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2.7 Meteorology, Air Quality, and Noise

This section describes the regional and local climatological, meteorological, and air quality as well as noise characteristics applicable to the VCS site. This section also provides site-specific meteorological information for use in evaluating construction and operational impacts. It concludes with a brief description of existing noise-generating sources at the site and expected noise levels relative to measured background conditions.

2.7.1 Regional Climatology

This subsection identifies sources of climatological data used to characterize various aspects of the climate representative of the site region and area around the VCS site (as described in Subsections 2.7.1 through 2.7.4), describes large-scale general climatic features, their relationship to conditions in the site area (Subsection 2.7.1.2), and summarizes normals, means, and extremes of standard weather elements (Subsection 2.7.1.3).

2.7.1.1 Data Sources

Several data sources are used to characterize regional climatological conditions pertinent to the VCS site. This includes data acquired by the National Weather Service (NWS) at its Victoria and Palacios, Texas, first-order stations and from 13 other nearby locations in its network of cooperative observer stations, as compiled and summarized by the National Climatic Data Center (NCDC).

These climatological observing stations are located in Aransas, Bee, Calhoun, DeWitt, Goliad, Jackson, Karnes, Lavaca, Matagorda, Refugio, San Patricio, and Victoria counties. Table 2.7-1 identifies the specific stations and lists their approximate distance and direction from the centroid of the proposed power block area at the site. Figure 2.7-1 illustrates these station locations relative to the VCS site.

The objective of selecting nearby, offsite climatological monitoring stations is to demonstrate that the mean and extreme values measured at those locations are reasonably representative of conditions that might be observed at the VCS site. The 50-mile-radius circle shown in Figure 2.7-1 provides a relative indication of the distance between the climate-observing stations and the VCS site.

The identification of stations to be included was based on the following general considerations:

- Proximity to the site (i.e., within the nominal 50-mile radius indicated above, to the extent practicable)
- Coverage in all directions surrounding the site (to the extent possible)

- Where more than one station exists for a given direction relative to the site, a station was included if it contributed one or more extreme conditions (e.g., rainfall, snowfall, maximum or minimum temperatures) for that general direction or added context for variation of conditions over the site area.

If an overall extreme precipitation or temperature condition was identified for a station located within a reasonable distance beyond the nominal 50-mile radius and that event was considered to be reasonably representative for the site area, such stations were also included, regardless of directional coverage.

Normals (i.e., 30-year averages), means, and extremes of temperature, rainfall, and snowfall are based on the following references:

- *2007 Local Climatological Data, Annual Summary with Comparative Data for Victoria, Texas* (NCDC Jun 2008b)
- *Climatography of the United States, No. 20, 1971–2000, Monthly Station Climate Summaries* (NCDC Jul 2005)
- *Climatography of the United States, No. 81, 1971–2000, U.S. Monthly Climate Normals* (NCDC Feb 2002)
- *Utah Climate Center, Utah State University, Climate Data Base for Texas* (USU Jun 2008)
- *Cooperative Summary of the Day, TD3200, Period of Record Through 2001, for the Central United States* (NCDC Nov 2002)
- *U.S. Summary of Day Climate Data (DS 3200/3210), Period of Record, 2002–2005* (NCDC Jul 2006)

First-order NWS stations also record measurements, on an hourly basis, of other weather elements, including winds, several indicators of atmospheric moisture content (i.e., relative humidity, dew point, and wet bulb temperatures), and barometric pressure, as well as other observations when those conditions occur (e.g., fog, thunderstorms). Table 2.7-2**,** excerpted from the 2007 local climatological data (LCD) summary for the Victoria, Texas, NWS station, presents the long-term characteristics of these parameters.

Additional data sources were also used in describing the climatological characteristics of the site area and region, including:

- *Minimum Design Loads for Buildings and Other* Structures (ASCE 2005)

- *Historical Hurricane Tracks Storm Query, 1851 through 2008* (NOAA-CSC Sep 2009)
- *The Climate Atlas of the United States* (NCDC Sep 2002)
- *Storm Events for Texas, Hail, Snow and Ice, Tornado, Hurricane and Tropical Storm, and Dust Storm Event Summaries* (NCDC Apr 2008, NCDC Jun 2008a, and NCDC Jun 2008c)
- *Storm Data (and Unusual Weather Phenomena with Late Reports and Corrections), January 1959 (Volume 1, Number 1) to January 2004 (Volume 46, Number 1)* (NCDC Jun 2004)
- *Air Stagnation Climatology for the United States (1948–1998)* (Wang and Angell Apr 1999)
- *Ventilation Climate Information System* (USDA Apr 2003, USDA Oct 2007)
- *Climatography of the United States, No. 85, Divisional Normals and Standard Deviations of Temperature, Precipitation, and Heating and Cooling Degree Days 1971–2000 (and previous normal periods)* (NCDC Jun 2002)

2.7.1.2 **General Climate**

The VCS site is located in the south-central Texas Coastal Plain, situated approximately 35 miles to the northwest of the Gulf of Mexico (see Figure 2.7-1). Topographic features within 5 miles and 50 miles of the site are addressed in Subsection 2.7.4.5. Terrain in the site area is generally flat to gently rolling. Elevations range from 0 feet above mean sea level (MSL) to the south to 550 feet above MSL to the west and northwest of the site.

The State of Texas is divided into 10 climate divisions. A climate division represents a region within a state that is as climatically homogeneous as possible. Division boundaries generally coincide with county boundaries except in the Western United States. The VCS site is located near the boundaries of two separate climate divisions within the State of Texas. It is physically situated in the western portion of Climate Division TX-08 (Upper Coast), but also lies directly adjacent to the eastern extent of the southern portion of Climate Division TX-07 (South Central) (NCDC Jun 2002).

The general climate in this region is classified as maritime subtropical (or humid subtropical) and is characterized by mild, short winters; long periods of mild sunny weather in the autumn; somewhat more windy but mild weather in the spring; and long, hot summers.

The regional climate is influenced by a semipermanent, subtropical high-pressure system over the North Atlantic Ocean—the Bermuda High (also known as the western extent of the Azores High). Because of the clockwise circulation around this high-pressure system, maritime tropical air mass characteristics prevail much of the year, especially during the summer when the Bermuda High is well developed. The Bermuda High can extend westward into the Gulf of Mexico at this time of year and, when it does, a synoptic weather type referred to as a Gulf High is said to be present (LOSC Sep 2002).

Collectively, these systems govern late spring and summer temperature and precipitation patterns. However, the influence of this macroscale circulation feature is also evident during the transitional seasons (spring and autumn), although relatively less so during the autumn months (in terms of the wind distribution turning more easterly) when it is disrupted by the passage of relatively smaller synoptic- and mesoscale weather systems from the north. Wind direction and speed conditions for the site and surrounding area are described in more detail in Subsections 2.7.1.3.4 and 2.7.4.2.

This macro-circulation feature also has an effect on the frequency of high air pollution potential in the VCS site region. These characteristics and their relationship to the Bermuda High, especially during the summer and early autumn, are addressed in Subsection 2.7.2.3.

During winter, cold air masses increasingly intrude into the region with the cyclonic (i.e., counterclockwise) northerly flow that follows the passage of low-pressure systems. These systems frequently originate in the continental interior, pick up moisture-laden air as the result of southeasterly airflow in advance of the system, and result in a variety of precipitation events that include rain, sleet, freezing rain, or mixtures depending on the temperature characteristics of the weather system itself and the temperature of the underlying air (see Subsection 2.7.3.4).

Larger and relatively more persistent outbreaks of cold, dry air, associated with high-pressure systems that move southward out of Canada, also occasionally affect the site region. These weather conditions are moderated by the Gulf of Mexico immediately to the south and owing to surface heating (during the day) as the front passes over the land.

The Gulf High synoptic weather type can also occur during the winter and spring when continental polar high pressure systems move southward over eastern Texas and Louisiana (LOSC Sep 2002), bringing modified polar air with southerly to southeasterly wind flows in the VCS site area.

