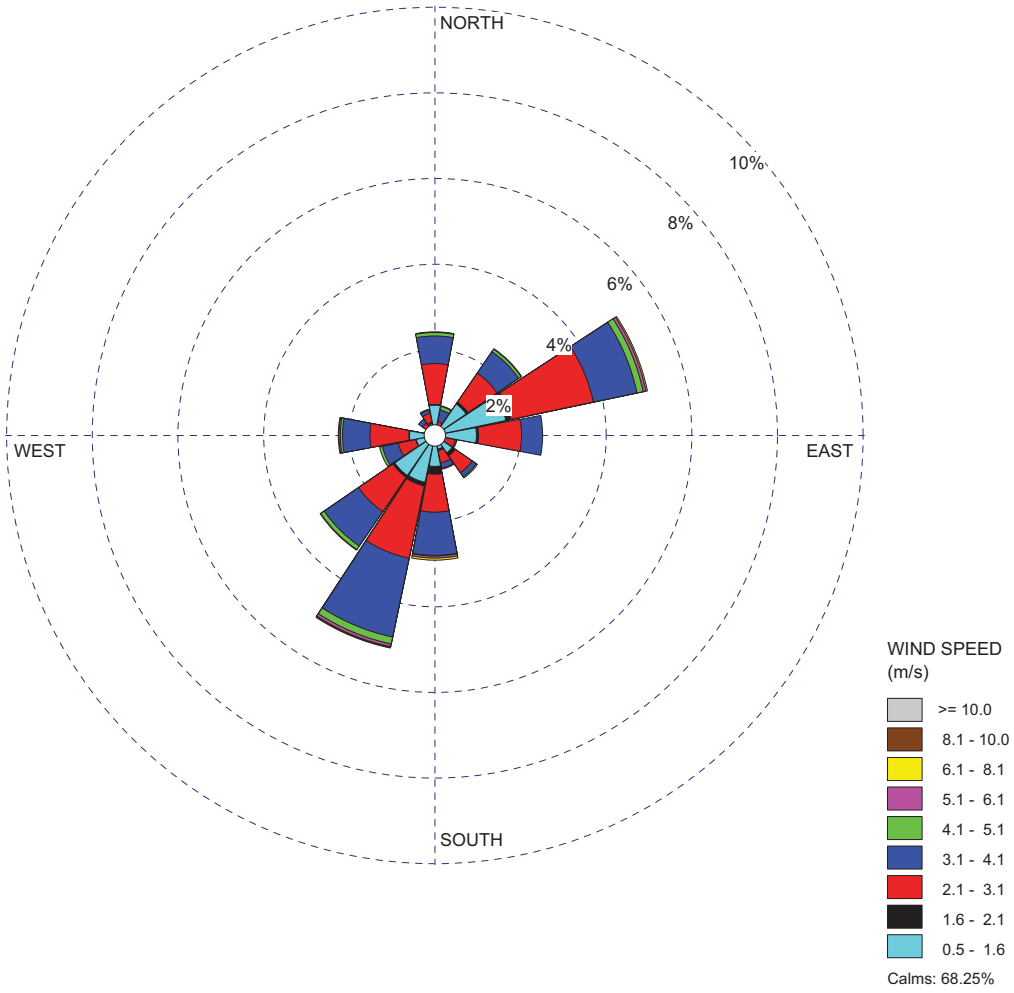
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 6 of 12) Wind Rose Oak Ridge NWS 10 Years June



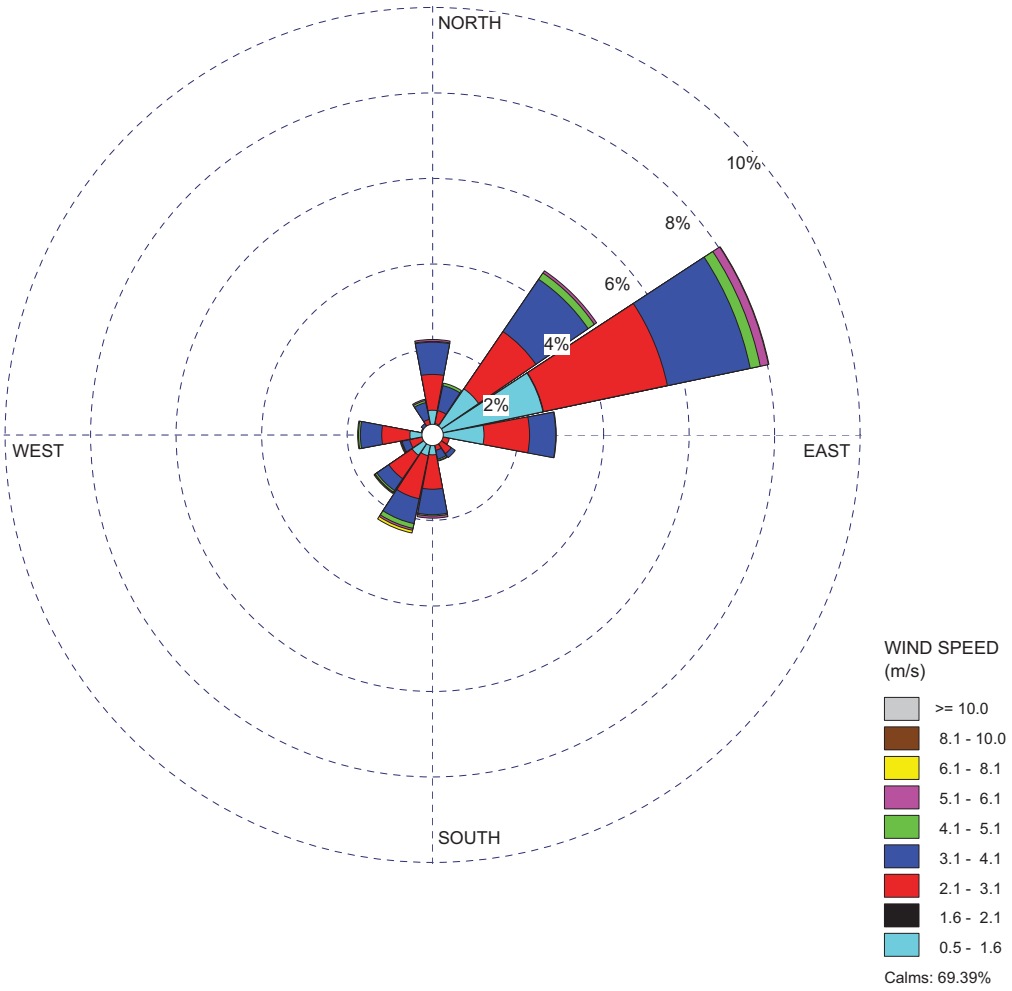
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 7 of 12) Wind Rose Oak Ridge NWS 10 Years July