Monthly precipitation exhibits a cyclical pattern, with the predominant maximum period occurring from late spring into early summer, and a secondary maximum period from early to mid-autumn (Table 2.7-2). The late spring/early summer maximum is primarily a result of thunderstorm activity. The early to mid-autumn secondary maximum is associated with thunderstorms and very heavy rains that accompany tropical systems that occasionally move through the region (see Subsection 2.7.3.5). The VCS site is located close enough to the Gulf of Mexico that the strong winds associated with tropical systems can also have a significant effect on the site area.

2.7.1.3 Normal, Mean, and Extreme Climatological Conditions

This subsection describes normals and period-of-record means and extremes for several standard weather elements (i.e., temperature, atmospheric water vapor, precipitation, and wind conditions) representative of this climate setting.

As indicated previously, Table 2.7-2 presents the more extensive set of meteorological measurements and observations made at the Victoria, Texas, NWS station located approximately 17 miles north-northeast of the VCS site. For comparison, Table 2.7-3 summarizes the annual normal daily maximum, minimum, and mean temperatures, as well as the normal annual rainfall and snowfall totals for Victoria, Texas, and 12 of the 13 other nearby cooperative observing stations (such data not being available for the Maurbro and Edna Highway 59 Bridge stations).

With the exception of temperature measurements from Maurbro and Edna Highway 59 Bridge, and snowfall measurements at Refugio 2 NW and Karnes City 2N, long-term periods of record for temperature and precipitation for the other climatological observing stations, as well as summaries of the latest 30-year station normals from 1971 through 2000, are readily available from the NCDC (NCDC Jul 2005).

More detailed descriptions of these and other climatological characteristics, including measured extremes, are addressed in Subsection 2.7.4.1.

2.7.1.3.1 Temperature

Daily mean temperatures are based on the average of the daily mean maximum and minimum temperature values. Annual daily normal temperatures vary over the site area by only approximately 3°F, ranging from 68.2°F at the Yoakum station (approximately 46 miles north of the VCS site to 71.3°F at the Goliad station (approximately 22 miles to the west) (Table 2.7-3).

The diurnal (day-to-night) temperature ranges, as indicated by the differences between the daily mean maximum and minimum temperatures, are fairly comparable, ranging from 11.4°F at Port O'Connor (approximately 39 miles east-southeast of the VCS site) to 24.2°F at the Cuero station (approximately 37 miles to the north-northwest) (USU Jun 2008). This range reflects each station's proximity to the Gulf Coast—Port O'Connor is located directly on the coast (less temperature variability because of maritime influence), whereas Cuero is located farther inland. Similar variations in diurnal temperature range are noted among the other observing stations in the site area.

On a monthly basis, the LCD summary for the Victoria, Texas, NWS station indicates that the daily normal temperature is highest during July and August (84.2°F) and reaches a minimum in January (53.2°F) (NCDC Jun 2008b).

Table 2.7-4 shows the highest temperature observed in the site area (113°F) was recorded on September 5, 2000, at the Cuero cooperative station. The lowest temperature observed in the site area (6°F) was recorded on December 23, 1989, at the Yoakum cooperative station, located approximately 46 miles north of the site (NCDC Jul 2005; USU Jun 2008).

2.7.1.3.2 **Atmospheric Water Vapor**

Based on a 24-year period of record, the LCD summary for the Victoria, Texas, NWS station (Table 2.7-2) indicates that the mean annual wet bulb temperature is 64.2°F, with a seasonal maximum during the summer months (June through August) and a seasonal minimum during the winter months (December through February). The highest monthly mean wet bulb temperature is 76.1°F in July (only slightly less during August); the lowest monthly mean value (49.7°F) occurs during January (NCDC Jun 2008b).

The LCD summary shows a mean annual dew point temperature of 61.2°F, reaching its seasonal maximum and minimum during the summer and winter, respectively. The highest monthly mean dew point temperature is 73.6°F in July (again, only slightly less during August). The lowest monthly mean dew point temperature (46.4°F) occurs during January (NCDC Jun 2008b).

The 30-year normal daily relative humidity averages 76 percent on an annual basis, typically reaching its diurnal maximum in the early morning hours (approximately 0600 Local Standard Time [LST]) and its diurnal minimum during the early afternoon hours (approximately 1200 LST). There would be less variability in this daily pattern with the passage of weather systems, persistent cloud cover, and precipitation. Nevertheless, this diurnal pattern is evident throughout the year. The LCD summary indicates that average early morning relative humidity levels are greater than or equal to 93 percent during the months of June, July, August, and September (NCDC Jun 2008b).

2.7.1.3.3 **Precipitation**

Table 2.7-3 shows normal annual rainfall totals for the 15 observing stations listed in Table 2.7-1 (i.e., within approximately 50 miles of the VCS site) vary, ranging from 28.35 inches at the Karnes City 2N observing station (approximately 55 miles to the west-northwest of the VCS site) to 45.40 inches at the Palacios Municipal Airport station (approximately 48 miles to the east) (NCDC Feb 2002). Total annual rainfall tends to decrease more from east to west than as a function of distance inland from the Gulf of Mexico and adjacent bay waters.

If the four climatological observing stations closest to, and surrounding, the VCS site are considered (i.e., Victoria Regional Airport, Goliad, Refugio 2 NW, and Aransas Wildlife Refuge), all within 25 miles, normal annual rainfall totals are quite similar, ranging from 38.58 inches at Goliad to

40.83 inches at Aransas Wildlife Refuge (NCDC Feb 2002). Therefore, long-term average annual total rainfall at the VCS site could reasonably be expected to be within this range.

The LCD summary of normal rainfall totals for the Victoria, Texas, NWS station (Table 2.7-2 indicates two seasonal maximums, the highest (13.05 inches) during late spring into early summer (April through June) and the second (12.31 inches) during mid-summer into mid-autumn (August through October). Together, these periods account for approximately 63 percent of the annual total for the Victoria NWS station, although rainfall is greater than 2.0 inches during every month of the year. The overall maximum monthly total rainfall occurs during May (5.12 inches) (NCDC Jun 2008b).

The overall highest 24-hour rainfall total in the site area, 17.58 inches, was recorded on October 18, 1994, at the Edna Highway 59 Bridge cooperative observing station (USU Jun 2008), located approximately 32 miles northeast of the VCS site. The overall highest monthly rainfall total in the site area, 26.30 inches during September 1971, was recorded at the Refugio cooperative observing station (USU Jun 2008; NCDC Jun 2008d), located approximately 25 miles to the southwest of the VCS site.

Snow in the VCS site area is an unusual event and occurs, on average, less than 1 day per year as indicated by the LCD summary for the Victoria, Texas, NWS station in Table 2.7-2 (NCDC Jun 2008b). Table 2.7-3 indicates that normal annual snowfall totals at the listed observing stations average 0.5 inch per year or less. Heavy snowfall events rarely occur in the VCS site area, as described in Subsection 2.7.3.4. The greatest snowfall totals on record among the observing stations listed in Table 2.7-4 were measured at the Goliad station, located 22 miles west of the VCS site, as a result of the Christmas storm of 2004 (December 25, 2004). The 24-hour and cumulative monthly totals at Goliad were 12.0 inches in both cases (NCDC Jul 2006; USU Jun 2008; NCDC Jun 2008d).

See Subsection 2.7.4.1.3 for more details regarding these events and a description of other station precipitation records.

2.7.1.3.4 **Wind Conditions**

Based on a 28-year period of record, the LCD summary for the Victoria, Texas, NWS station (Table 2.7-2) indicates that the annual prevailing wind direction (i.e., the direction from which the wind blows most often) is from 170 degrees (i.e., south-southeasterly). Monthly prevailing winds are from the south-southeast or south-southwest during the spring and summer (March through August), while from the north during mid-autumn through the winter (October through February) (NCDC Jun 2008b). These characteristics are further enhanced by the establishment of the Bermuda High in the summer and the passage of northerly cold fronts beginning in mid-autumn and continuing through the winter (see Subsection 2.7.1.2).

Based on a 24-year period of record, the LCD summary shows an annual mean wind speed of 9.5 miles per hour. On a seasonal basis, the highest average wind speeds occur during the spring (approximately 10.8 mph) and are lowest during the summer and autumn months (8.6 and 8.7 mph, respectively). On average, the LCD indicates that the highest monthly average wind speed (11.0 mph) occurs during April (NCDC Jun 2008b).

Characteristics of extreme wind conditions for design basis purposes are described in Subsection 2.7.3.2. Wind data summaries, based on measurements from the onsite pre-application phase meteorological monitoring program are described in Subsections 2.7.4.2 and 2.7.4.3.

2.7.2 **Air Quality**

This subsection addresses current ambient air quality conditions in the VCS site area and region (e.g., the compliance status of various air pollutants) that have a bearing on plant design, construction, and operating basis considerations (Subsection 2.7.2.1). It also cross-references other subsections that address the types and characteristics of nonradiological emission sources associated with plant construction and operation and the expected impacts associated with those activities (Subsection 2.7.2.2), and characterizes conditions (from a climatological standpoint) in the site area and region that may be restrictive to atmospheric dispersion (Subsection 2.7.2.3).

2.7.2.1 **Regional Air Quality Conditions**

The VCS site is located within the Corpus Christi-Victoria Intrastate Air Quality Control Region (AQCR), which includes Aransas, Bee, Brooks, Calhoun, DeWitt, Duval, Goliad, Gonzales, Jackson, Jim Wells, Kenedy, Kleberg, Lavaca, Live Oak, McMullen, Nueces, Refugio, San Patricio, and Victoria counties (40 CFR 81.136). Attainment areas are areas where the ambient levels of criteria air pollutants are designated as being “better than,” “unclassifiable/attainment,” or “cannot be classified or better than” the EPA-promulgated National Ambient Air Quality Standards (NAAQS). Criteria pollutants are those for which NAAQS have been established: sulfur dioxide, particulate matter (i.e., PM_{10} and $PM_{2.5}$, which are particles with nominal aerodynamic diameters less than or equal to 10.0 and 2.5 microns, respectively), carbon monoxide, nitrogen dioxide, ozone, and lead (40 CFR 50).

The Corpus Christi-Victoria Intrastate AQCR is in attainment for all criteria air pollutants except lead, which is undesignated (40 CFR 81.344).

There are no pristine areas designated as “Mandatory Class I Federal Areas Where Visibility is an Important Value” that are located within 100 miles of the VCS site. The Big Bend National Park is the closest Class I area (40 CFR 81.429) located approximately 355 miles west of the VCS site.

2.7.2.2 **Projected Air Quality Conditions**

The nuclear steam supply systems and other related radiological systems are not sources of criteria pollutants or other toxic air emissions. Supporting equipment (e.g., diesel generators, combustion turbines, and auxiliary boilers), and other nonradiological emission-generating sources (e.g., storage tanks and related equipment) or activities are not expected to be a significant source of criteria pollutant emissions.

Emergency equipment will only be operated on an intermittent test or emergency-use basis. Therefore, these emission sources will not be expected to affect ambient air quality levels in the vicinity of the VCS site, nor will they be anticipated to be a significant factor in the design and operating bases of VCS. Sections 4.7 and 5.11 evaluate proposed projects with the potential to affect air quality in the Corpus Christi-Victoria AQCR. Likewise, because of the relatively long distance of separation from the VCS site, visibility at any Class I Federal Areas will not be expected to be significantly affected by project construction and facility operations.

Emission-generating sources and activities related to construction of the VCS, potential impacts, and mitigation measures are addressed in Subsection 4.4.1.3. Nonradiological emission-generating sources associated with routine facility operations are described further in Subsection 3.6.3.1. Characteristics of these emission sources and the potential effects on air quality and visibility associated with their operation are addressed under Subsection 5.8.1.

2.7.2.3 **Restrictive Dispersion Conditions**

Atmospheric dispersion can be described as the transport and diffusion of effluents released into the atmosphere. Horizontal and along-wind dispersion is controlled primarily by wind direction variation, wind speed, and atmospheric stability. Subsection 2.7.4.2 addresses wind characteristics for the VCS site vicinity based on measurements from the pre-application phase, onsite meteorological monitoring program. The persistence of those wind conditions is described in Subsection 2.7.4.3.

In general, lower wind speeds represent less turbulent air flow, which is restrictive to both horizontal and vertical dispersion. Wind direction tends to be more variable under lower wind speed conditions (which increases horizontal dispersion); however, air parcels containing pollutants are often recirculated within a limited area, thereby increasing cumulative exposure.

Major air pollution episodes are usually related to the presence of stagnating high-pressure weather systems (or anti-cyclones) that influence a region with light and variable wind conditions for four consecutive days or more. An updated air stagnation climatology has been published with data for the continental United States based on more than 50 years of observations, from 1948 through 1998 (Wang and Angell Apr 1999). In this study, stagnation conditions were defined as 4 or more consecutive days when meteorological conditions were conducive to poor dispersion. Although interannual frequency varies, the data in Figures 1 and 2 of that report indicates that on average, the VCS site region can expect approximately 30 days per year with stagnation conditions, or approximately five to six cases per year, with a mean duration of approximately 5 days for each case (Wang and Angell Apr 1999).

Air stagnation conditions primarily occur during an “extended” summer season (May through October). This is a result of the weaker pressure and temperature gradients, and therefore weaker wind circulations, during this period (as opposed to the winter season). Based on Figures 17 to 67 in Wang and Angell (Apr 1999), the highest incidence of air stagnation is recorded between July and September, typically reaching its peak during August, when the Bermuda High pressure system has become established. As the LCD summary for Victoria, Texas, in Table 2.7-2 indicates, this 3-month period coincides with the lowest monthly mean wind speeds during the year. Air stagnation is at a relative minimum within this “extended” summer season during May and June (Wang and Angell Apr 1999).

An interactive, spatial database developed by the U.S. Department of Agriculture Forest Service, referred to as the Ventilation Climate Information System, is readily available and provides both monthly and annual graphical and tabular summaries of relevant dispersion-related characteristics (e.g., morning and afternoon modeled mixing heights, modeled surface wind speeds, and resultant ventilation indices) (USDA Oct 2007). The system, although developed primarily for fire management and related air quality purposes, extends the period of record to climatologically representative durations of 30 to 40 years, depending on the parameter.

Table 2.7-5 summarizes minimum, maximum, and mean morning and afternoon mixing heights, surface wind speeds, and ventilation indices on a monthly, seasonal, and annual basis for the VCS site area. As atmospheric sounding measurements are still only made from a relatively small number of observation stations, these statistics represent model-derived values within the interactive database for a specific location (USDA Apr 2003), in this case, the VCS site. The seasonal and annual values listed in Table 2.7-5 were derived as weighted means based on the corresponding monthly values.

From a climatological standpoint, the lowest mean morning mixing heights occur in the autumn, and the highest mean morning mixing heights occur during the spring. As might be expected, mean afternoon mixing heights reach a seasonal minimum in the winter and a maximum during the summer as the result of more intense summertime heating.

The wind speeds listed in Table 2.7-6, representing the VCS site area, are consistent with the LCD summary for Victoria, Texas (Table 2.7-2) although approximately 1 meter per second lower. Lower daily mean wind speeds (i.e., the average of the morning and afternoon mean values in Table 2.7-6) are shown to generally occur during the summer and autumn as in the LCD (USDA Oct 2007 and NCDC Jun 2008b). This period of minimum wind speeds also coincides with the “extended” summer season described by Wang and Angell (Apr 1999) that is characterized by relatively higher air stagnation conditions.

The ventilation index is based on the product of the wind speed and the mixing height. It uses surface winds instead of higher level winds, so the index values represent conservative estimates of ventilation potential. This is more indicative of the dispersion potential near the ground and, therefore, directly relevant to the release heights of the sources evaluated in Subsections 2.7.5 and 2.7.6.

Based on the classification system for ventilation indices (USDA Apr 2003), the morning ventilation indices for the VCS site area indicate “marginal” ventilation potential on an annual average basis with conditions rated as “fair” during the spring and “marginal” for the other three seasons (USDA Oct 2007); again, consistent with the characteristics reported by Wang and Angell (Apr 1999).