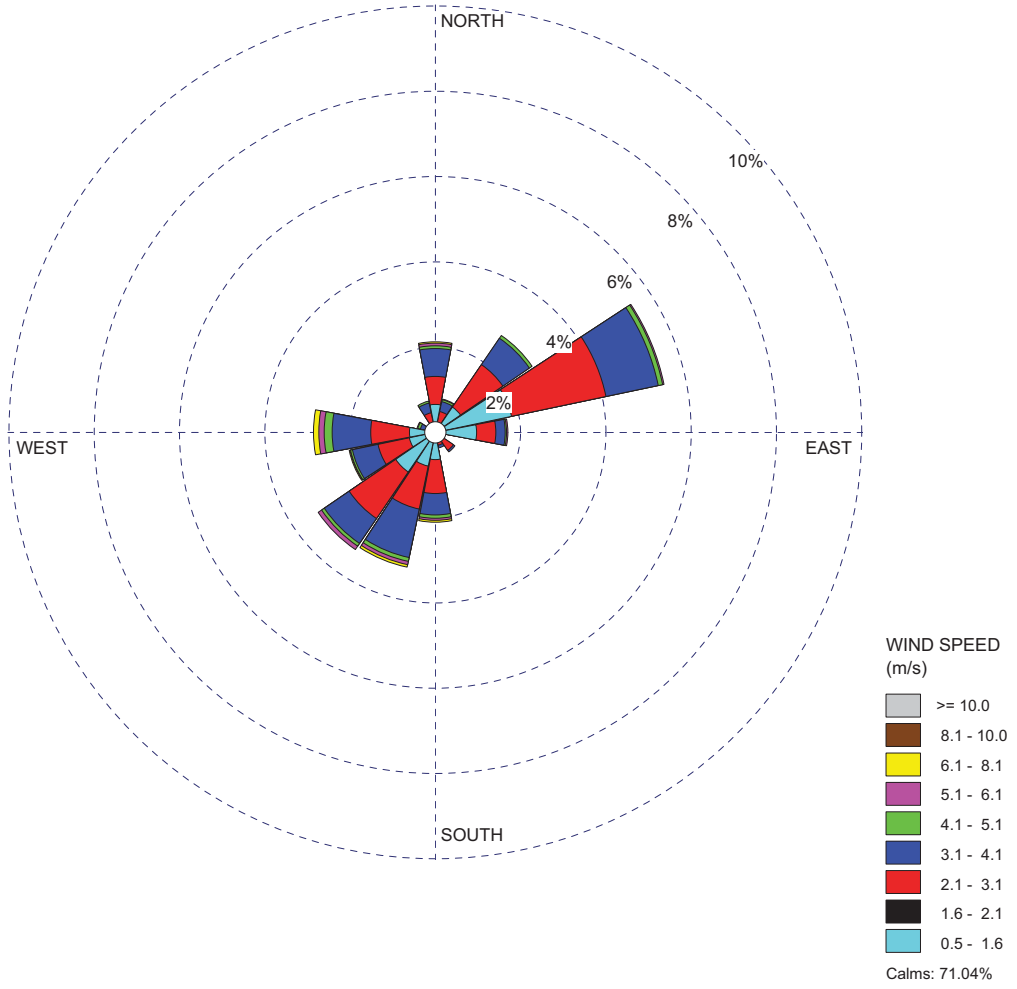
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 8 of 12) Wind Rose Oak Ridge NWS 10 Years August



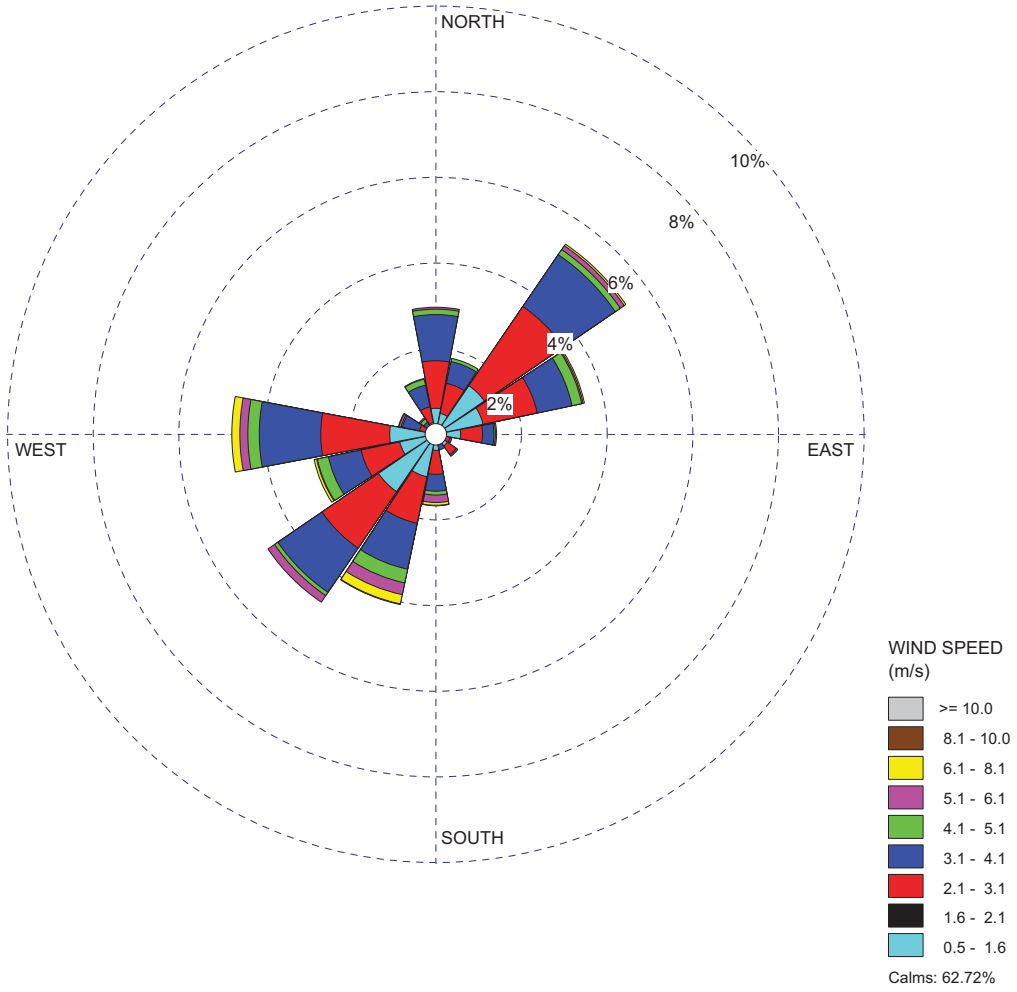
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 9 of 12) Wind Rose Oak Ridge NWS 10 Years September



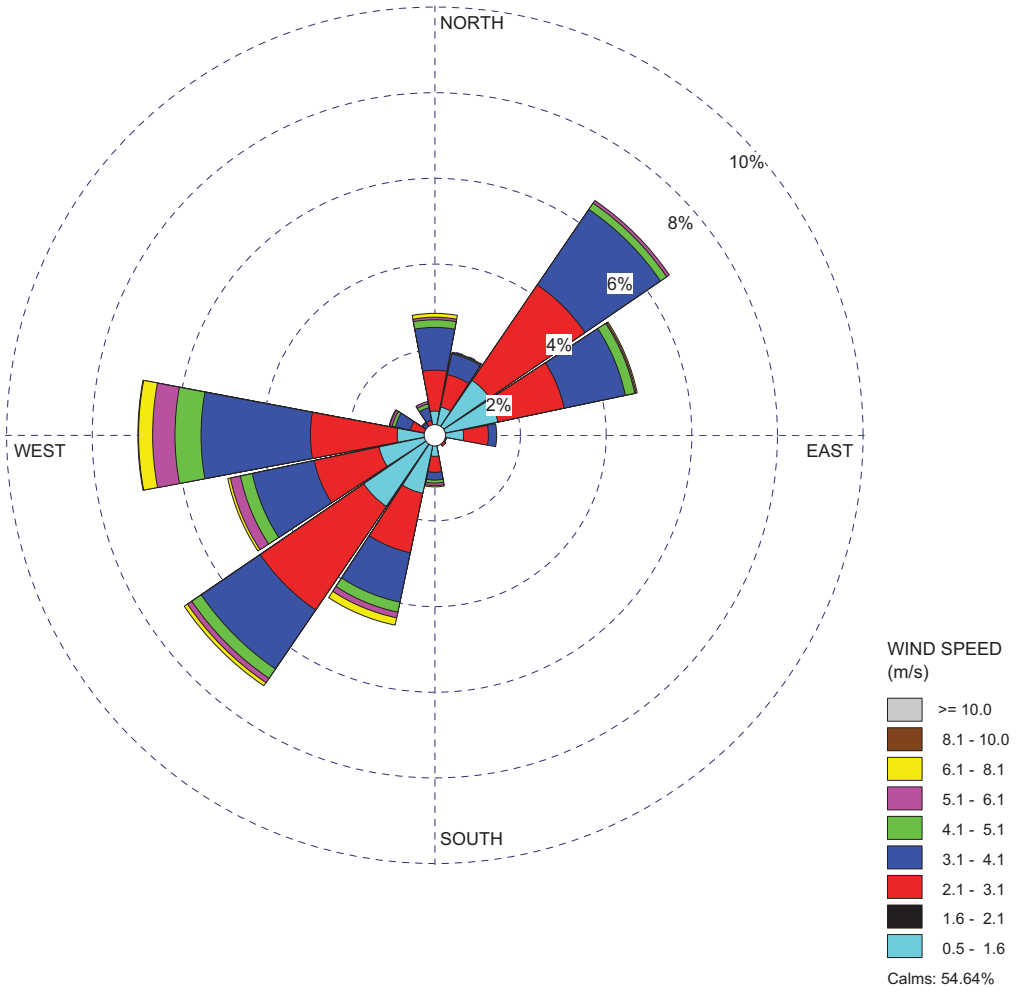
Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 10 of 12) Wind Rose Oak Ridge NWS 10 Years October



Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 11 of 12) Wind Rose Oak Ridge NWS 10 Years November



Sampling Period: 2000 to 2009

Figure 2.7.4-3. (Sheet 12 of 12) Wind Rose Oak Ridge NWS 10 Years December

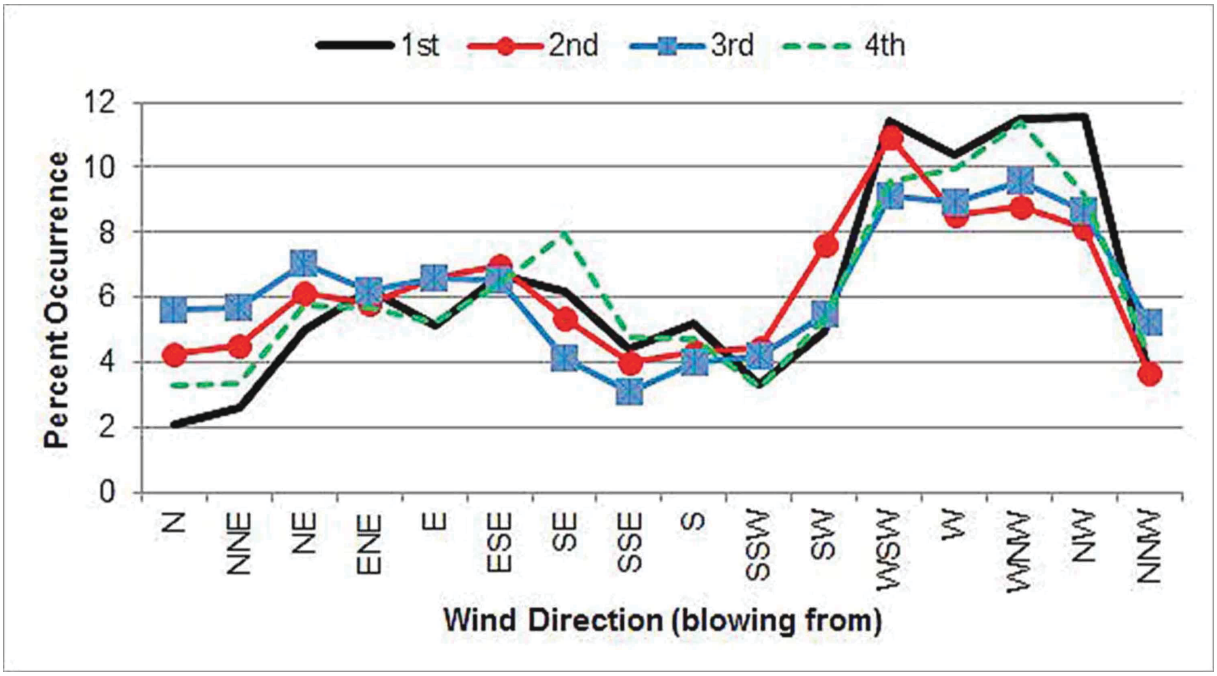
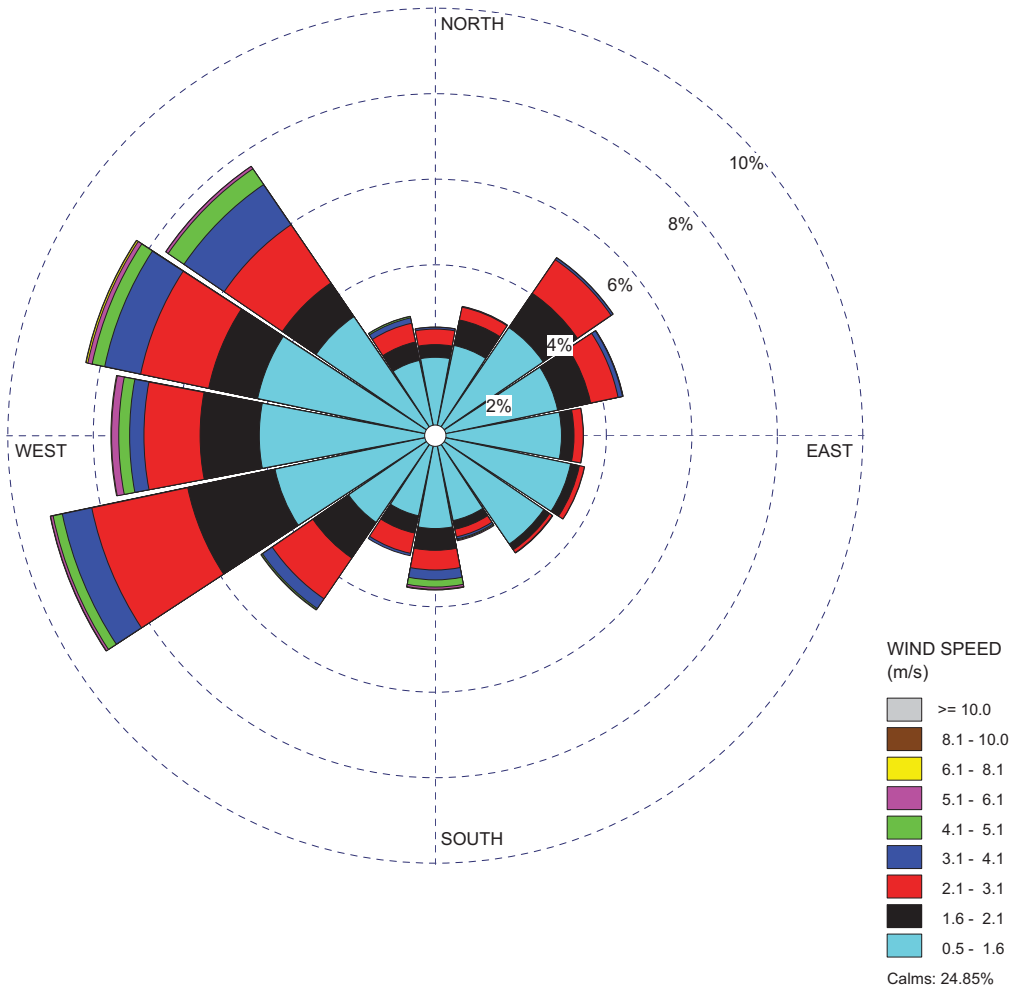
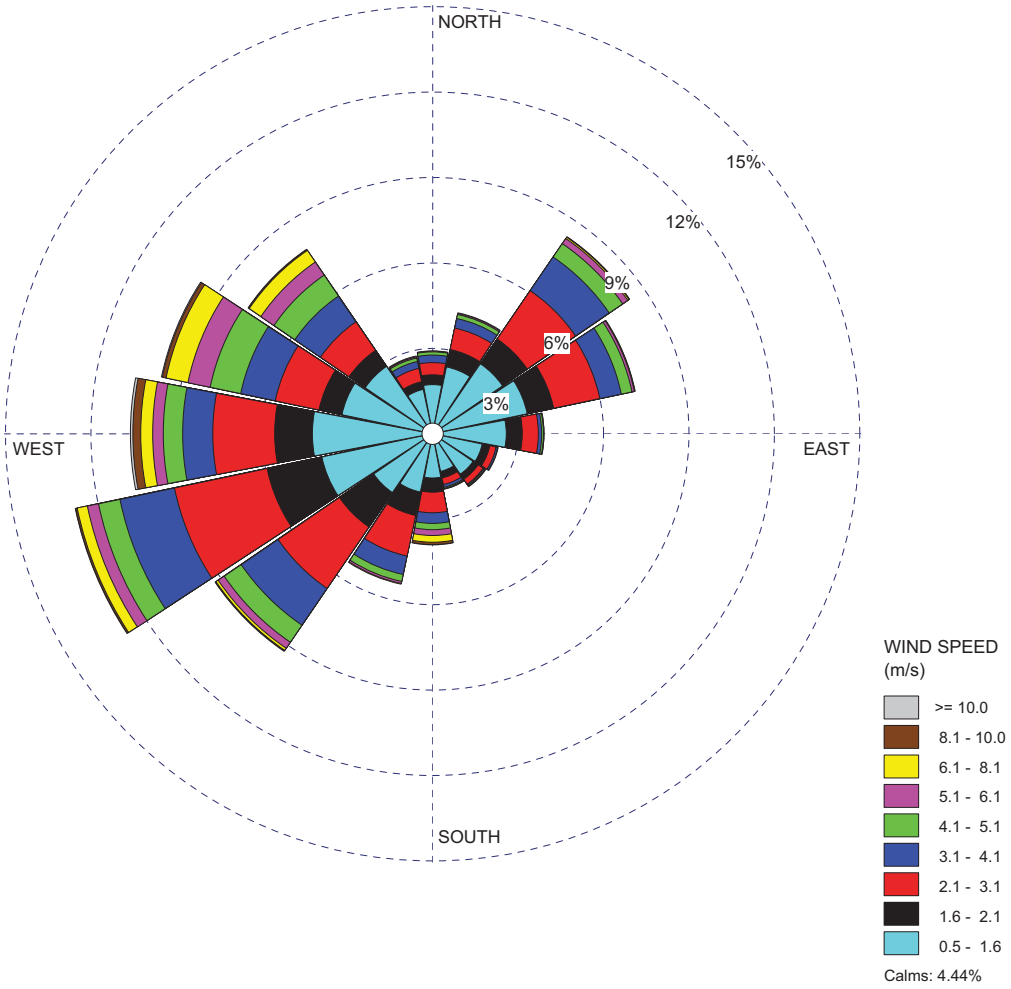