Ventilation indices markedly improve during the afternoon with conditions rated as “good” on an annual average basis and for all seasons except the winter which is classified as “fair” (USDA Oct 2007). Mean wind speeds do not vary significantly in the site area over the course of the year. As a result, the relatively better ventilation index classifications are attributable to the higher mixing height values, which, for the summer and autumn seasons, tend to mask the general potential for more restrictive dispersion conditions during the “extended” summer referred to by Wang and Angell (Apr 1999). Nevertheless, the decrease in the ventilation index values between the summer and autumn is still evident and consistent with the monthly variations for air stagnation potential described previously.

2.7.3 **Severe Weather**

This subsection addresses severe weather phenomena that affect the VCS site area and region and that are considered in the design and operating bases for the plant. These include:

- The frequencies of thunderstorms and lightning (Subsection 2.7.3.1)
- Observed and probabilistic extreme wind conditions (Subsection 2.7.3.2)
- Tornadoes and related wind and pressure characteristics (Subsection 2.7.3.3)
- The frequency and magnitude of hail, snowstorms, and ice storms (Subsection 2.7.3.4)
- Tropical cyclones and related effects (Subsection 2.7.3.5)

- Droughts and dust (sand) storms (Subsection 2.7.3.6)

2.7.3.1 Thunderstorms and Lightning

Thunderstorms can occur in the VCS site area at any time during the year. Based on a 48-year period of record, Victoria, Texas, averages approximately 56 thunderstorm-days (i.e., days on which thunder is heard at an observing station) per year. On average, August has the highest monthly frequency of occurrence, approximately 10 days. Annually, more than half (approximately 57 percent) of thunderstorm-days are recorded between early summer and early autumn (i.e., from June through September). From November through February, a thunderstorm might be expected to occur approximately 2 days per month (NCDC Jun 2008b).

The mean frequency of lightning strokes to earth can be estimated using a method attributed to the Electric Power Research Institute, as reported by the U.S. Department of Agriculture Rural Utilities Service in the publication titled *Summary of Items of Engineering Interest* (USDA Aug 1998). This methodology assumes a relationship between the average number of thunderstorm-days per year (***T***) and the number of lightning strokes to earth per square mile per year (***N***), where:

$$N = 0.31T$$

Based on the average number of thunderstorm-days per year at Victoria, Texas (i.e., 56, see Table 2.7-2), the frequency of lightning strokes to earth per square mile is approximately 17 per year for the VCS site area. This frequency is essentially equivalent to the mean of the 10-year (1989 to 1999) lightning flash density for the area that includes the VCS site, as reported by the NWS (six to eight flashes per square kilometer per year [NSSL 2006]) and, therefore, is considered to be a reasonable indicator.

The VCS power block area is a rectangular area that encompasses all units and covers approximately 77.9 acres, or 0.122 square mile (mi^2). Given the estimated annual average frequency of lightning strokes to earth in the VCS site area, the frequency of lightning strokes in the power block area can be estimated as follows:

(17 lightning strokes/mi^2/year) x (0.122 mi^2) = 2.07 lightning strokes/year, or approximately twice each year.

2.7.3.2 Extreme Winds

The frequency of peak wind speed gusts can be characterized from information in the *Climate Atlas of the United States* (NCDC Sep 2002), which is based on observations made over the 30-year period of record from 1961 to 1990. Frequencies of occurrence were developed from values reported as the 5-second peak gust for the day. Mean annual occurrences of peak gusts greater than or equal to 50 mph, 40 mph, and 30 mph in the VCS site area range between 1.5 and 2.4 days per year, 9.5 and 20.4 days per year, and 60.5 and 80.4 days per year, respectively.

Estimating the wind loading on plant structures for design and operating bases considers the “basic” wind speed, which is the “3-second gust speed at 33 feet (10 meters) above the ground in Exposure Category C,” as defined in Sections 6.2 and 6.3 of the ASCE-SEI design standard, *Minimum Design Loads for Buildings and Other Structures* (ASCE 2005).

The "basic" windspeed is approximately 113 mph, as estimated by linear interpolation from the plot of basic wind speeds in Figure 6-1A of ASCE 7-05 for that portion of the United States that includes the VCS site. The site is located in a hurricane-prone region as defined in Section 6.2 of the ASCE-SEI design standard. This value is associated with a mean recurrence interval of 50 years. Section C6.0 (Table C6-3) of the ASCE-SEI design standard provides conversion factors for estimating the 3-second gust wind speeds for other recurrence intervals. Based on this guidance, the 100-year return period value is determined by multiplying the 50-year return period value by a factor of 1.07, which yields a 100-year return period 3-second gust wind speed for the site of approximately 121 mph.

The National Oceanic and Atmospheric Administration’s Coastal Services Center (NOAA-CSC) provides a comprehensive historical database, extending from 1851 through 2009, of tropical cyclone tracks based on information compiled by the National Hurricane Center. This database indicates that a total of 61 tropical cyclone storm tracks have passed within a 100-nautical-mile radius of the VCS site during this historical period (NOAA-CSC Sep 2009). The maximum wind speed observed in the site region was from an unnamed storm in 1886. The peak 1-minute wind speed for the storm is reported as 155 mph. This is similar to peak winds observed inland during Hurricane Carla (September 1961) and Hurricane Celia (180 mph adjusted for increased surface roughness to 154 mph inland, August 1970) (NOAA-CSC Sep 2009, NCDC Jun 2004, U.S. Weather Bureau 1961).

2.7.3.3 **Tornadoes**

Based on Figure 1 of RG 1.76 and the coordinates for the power block area, the VCS site is located within Tornado Intensity Region II. Accordingly, the design basis tornado characteristics for Tornado Intensity Region II (U.S. NRC Mar 2007a) have been applied to the VCS site and are:

- Maximum wind speed = 200 mph
- Translational speed = 40 mph
- Maximum rotational speed = 160 mph

- Radius of maximum rotational speed = 150 feet
- Pressure drop = 0.9 pounds per square inch (psi)
- Rate of pressure drop = 0.4 psi per second

Revision 1 of RG 1.76 retains the 10^{-7} exceedance probability for tornado wind speeds, the same as the original version of that regulatory guide. Revision 2 of NUREG/CR-4461 (U.S. NRC Feb 2007) describes the relationship between the previous use of the original Fujita scale of wind speed ranges for different tornado intensity classifications and the enhanced Fujita scale wind speed ranges in the revised analysis of tornado characteristics. That document was the basis for most of the technical revisions to RG 1.76.

Tornadoes observed within a 2-degree latitude and longitude square, centered on the VCS site, are used to characterize their frequency of occurrence from a climatological standpoint. Data was obtained from the NCDC *Storm Events* database of tornado occurrences by location, date, and time; starting and ending coordinates; Fujita-scale wind speed classification (or F-scale); Pearson-scale path length and path-width dimensions (or P-scale); and other storm-related statistics (NCDC Jun 2008a).

The 2-degree square area for this evaluation includes all or portions of 25 counties in Texas. All tornado occurrences for a given county were included, even if some portion of the county was not within the 2-degree latitude/longitude square. Through the nearly 58-year period from 1950 through September 2007, the records in the database indicate that a total of 784 tornadoes occurred in one of these counties (NCDC Jun 2008a).

Tornado F-scale classifications and respective frequencies of occurrence are as follows:

- F5 = 0
- F4 = 1
- F3 = 23
- F2 = 81
- F1 = 230
- F0 = 372

An additional 77 tornadoes were not assigned an F-scale in the *Storm Events* database (NCDC Jun 2008a) and are therefore assumed to be comparable to an F0 classification.

Tornadoes have occurred in the VCS site area during all months of the year, with nearly identical peak frequencies in the autumn and spring (approximately 36 percent and 33 percent, respectively). On a monthly basis, the greatest number of events has been recorded in September (160), followed by the second-highest count during the month of May (146). Together, they comprise 39 percent of the tornadoes that occur annually in the site area. Fewer than 10 percent of all tornadoes have occurred during the winter months (NCDC Jun 2008a).

2.7.3.4 **Hail, Snowstorms, and Ice Storms**

Frozen precipitation in the VCS site region typically occurs in the form of hail, snow, sleet, and freezing rain. The frequency and characteristics of these types of weather events are based on the following two references: the latest version of *The Climate Atlas of the United States* (NCDC Sep 2002), which has been developed from observations made over the 30-year period of record from 1961 to 1990, and the NCDC *Storm Events* database for Texas (NCDC Apr 2008) based on observations for the period of January 1950 to March 2007.

Hail can occur at any time of the year in the site area and is associated with intense thunderstorms. It is observed primarily during the late winter through early summer months (February through June), reaching a peak during May and April, and occurring least often from mid-summer into early autumn (July through September) (NCDC Apr 2008).

The *Climate Atlas* (NCDC Sep 2002) indicates that the northern two-thirds of Victoria County and most of DeWitt County to the northwest can expect, on average, hail with diameters 0.75 inch or greater approximately 1 to 2 days per year. The *Climate Atlas* also shows a similar frequency in smaller portions of the adjacent or nearby Goliad, Karnes, Jackson, Bee, and San Patricio counties. However, a relatively lower frequency is indicated for most of the area in these counties. Other nearby counties of Matagorda, Calhoun, Refugio, and Aransas, which are directly adjacent to the Gulf of Mexico, can expect 0.75-inch or greater hail approximately 1 day or fewer per year. The *Climate Atlas* indicates that the occurrence of hail with diameters greater than or equal to 1.0 inch is relatively less frequent over the site area (NCDC Sep 2002).

Hailstorms are point observations and biased by population density. This may explain the areal extent of higher frequencies around Victoria and the eastern half of DeWitt County and what could be interpreted as generally lower frequencies of occurrence in other nearby counties not directly adjacent to the Gulf of Mexico. A decrease in frequency toward the coast appears to be reasonable. The slightly higher annual mean frequency of approximately 1 to 2 days per year with hail larger than or equal to 0.75 inch in diameter is considered to be a representative indicator for the VCS site.

Hailstorms within Victoria and surrounding counties have generally reported maximum hailstone diameters ranging between 2.0 and 4.5 inches. Golfball-sized hail (approximately 1.75 inches in diameter) is not a rare occurrence and has been observed numerous times in the site area (NCDC Apr 2008). However, in terms of extreme hailstorms, the NCDC *Storm Events* database indicates that grapefruit- to softball-sized hail (approximately 4.0 to 4.5 inches in diameter, respectively) was observed on three occasions within 50 miles of the VCS site:

- April 11, 1995 (4.5 inches), Calhoun County, approximately 30 miles to the southeast of the VCS site
- February 19, 1991 (4.5 inches), DeWitt County, approximately 45 miles to the north-northwest
- May 25, 1961 (4.0 inches), Lavaca County, approximately 40 miles to the north-northwest

From central Texas southward, most winters bring no accumulation of snow. Snowstorms occur only once every few decades, but no corner of the state is immune (USU Jun 2008). Any accumulation of snow is a rare occurrence in the Upper Coast climate division where the VCS site is located, with normal annual totals at all listed nearby observing stations averaging less than 0.5 inch (see Table 2.7-3). Historical records for the site area indicate that maximum 24-hour and monthly snowfalls have occurred during the months of November through February (see Table 2.7-4). The *Climate Atlas* (NCDC Sep 2002) indicates that the occurrence of snowfalls 0.1 inch or greater in the VCS site area average less than 1 day per year (see also Table 2.7-2). Additional details regarding maximum 24-hour and cumulative monthly record snowfall totals are given in Subsection 2.7.4.1.3.

Depending on the temperature characteristics of the air mass, snow events are often accompanied by, or alternate between, sleet and freezing rain as the weather system traverses the VCS site region. In most cases, freezing rain results from the process of warm moist air “overrunning” colder air and is caused by rain falling into a relatively shallow layer of cold air with temperatures either at or just below the freezing point. Arctic air masses that reach the Upper Coast climate division in the winter season are typically very shallow and have been known to produce ice storms. The *Climate Atlas* (NCDC Sep 2002) indicates that, on average, freezing precipitation occurs approximately 3 to 5 days per year in the area that includes the VCS site.

From an operational standpoint, ice storm effects often include hazardous driving conditions, and occasionally downed trees and power lines as the result of ice buildup on these surfaces. The NCDC *Storm Data* and *Storm Events* summaries (NCDC Jun 2004 and NCDC Apr 2008, respectively) for the VCS site area frequently do not include statements of ice accumulation, which suggests that the amounts are light.

2.7.3.5 Tropical Cyclones

Tropical cyclones include not only hurricanes and tropical storms, but systems classified as tropical depressions, subtropical storms, subtropical depressions, and extratropical storms. This characterization considers all “tropical cyclones” (rather than systems classified only as hurricanes and tropical storms) because storm classifications are generally downgraded once landfall occurs and the system weakens, although they may still result in significant rainfall and extreme wind events as they travel through the site region.

Storm classifications and respective frequencies of occurrence over this 158-year period of record (1851–2008) are as follows:

- Hurricanes: Category 5 (1), Category 4 (4), Category 3 (5), Category 2 (6), Category 1 (16)
- Tropical storms: 23
- Tropical depressions: 6
- Subtropical storms: 0
- Subtropical depressions: 0
- Extratropical storms: 0

Wind speeds (1-minute average) corresponding to each of the Saffir-Simpson Hurricane Categories are listed below:

Hurricane Classification	Wind Speed (mph)
Category 1	74–95
Category 2	96–110
Category 3	111–130
Category 4	131–155
Category 5	>155

Tropical cyclones within this 100-nautical-mile radius have occurred as early as June and as late as October, with the highest frequency (18 out of 61 events) recorded during September, including all classifications at and above Tropical Depression status. June, July, and August account for 13, 12, and 14 events, respectively. Tropical storms have occurred in all months from June to October.

During the months of June through September, hurricanes occur with similar frequency (7, 5, 7, and 8, respectively). The only Category 5 hurricane to track within 100 nautical miles of the VCS site was Hurricane Carla in September 1961. Of the four Category 4 hurricanes that have occurred within this radial distance, three were recorded in August, and one was recorded in September. Two Category 3 hurricanes have occurred in September and one each in July, August, and October. Most major hurricanes in the site area have occurred from mid- to late-summer (NOAA-CSC Sep 2009).

Tropical cyclones are responsible for at least 16 separate rainfall records among the 15 NWS and cooperative observer network stations listed in Table 2.7-1: four 24-hour (daily) rainfall totals and 12 monthly rainfall totals (see Table 2.7-4). In late June 1960, two 24-hour records were set at the Maurbro and Point Comfort cooperative observing stations as the result of an unnamed tropical storm (14.80 inches and 14.65 inches, respectively). Rainfall associated with Hurricane Beulah in late September 1967, whose track did not pass within 100 nautical miles of the VCS site, nevertheless, resulted in historical 24-hour maximum totals of 10.61 inches at the Beeville 5 NE station and 9.16 inches at the Goliad observing station (NCDC Jul 2005, USU Jun 2008, NCDC Nov 2002, and NOAA-CSC Sep 2009).

Monthly station records were established because of partial contributions from the following tropical cyclones (NCDC Jun 2008b, NCDC Jul 2005, USU Jun 2008, NCDC Nov 2002, NOAA-CSC Sep 2009, and NCDC Jun 2008d):

- Hurricane Fern in September 1971 (26.30 inches at Refugio)
- Hurricane Beulah in September 1967 (25.59 inches at Sinton, 22.62 inches at Beeville 5 NE, 22.60 inches at Karnes City 2N, 22.19 inches at Goliad, 21.27 inches at Cuero, and 20.85 inches at Rockport)
- An unnamed tropical storm in June 1960 (25.24 inches at Point Comfort and 22.47 inches at Maurbro)
- An unnamed hurricane in October 1949 (24.28 inches at Palacios Municipal Airport)
- Tropical Storm Erin in July 2007 (22.65 inches at Aransas Wildlife Refuge and 20.35 inches at the Victoria Regional Airport)

As indicated above, significant amounts of rainfall can still be associated with a tropical cyclone once the system moves inland. Wind speed intensity, however, noticeably decreases as the system passes over land and is subjected to increased frictional forces. Examples of such effects, associated with some of the more intense tropical cyclones that have passed within 100 nautical miles of the VCS site are:

- Hurricane Carla (September 1961). The storm remained at hurricane strength as it crossed the area within 100 nautical miles of the VCS site. Carla rapidly decreased in intensity after moving onshore (having reached Category 5 status while offshore, but decreasing to a Category 3 hurricane at landfall). The storm was downgraded to Tropical Storm status just northeast of Austin, Texas. (NCDC-CSC Sep 2009; U.S. Weather Bureau Sep 1961).