Figure 2.7.4-4. Clinch River Property Average 10-Meter Wind Direction (by Quarter)



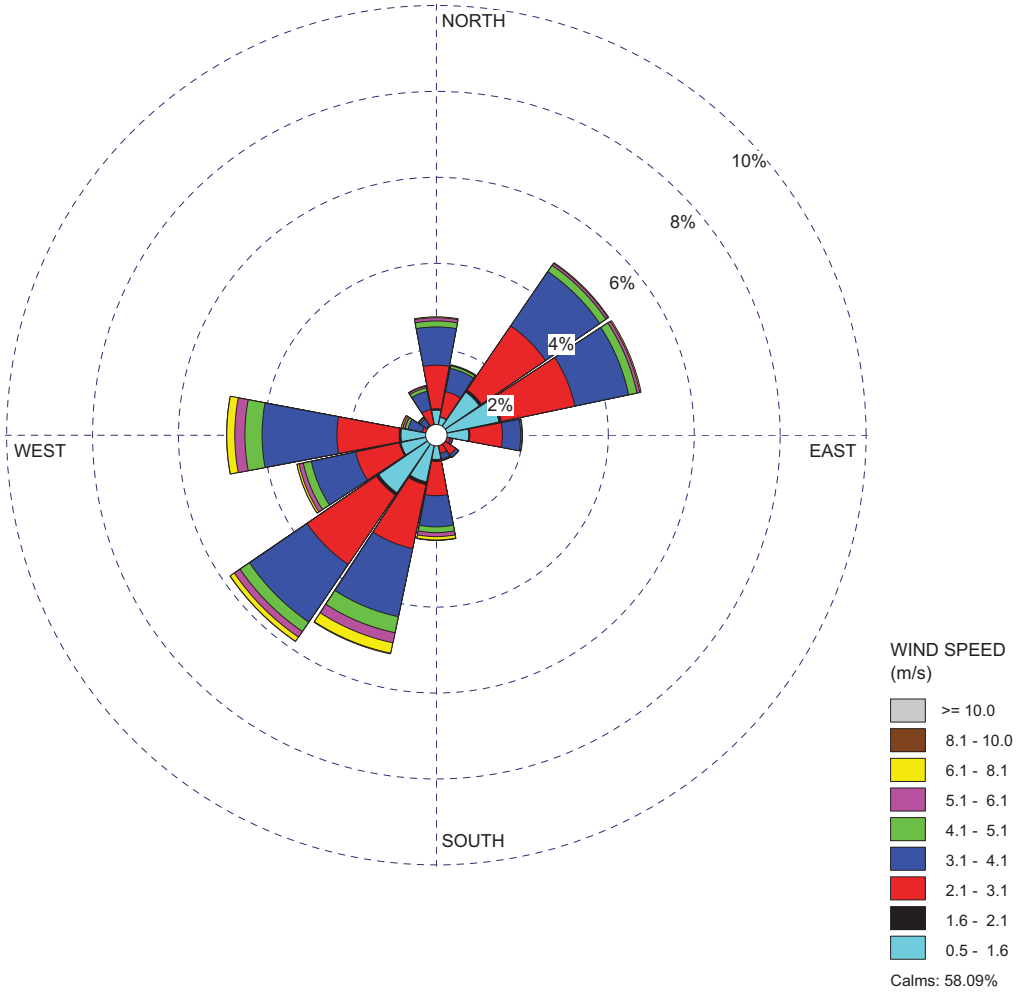
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-5. Wind Rose CRN Site 10-Meter All Data



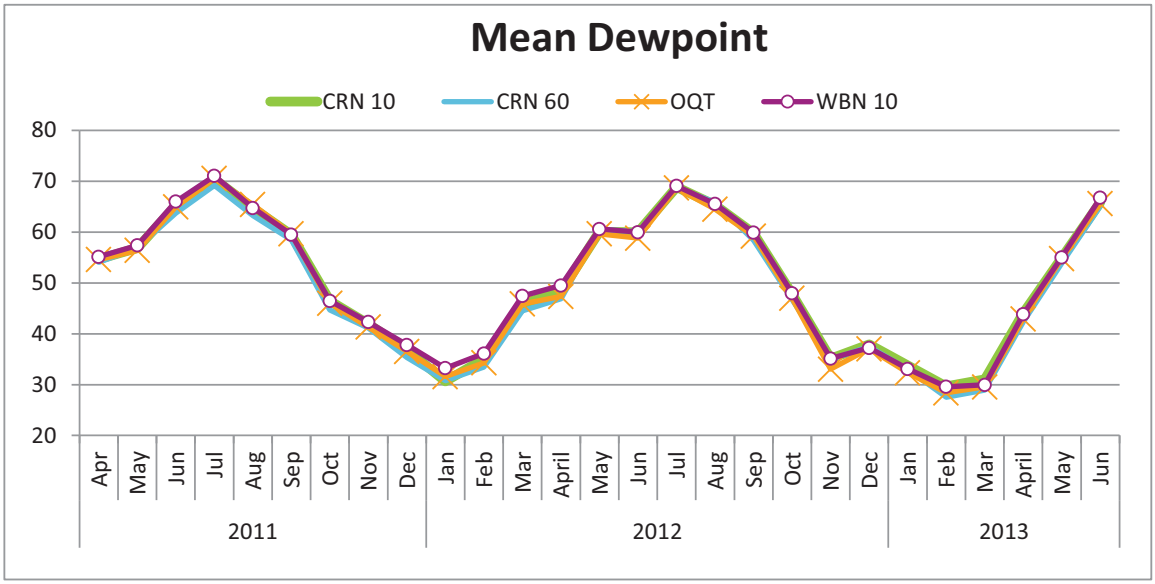
Sampling Period: April 21, 2011 to June 30, 2013

Figure 2.7.4-6. Wind Rose CRN Site 60-Meter All Data



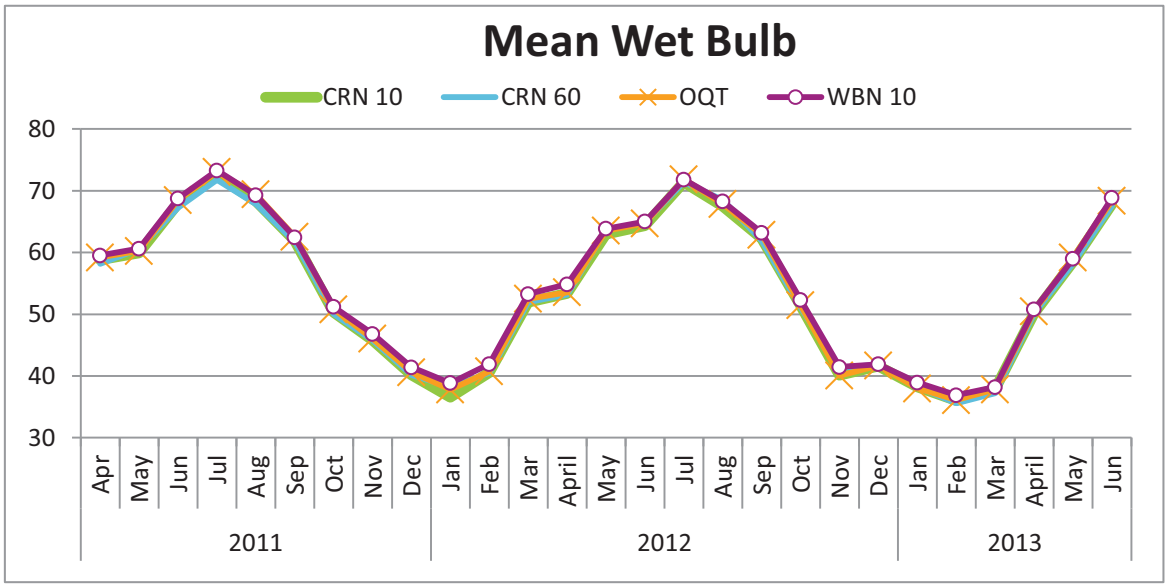
Sampling Period: 2000 to 2009

Figure 2.7.4-7. Wind Rose Oak Ridge NWS 10 Years All Data



Note:
CRN 10 = CRN Site 10-meter data
CRN 60 = CRN Site 60-meter
OQT = Oak Ridge NWS
WBN = Watts Bar Nuclear Site

Figure 2.7.4-8. Concurrent Mean Dew Point Temperatures (Fahrenheit)



Note:
CRN 10 = CRN Site 10-meter data
CRN 60 = CRN Site 60-meter
OQT = Oak Ridge NWS
WBN = Watts Bar Nuclear Site

Figure 2.7.4-9. Concurrent Mean Wet Bulb Temperatures (Fahrenheit)

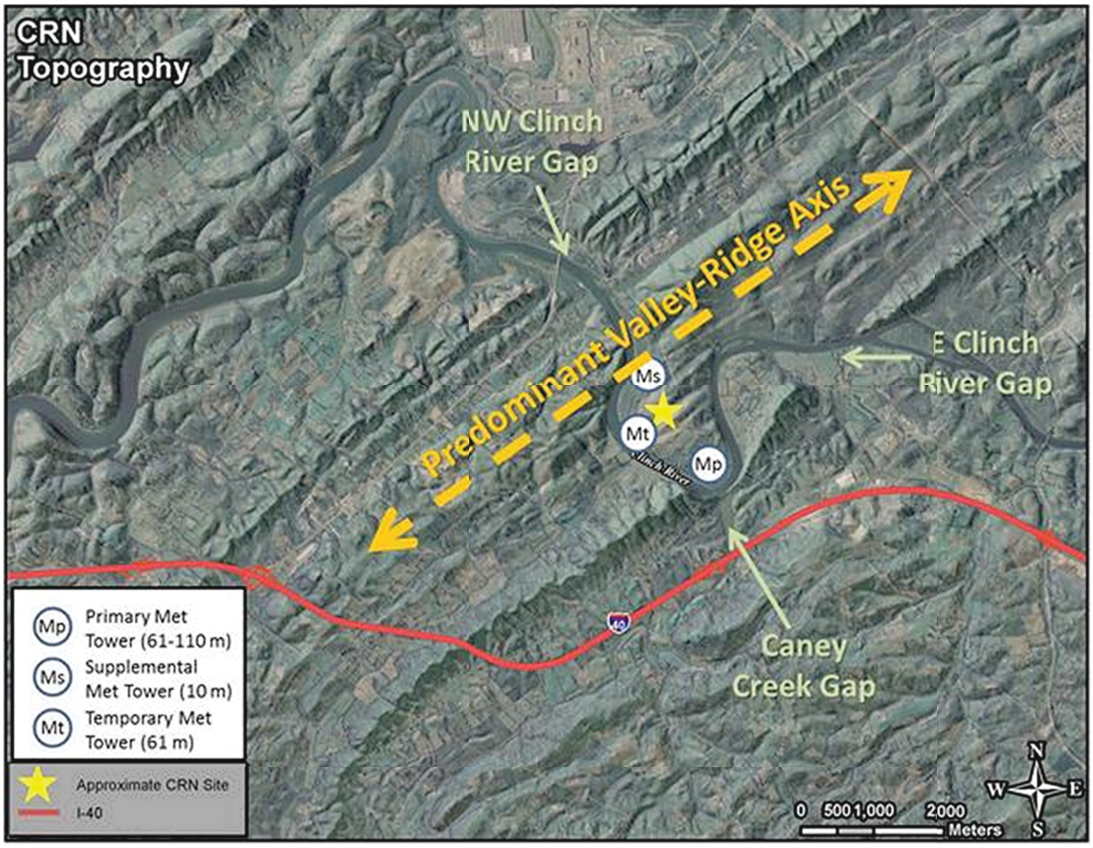
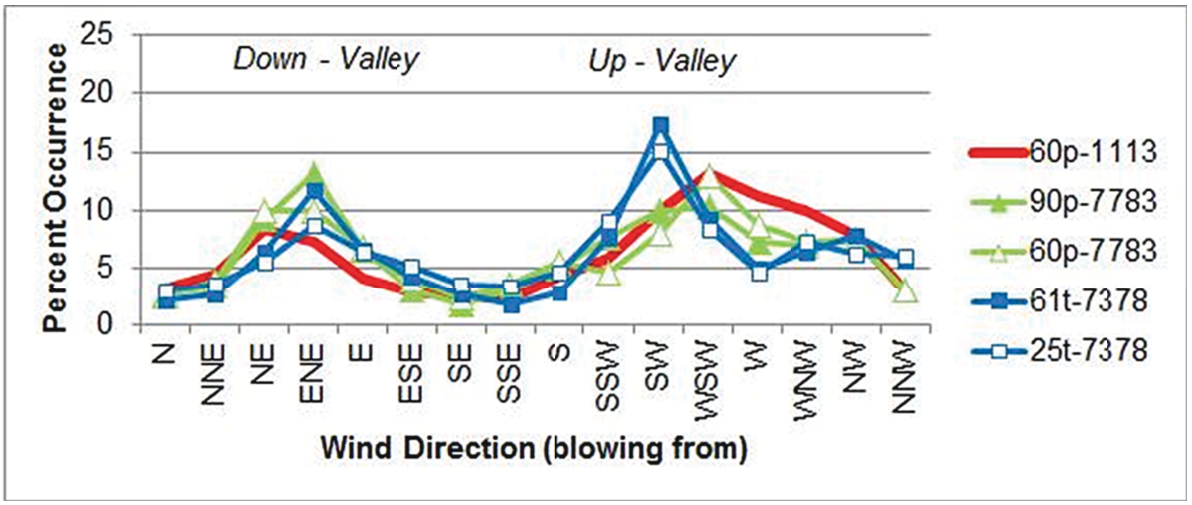