- Hurricane Celia (August 1970). Celia crossed the Texas coastline approximately 50 miles south-southwest of the VCS site, between Corpus Christi and Aransas Pass. It remained a Category 3 hurricane for approximately 40 miles inland, decreasing to a Category 1 storm as it traversed the remainder of the area within 100 nautical miles of the site. Celia was downgraded to Tropical Storm status approximately 135 miles inland from the coast (NOAA-CSC Sep 2009; NCDC Jun 2004).

- Hurricane Claudette (July 2003). Hurricane Claudette (Category 1) struck the middle Texas coast near Port O'Connor with sustained winds estimated at approximately 90 mph. Claudette continued moving inland across Victoria, Goliad, and Bee counties, eventually weakening to a tropical storm. Maximum rainfall measurements were recorded in Bee, Goliad, and Refugio counties (NOAA-CSC Sep 2009, NCDC Jun 2008d).

2.7.3.6 Droughts and Dust (Sand) Storms

Droughts are prolonged periods of very dry weather, which cause serious water imbalances in the affected area. The Upper Coast climate division where the VCS site is located (see Subsection 2.7.1.2) is commonly affected by drought conditions. However, the most severe droughts occur in west and northwestern Texas where the southwestern desert of the United States extends (Bomar 1983). Subsection 2.3.1.1.1 describes the effect of droughts on the VCS site (water sources such as the Guadalupe River) and describes historical low water conditions from droughts and their frequencies.

Dust storms predominantly originate in normally arable regions during periods of drought where dust and sand layers are loosened. Dust storms in the upper coastal region of Texas are very rare because of the lush grasslands and small interspersed pine and oak thickets. Severely reduced visibilities because of large-scale dust storms in Texas occur on average only once every 3 to 5 years (Bomar 1983). The NCDC *Storm Events* database indicates no occurrences of dust storms near the VCS site since 1993 (NCDC Jun 2008c).

2.7.4 Local Meteorology

Data acquired by the NWS at its Victoria and Palacios, Texas, first-order stations and from 13 other nearby locations in its network of cooperative observer stations, as compiled and summarized by the

NCDC and the Utah State GIS Climate Search (USU Jun 2008; NCDC Nov 2002, NCDC Jul 2006, NCDC Jun 2008b), are used to characterize normals, and period-of-record means and extremes of temperature, rainfall, and snowfall in the vicinity of the VCS site. Subsection 2.7.1.1 identifies the sources of these climatological summaries and other data resources. The approximate distances and directions of these climatological observing stations relative to the site are listed in Table 2.7-1; their locations are shown in Figure 2.7-1.

As indicated in Subsection 2.7.1.1, first-order NWS stations also record measurements on an hourly basis of other weather elements, including winds, relative humidity, dew point and wet bulb temperatures, barometric pressure, and other observations when those conditions occur (e.g., fog, thunderstorms).

Besides using data from these nearby climatological observing stations, measurements from the tower-mounted meteorological monitoring system that currently supports the VCS site are also used to characterize dispersion conditions in support of this ESP application. Refer to Subsections 6.4.2 and 6.4.3 for a description of relevant details about this pre-application monitoring program, including tower location, terrain features and elevations in the vicinity of the proposed site, instrumentation and measurement levels, data recording and processing, and system operation, maintenance, and calibration activities.

2.7.4.1 **Normal, Mean, and Extreme Values**

Subsection 2.7.1.3 summarizes normals, and period-of-record means and extremes for several standard weather elements (temperature, atmospheric water vapor, precipitation, and wind conditions).

To substantiate that mean and extreme values at these stations (based on their long-term records of observations) are representative of conditions that might be expected at the VCS site, this subsection provides additional details regarding the individual station records from which the values presented in Subsection 2.7.1.3 were obtained.

Historical extremes of temperature, rainfall, and snowfall are listed in Table 2.7-4 for the 15 NWS and cooperative observing stations in the VCS site area.

2.7.4.1.1 **Temperature**

Characteristics of the normal daily maximum and minimum temperatures, the daily mean temperatures, and the diurnal temperature ranges for 13 of the 15 nearby climatological observing stations that make such measurements are described in Subsection 2.7.1.3.1 and presented in Table 2.7-3. The overall maximum and minimum temperature extremes observed in the VCS site area are summarized in Subsection 2.7.1.3.1 as well.

Extreme maximum temperatures recorded in the vicinity of the VCS site have ranged from 103°F to 113°F, with the highest reading observed at the Cuero cooperative station on September 5, 2000. As Table 2.7-4 and the accompanying notes show, individual station extreme maximum temperature records were set at multiple locations on the same or adjacent dates (e.g., Palacios Municipal Airport, Port O'Connor, Point Comfort, Yoakum, Rockport, Sinton, Victoria Regional Airport, Refugio 2 NW, and Karnes City 2N on September 5 and 6, 2000) (NCDC Jul 2005; NCDC Nov 2002; NCDC Jul 2006; USU Jun 2008).

Extreme minimum temperatures in the vicinity of the VCS site have ranged from 6°F to 12°F, with the lowest reading on record observed at the Yoakum cooperative station (approximately 46 miles to the north) on December 23, 1989. More noteworthy, though, Table 2.7-4 and the accompanying notes indicate that record low temperatures were also set at Palacios Municipal Airport, Port O'Connor, Point Comfort, Cuero, Sinton, Aransas Wildlife Refuge, Victoria Regional Airport, and Karnes City 2N on the same date (NCDC Jul 2005; NCDC Nov 2002; NCDC Jul 2006; USU Jun 2008).

The extreme maximum and minimum temperature data indicates that synoptic-scale conditions responsible for periods of record-setting excessive heat, as well as significant cold air outbreaks, tend to affect the overall VCS site area. The similarity of the respective extremes and their dates of occurrence suggest that these statistics are reasonably representative of the temperature extremes that might be expected to be observed for the VCS site region.

2.7.4.1.2 **Atmospheric Water Vapor**

Annual, seasonal, and monthly characteristics of the wet bulb and dew point temperatures, along with relative humidity (including diurnal variations), based on measurements at the nearby Victoria, Texas, NWS station, are described in Subsection 2.7.1.3.2.

2.7.4.1.3 **Precipitation**

Characteristics of the normal (30-year average) annual rainfall and snowfall totals are described in Subsection 2.7.1.3.3 and presented in Table 2.7-3. The overall maximum daily and monthly totals observed in the VCS site area for these forms of precipitation are summarized in Subsection 2.7.1.3.3 as well.

Precipitation is a point measurement. Mean and extreme statistics, such as individual storm event, or daily or cumulative monthly totals vary from station to station. Assessing the variability of precipitation extremes over the VCS site area to evaluate whether the available long-term data is representative of conditions at the site depends greatly on station coverage.

Historical precipitation extremes (rainfall and snowfall) are presented in Table 2.7-4 for the 15 nearby climatological observing stations listed in Table 2.7-1. Maximum recorded 24-hour rainfall totals range from 8.15 inches at the Rockport station, approximately 40 miles south of the VCS site, to 17.58 inches at the Edna Highway 59 Bridge observing station, approximately 32 miles to the northeast (NCDC Jul 2005; NCDC Nov 2002; NCDC Jul 2006; USU Jun 2008). Maximum monthly rainfall totals range from 18.33 inches at Yoakum, approximately 46 miles to the north, to 26.30 inches at the Refugio observing station, approximately 25 miles to the southwest (NCDC Jul 2005; NCDC Nov 2002; NCDC Jul 2006; USU Jun 2008; NCDC Jun 2008d; NCDC 2008c).