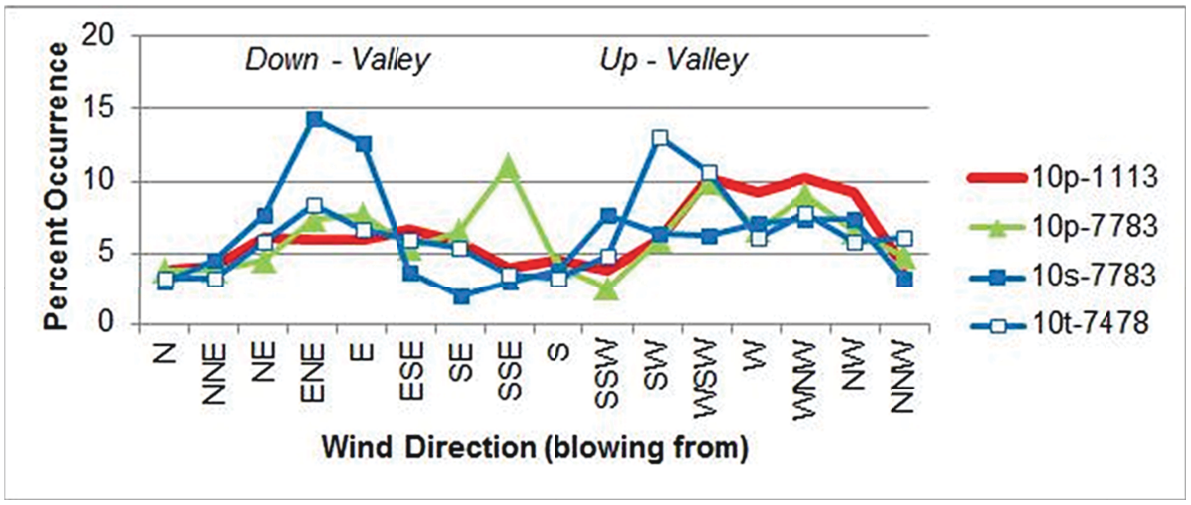
Figure 2.7.4-10. Topography in the Vicinity of the CRN Site



Primary Tower (Mp):
60p-1113 = 60 m (4/21/2011-6/30/2013)
90p-7783 = 90 m (2/16/1977-11/4/1983)
60p-7783 = 60 m (2/16/1977-11/4/1983)

Temporary Tower (Mt):
61t-7378 = 61 m (4/11/1973-3/2/1978)
25t-7378 = 25 m (4/11/1973-3/2/1978)

Frequency of Elevated Wind Directions



Primary Tower (Mp):
10p-1113 = 10 m (4/21/2011-6/30/2013)
10p-7783 = 10 m (2/16/1977-11/4/1983)

Supplemental Tower (Ms):
10s-7783 = 10 m (4/11/1973-3/2/1978)

Temporary Tower (Mt):
10t-7478 = 10 m (4/3/1974-3/2/1978)

Frequency of 10-meter Wind Directions

Figure 2.7.4-11. (Sheet 1 of 2) Effects of Topography on Wind Flow in the CRN Site Vicinity

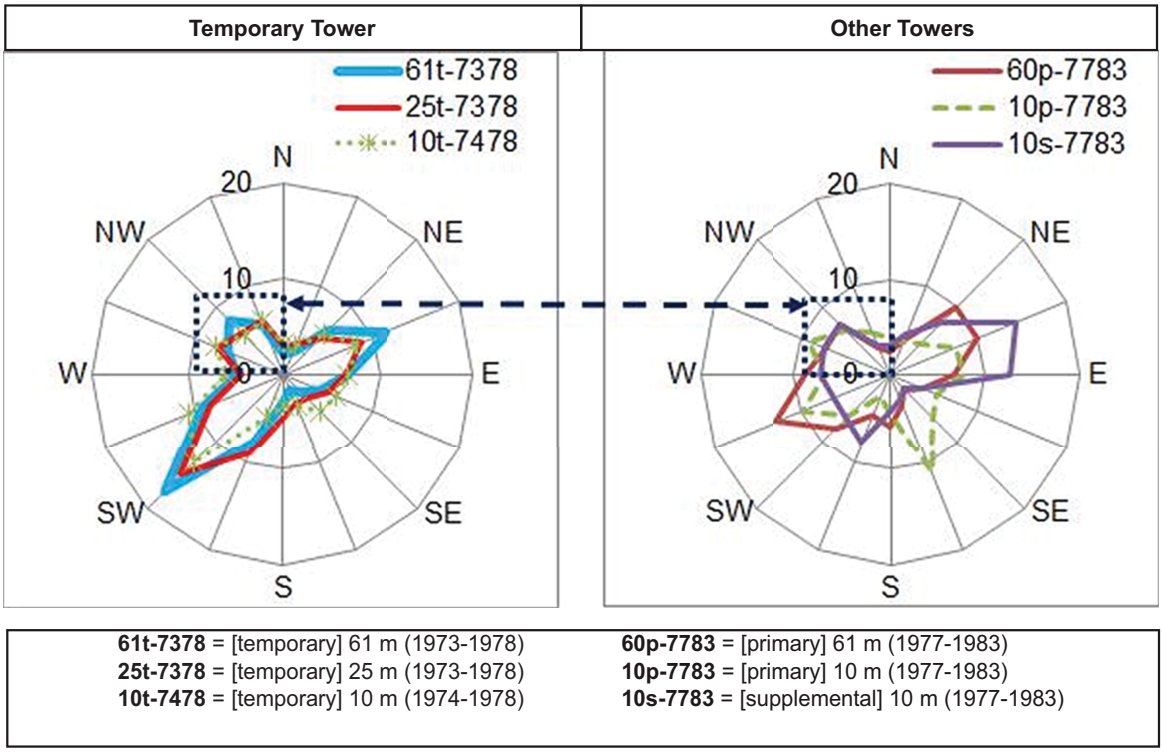
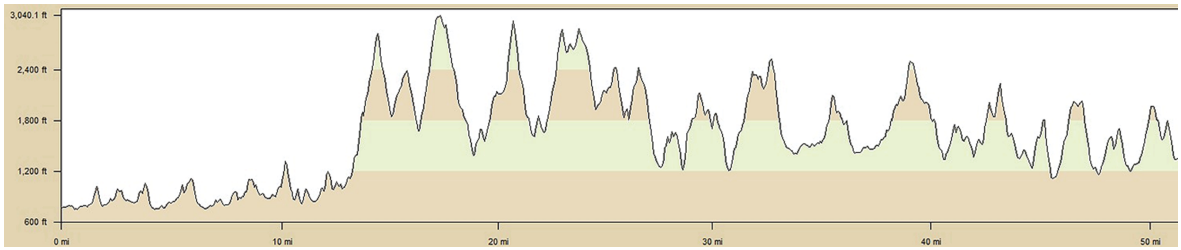
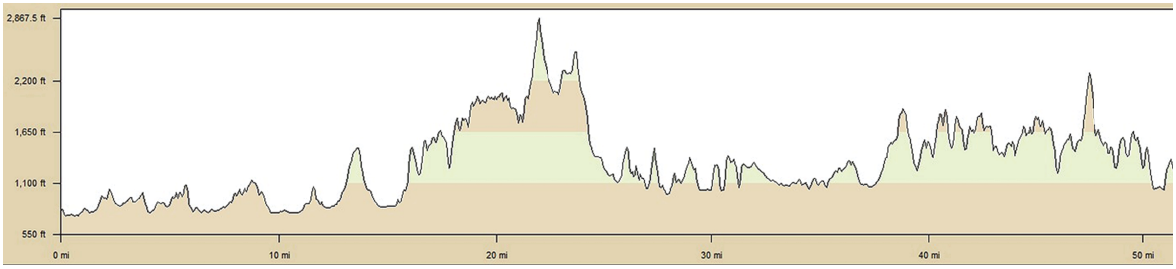


Figure 2.7.4-11. (Sheet 2 of 2) Effects of Topography on Wind Flow in the CRN Site Vicinity