Most of the individual station monthly rainfall records (and to a lesser extent the 24-hour record totals) were established as a result of precipitation associated with tropical cyclones. Of those records, half were because of tropical cyclones that passed within a 100-nautical-mile radius of the VCS site. The other half (i.e., six monthly totals and two 24-hour totals) were attributable to the expansive influence of Hurricane Beulah, which did not pass within that radial distance of the site.

However, the overall highest 24-hour rainfall total in the site area, 17.58 inches, on October 18, 1994, at the Edna Highway 59 Bridge cooperative observing station (USU Jun 2008) was not directly associated with a tropical cyclone. This extreme rainfall event was one of many over southeast Texas caused by a synoptic situation that included a steady stream of tropical moisture into the region in the wake of former Pacific Hurricane Rosa. The remnants of that storm crossed into Mexico, moved through Texas, and slowed after entering the Mississippi Valley. This system coupled with a quasi-stationary frontal boundary along the Texas Coast that provided a source of lift and supported widespread and continual thunderstorm development (NCDC Jun 2004).

Similarly, the highest monthly rainfall total in the site area, 26.30 inches during September 1971, was recorded at the Refugio cooperative observing station (USU Jun 2008; NCDC Jun 2008c).

In general, when monthly rainfall records were established at a given observing station, regardless of their cause(s), significant amounts of precipitation were usually measured at most of the other stations in the site area, particularly when associated with the passage of tropical cyclones. This is usually not the case for maximum 24-hour rainfall records because of the occurrence of more local-scale events such as thunderstorms and because of the intense nature of these storms in this coastal area. However, there does not appear to be any clear relationship between the rainfall recorded during such extreme events, whether on a 24-hour or monthly basis, and the distance inland within the area considered around the VCS site (Figure 2.7-1). Therefore, based on the range of the maximum recorded 24-hour and monthly rainfall totals among these stations, the areal distribution of these climatological observing stations around the site, and their proximity to the site, data suggests that rainfall extremes close to the upper limits of the respective maxima can reasonably be expected to occur at the VCS site.

From central Texas southward, most winters bring no accumulation of snowfall. Major snowstorms occur only once every few decades, but no corner of the state is immune (USU Jun 2008). Among the 15 nearby observing stations listed in Table 2.7-4, 7 of the 24-hour maximum snowfall records were established as a result of the Christmas storm of 2004 occurring on December 24–25. The highest, 12.0 inches, was measured at the Goliad observing station approximately 22 miles to the west of the VCS site. Other station records on this date range from 4.5 inches at Beeville 5 NE, approximately 42 miles west-southwest, to 9.5 inches at the Refugio 2 NW observing station, approximately 25 miles to the southwest (Table 2.7-4). Because of the rarity of such events in the site area, any of the record snowfall amounts listed in Table 2.7-4 can reasonably be expected to occur at the VCS site when such events do take place.

2.7.4.1.4 **Fog**

The closest station to the VCS site at which observations of fog are made and routinely recorded is the Victoria, Texas, NWS station approximately 17 miles to the north-northeast. The 2007 LCD summary for this station (Table 2.7-2) indicates an average of approximately 44 days per year of heavy fog conditions, based on a 43-year period of record. The NWS defines heavy fog as fog that reduces visibility to 1/4 mile or less (NCDC Jun 2008b).

On a seasonal basis, heavy fog conditions occur most often during the winter months (December through February), reaching peak frequency in January, averaging 7.2 days per month. Heavy fog conditions occur least often in the summer (i.e., June to August), averaging less than 1 day per month (NCDC Jun 2008b).

The frequency of heavy fog conditions at the VCS site would be expected to be very similar to the observations made at the Victoria, Texas, NWS station because of their close proximity to each other (approximately 17 miles). This is consistent with the higher frequency of occurrence reported in *The Climate Atlas of the United States* (NCDC Sep 2002), which indicates an annual average frequency of 35.5 to 40 days per year in the area that includes both Victoria, Texas, and the VCS site. The seasonal variation in *The Climate Atlas* is very similar to that in the 2007 LCD for the Victoria NWS station (NCDC Jun 2008b; NCDC Sep 2002).

Enhancement of naturally occurring fog conditions as the result of the cooling basin and mechanical draft cooling towers associated with the VCS site is addressed in Subsection 5.3.3.

2.7.4.2 **Average Wind Direction and Wind Speed Conditions**

Long-term average wind motions at the macro- and synoptic scales (on the order of thousands to hundreds of kilometers) are influenced by the general circulation patterns of the atmosphere at the macroscale and by large-scale topographic features (e.g., land-water interfaces such as coastal areas). These characteristics are presented in Subsection 2.7.1.2.

Although they may reflect these larger-scale circulation effects, site-specific or microscale (on the order of 2 kilometers or less) wind conditions are influenced primarily by local and, to a lesser extent (in general), by meso- or regional-scale (up to approximately 200 kilometers) topographic features. Wind measurements at these smaller scales are currently available from the onsite, pre-application phase meteorological monitoring program operated in support of the proposed VCS site and, for comparison, from data recorded at the nearby Victoria, Texas, NWS station.

Subsections 6.4.2 and 6.4.3 describe the pre-application phase monitoring program. Wind direction and wind speed measurements were made at two levels on a 60-meter instrumented tower (at 10 meters and 60 meters). The monitoring program began operation on June 28, 2007.

Figures 2.7-2 through 2.7-6 present annual and seasonal wind rose plots, for the 10-meter level based on measurements over the 2-year period of record from July 1, 2007 through June 30, 2009.

The wind direction distribution at the 10-meter level indicates a prevailing wind from the south-southeast on an annual basis with approximately 50 percent of the winds blowing from the southeast quadrant (see Figure 2.7-2). Winds from the north and north-northeast sectors combined occur approximately 18 percent of the time annually.

On a seasonal basis, winds from the southeast quadrant appear to predominate throughout the year, but especially during the spring and summer (see Figures 2.7-4 and 2.7-5). During the winter, winds from the north sector become more prevalent (see Figure 2.7-3). Autumn represents a transitional season in that winds from the northeast and southeast quadrants occur with about the same frequency as north to northeasterly flow increases as the result of increased cold frontal passages (Figure 2.7-6); winds from the north sector increase in frequency during this season as well. Plots of individual monthly wind roses at the 10-meter measurement level are presented in Figure 2.7-7, Sheets 1 to 12.

Annual and seasonal wind rose plots from the 60-meter level are shown in Figures 2.7-8 through 2.7-12. By comparison, wind direction distributions for the 60-meter level are similar to the 10-meter level wind roses on an annual basis, and for the winter, spring, and summer seasons in terms of the predominant directional quadrants and variation over the course of the year. Autumn differs in that winds from the southeast quadrant clearly occur more often at the 60-meter level than at the 10-meter level, where the aggregate frequencies from the northeast and southeast quadrants appear to be similar. Plots of individual monthly wind roses at the 60-meter measurement level are presented in Figure 2.7-13, Sheets 1 to 12.

Wind data summarized in the LCD for the Victoria, Texas, NWS station (Table 2.7-2) indicates a prevailing south-southeasterly wind direction on an annual basis, as well as seasonal variations (NCDC Jun 2008b), that appear to be reasonably similar to the 10-meter-level wind flow at the VCS site. Differences between the two wind direction distributions are attributable to many factors: topographic setting, sensor exposure, instrument starting threshold, and period of record.

Table 2.7-6 summarizes seasonal and annual mean wind speeds based on measurements from the upper and lower levels of the onsite meteorological tower over the 2-year period from July 1, 2007 through June 30, 2009, and from instrumentation at the Victoria, Texas, NWS station based on a 24-year period of record (NCDC Jun 2008b). The height of the instruments at the Victoria NWS station is reasonably comparable to the lower (10-meter) level measurements at the VCS site.