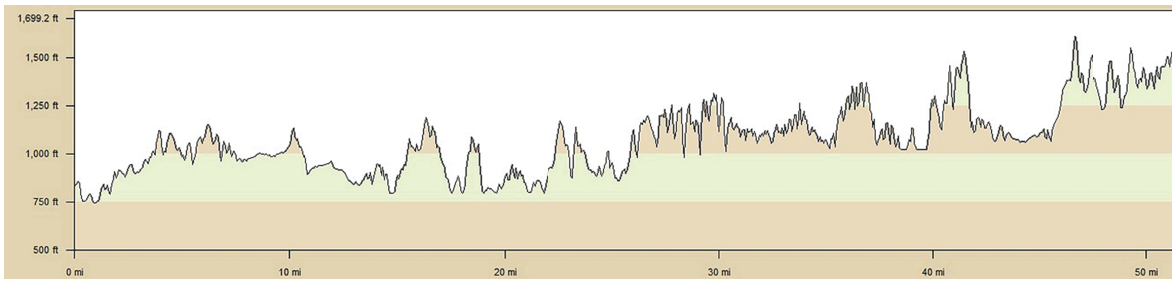


North

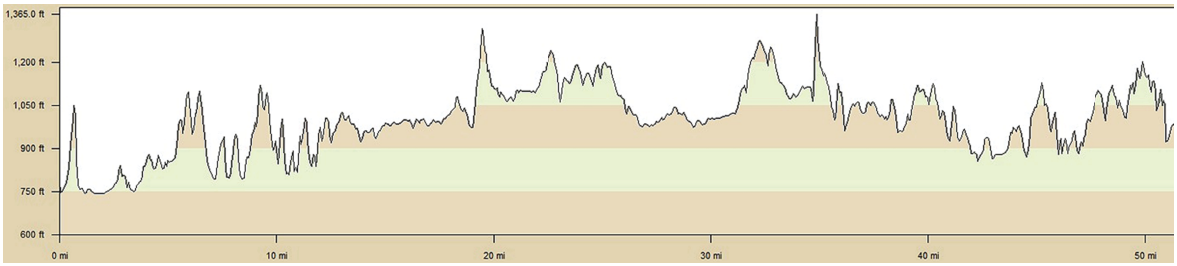


North Northeast

Figure 2.7.4-12. (Sheet 1 of 8) Elevation Profiles 0 to 50 Miles from CRN Site

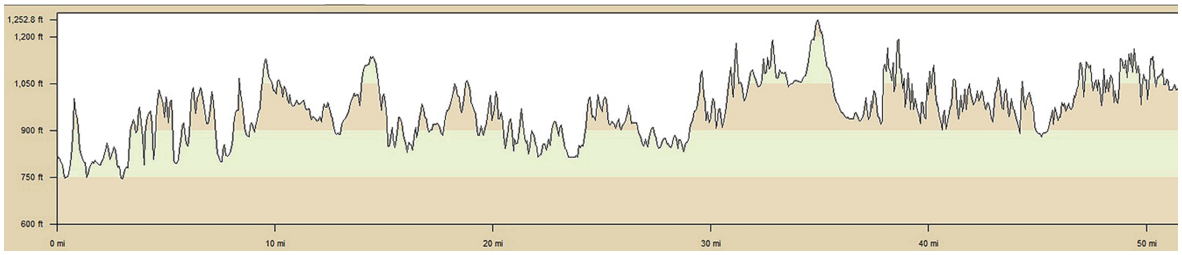


Northeast

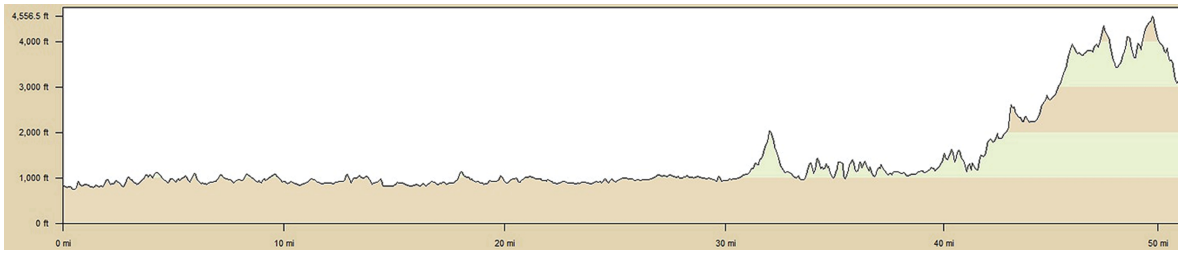


East Northeast

Figure 2.7.4-12. (Sheet 2 of 8) Elevation Profiles 0 to 50 Miles from CRN Site

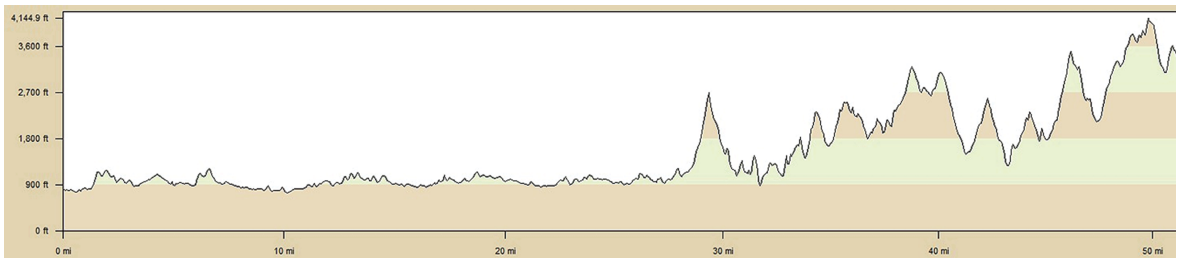


East

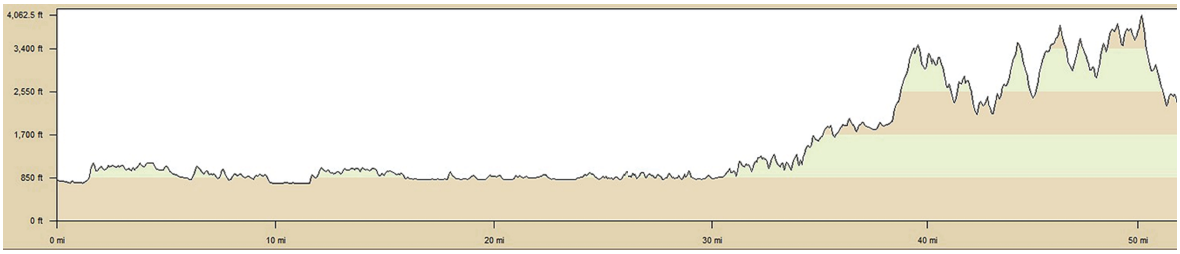


East Southeast

Figure 2.7.4-12. (Sheet 3 of 8) Elevation Profiles 0 to 50 Miles from CRN Site

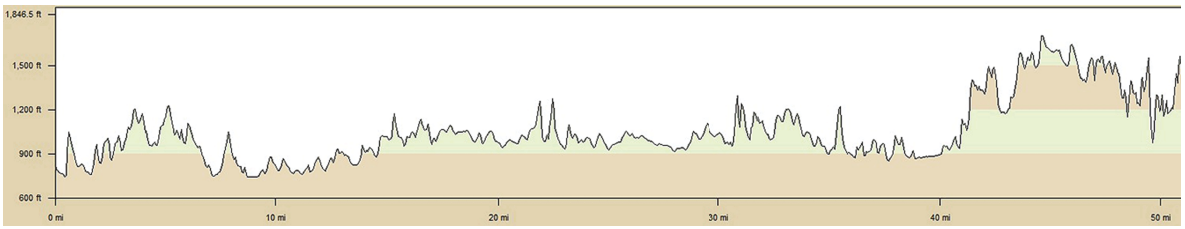


Southeast

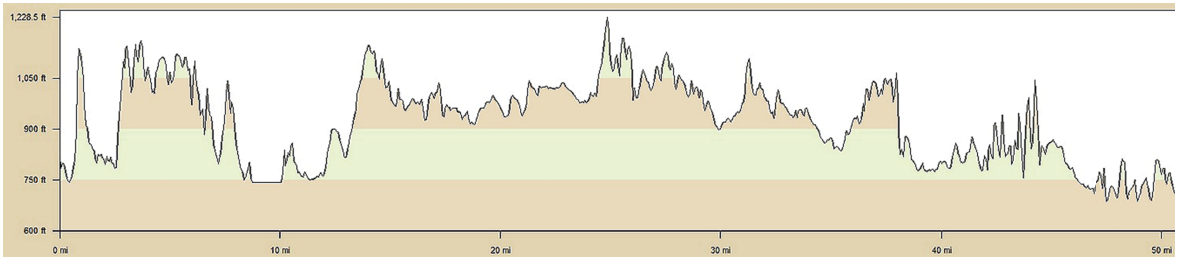


South Southeast

Figure 2.7.4-12. (Sheet 4 of 8) Elevation Profiles 0 to 50 Miles from CRN Site

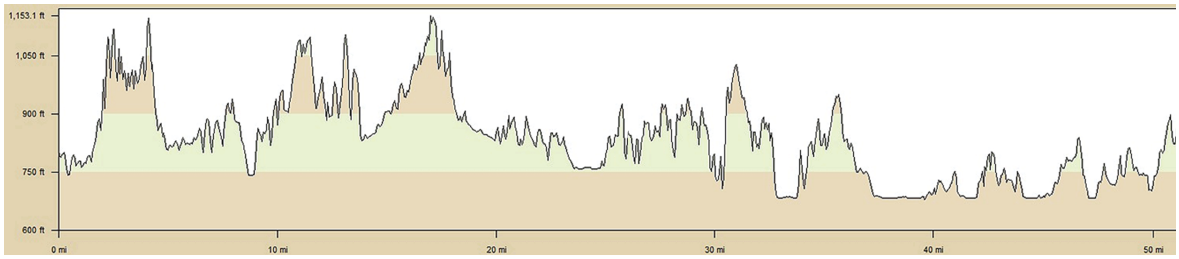


South

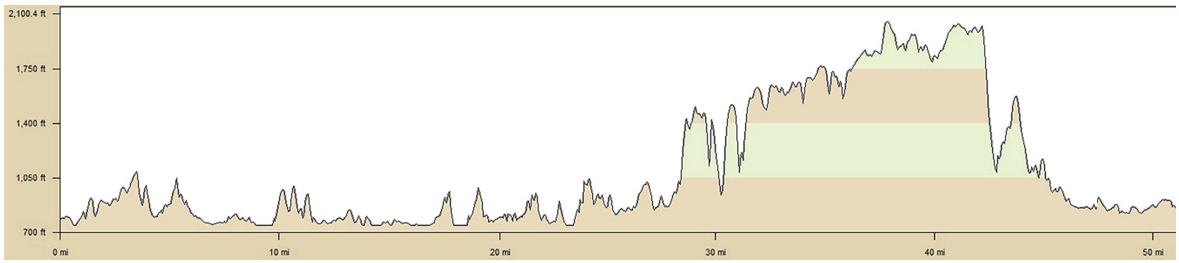


South Southwest

Figure 2.7.4-12. (Sheet 5 of 8) Elevation Profiles 0 to 50 Miles from CRN Site

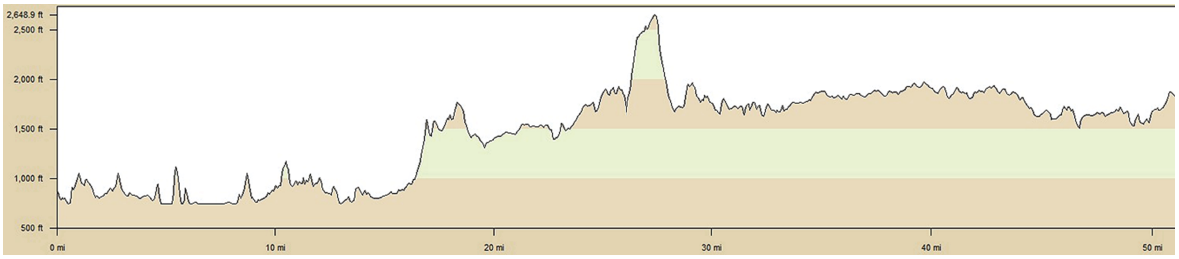


Southwest

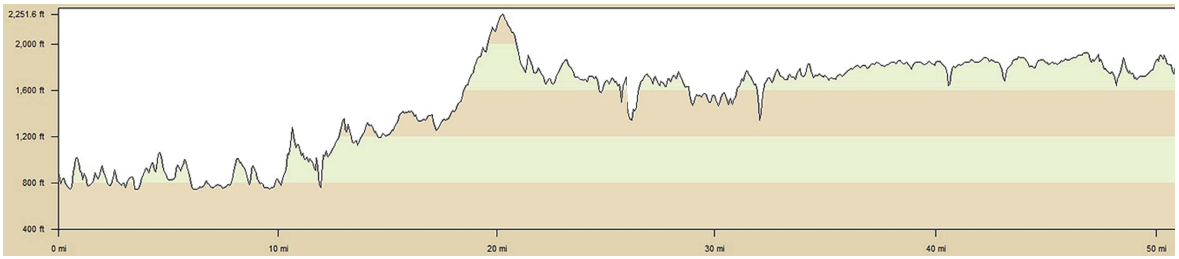


West Southwest

Figure 2.7.4-12. (Sheet 6 of 8) Elevation Profiles 0 to 50 Miles from CRN Site

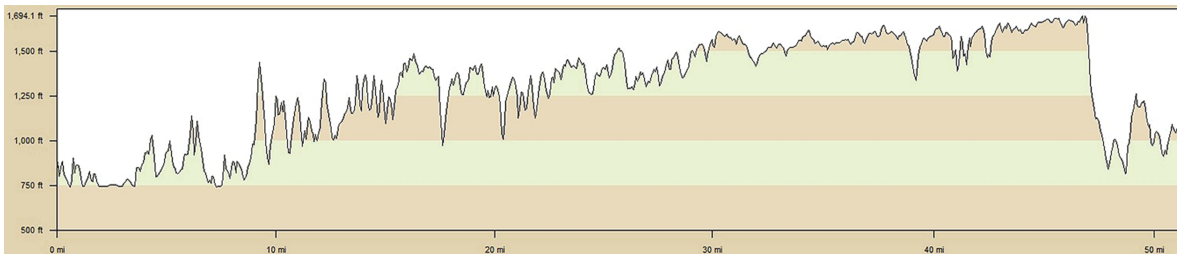


West

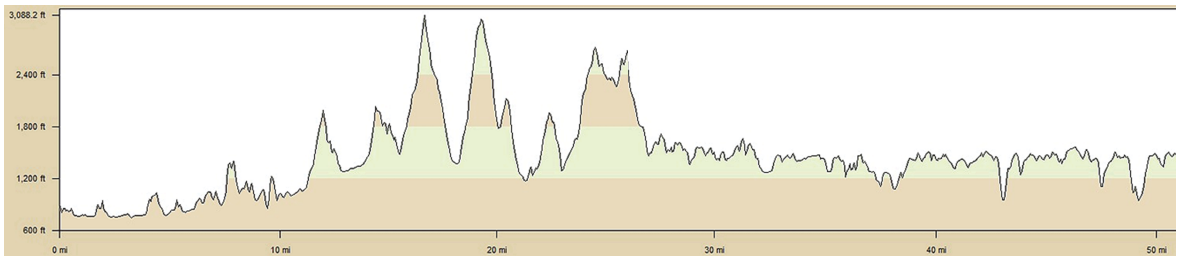


West Northwest

Figure 2.7.4-12. (Sheet 7 of 8) Elevation Profiles 0 to 50 Miles from CRN Site



Northwest



North Northwest

Figure 2.7.4-12. (Sheet 8 of 8) Elevation Profiles 0 to 50 Miles from CRN Site