On an annual basis, mean wind speeds at the 10- and 60-meter levels are 4.0 and 6.1 meters per second, respectively, at the VCS site. The annual mean wind speed at Victoria (4.2 meters per second) is similar to the 10-meter level at the VCS site, differing by only 0.2 meters per second. Seasonal average wind speeds are similar throughout the year, except during autumn when speeds average approximately 0.7 meters per second lower at the VCS site than at Victoria. Seasonal mean wind speeds for both locations follow the same pattern, described in Subsection 2.7.2.3, in relation to the seasonal variation of relatively higher air stagnation and restrictive dispersion conditions in the site region.

Only 33 occurrences of calm wind conditions were recorded by the onsite meteorological monitoring system at the 10-meter level, and only 6 occurrences at the 60-meter level, over the 2-year period from July 1, 2007 through June 30, 2009.

2.7.4.3 **Wind Direction Persistence**

Wind direction persistence is an indicator of the duration of atmospheric transport from a specific sector to a corresponding downwind sector-width. Atmospheric dilution is directly proportional to the wind speed (other factors remaining constant). When combined with wind speed, a wind direction persistence/wind speed distribution further indicates the downwind sectors with relatively more or less dilution potential (higher or lower wind speeds, respectively) associated with a given wind direction.

Tables 2.7-7 and 2.7-8 present wind direction persistence/wind speed distributions based on measurements from the VCS pre-application phase monitoring program for the two year period of record from July 1, 2007, through June 30, 2009. The distributions account for discrete durations ranging between 1 and 48 hours for wind directions from 22.5-degree upwind sectors centered on each of the 16 standard compass radials (i.e., north, north-northeast, northeast, etc.) and for wind speed groups greater than or equal to 5, 10, 15, 20, 25, and 30 mph. Distributions are provided for wind measurements made at the lower (10-meter) and the upper (60-meter) tower levels, respectively, identified in the preceding subsection. Except the first discrete value (1), all other discrete values are the upper limits of the durations. For example, 18 stands for $12 < \text{hour} \leq 18$;

therefore, any hour counts identified within this range means the longest persistence period is at least 12 hours.

Two individual years (July 01, 2007 through June 30, 2008 and July 01, 2008 through June 30, 2009) of the wind direction persistence tables for the 10-meter level are presented in Table 2.7-7, Sheets 1 through 3 and 4 through 6, respectively. The 60-meter level wind direction persistence tables are presented in Table 2.7-8, Sheets 1 through 3 and 4 through 6, respectively.

2.7.4.4 Atmospheric Stability

Atmospheric stability is a relative indicator for the potential diffusion of pollutants released into the ambient air. Atmospheric stability, as addressed in this ER, was based on the delta-temperature (∆**T**) method described in Section 2.2 of Revision 1 to RG 1.23 (U.S. NRC Mar 2007b).

Stability classifications are assigned according to the ∆T criteria provided in Table 1 of RG 1.23. The diffusion capacity is greatest for extremely unstable conditions and decreases progressively through the remaining unstable, neutral stability, and stable classifications.

During the 2-year period from July 1, 2007 through June 30, 2009, ∆**T** was determined from the difference between temperature measurements made at the 60- and 10-meter tower levels. Seasonal and annual frequencies of atmospheric stability class and associated 10-meter level mean wind speeds for this period of record are presented in Table 2.7-9.

The data indicates a predominance of neutral stability (Class D) and slightly stable (Class E) conditions throughout most of the year. These stability classes combined were recorded approximately 48 percent of the time on an annual basis, ranging seasonally from approximately 39 percent during autumn to approximately 55 percent during the winter. Extremely unstable conditions (Class A) were recorded slightly more than 8 percent of the time on an annual basis, occurring more frequently during the spring (approximately 12 percent of the time), and least often during the autumn (only approximately 4.5 percent of the time). Moderately and extremely stable conditions (Classes F and G, respectively) were recorded approximately 30 percent of the time on an annual basis, occurring most often during the autumn (approximately 43 percent of the time), owing in part to increased radiational cooling at night, and least often during the spring (approximately 21 percent of the time).

Joint frequency distributions (JFDs) of wind speed and wind direction by atmospheric stability class and for all stability classes combined for the 10- and 60-meter wind measurement levels are presented in Tables 2.7-10 and 2.7-11, respectively, based on the 2-year period of record from July 1, 2007 through June 30, 2009. The 10-meter level JFDs are used to evaluate short-term dispersion estimates for accidental atmospheric releases (see Subsection 2.7.5) and long-term diffusion estimates of routine releases to the atmosphere (see Subsection 2.7.6).

2.7.4.5 Topographic Description and Potential Modifications to Meteorological Conditions

The VCS site is located in Victoria County, Texas approximately 13 miles from the city of Victoria. The site is approximately 125 miles southwest of Houston and 60 miles north-northeast of Corpus Christi. The VCS site property encompasses approximately 11,500 acres. The power block area covers approximately 78 acres.

Terrain features within a 50-mile radius of the VCS site, based on digital map elevations, are illustrated in Figure 2.7-1. Terrain elevation profiles along each of the 16 standard 22.5-degree compass radials out to a distance of 50 miles from the site are shown in Figure 2.7-14 (Sheets 1 through 6). The locus of these radial lines is the "power block area reference point," which is approximately 250 feet south of the centroid of the power block area.

The nominal plant grade elevation for the power block area is 95 feet NAVD 88. Located within the south-central Texas Coastal Plain, terrain within 50 miles of the VCS site is generally flat to gently rolling with elevations decreasing to the east-northeast clockwise through the south-southwest. Elevations tend to increase to the west-southwest through the north-northeast with increasing distance from the site, with relief of up to approximately 450 feet relative to nominal plant grade. Figure 2.7-1 indicates that the highest elevation within 50 miles of the site is 550 feet above MSL (this spot elevation does not fall along one of the 16 standard direction radials presented in Figure 2.7-14). The lowest elevation within 50 miles of the site, 0 feet MSL (Gulf of Mexico and adjacent bay waters), occurs to the east through the south (Figures 2.7-1 and 2.7-14).

More detailed topographic features within a 5-mile radius of the VCS site, are shown in Figure 2.7-15. Terrain within this radial distance of the site primarily consists of flat plains with very little elevation change, relative to nominal plant grade.

Construction of the VCS site will include clearing, grubbing, excavation, leveling, and landscaping activities typical of large-scale projects (see Section 3.9 for a listing of activities and their estimated durations). The most prominent feature, however, in terms of land alteration associated with this facility, will be the excavation and construction of an approximately 4900-acre cooling water basin. Nevertheless, alterations to the existing terrain would not represent a significant change to the flat to gently rolling topographic character of the site vicinity or the surrounding site area (Figure 2.7-15).

Subsection 6.4.2 provides additional details regarding the considerations made in siting and equipping the meteorological tower installed for the pre-application phase monitoring program in relation to the construction of, and/or major structures associated with, the units.

The dimensions and operating characteristics of the facilities associated with the VCS site, including paved, concrete, or other improved surfaces, are considered to be insufficient to generate discernible, long-term effects to local- or microscale meteorological conditions, or to the mean and extreme climatological characteristics of the site area described previously under Subsections 2.7.1.3 and 2.7.4.1.

Wind flow will be altered in areas immediately adjacent to and downwind of larger site structures. These effects will likely dissipate within 10 structure heights downwind of the intervening structure(s). Similarly, although ambient temperatures immediately above any improved surfaces could increase, these temperature effects will be too limited in their vertical profile and horizontal extent to alter local, area-, or regional-scale mean or extreme ambient temperature patterns. See Subsections 6.4.2.4 and 6.4.2.5 for additional details.

The VCS site would use a cooling basin and mechanical draft cooling towers as a means of heat dissipation during normal operation. Potential meteorological effects resulting from the cooling basin and cooling towers could include enhanced ground-level fogging and icing, cloud shadowing and precipitation enhancement, and increased ground-level humidity. These effects are addressed in detail in Subsections 5.3.3.1 and 5.3.3.2.

2.7.5 **Short-Term Diffusion Estimates**

2.7.5.1 **Regulatory Basis and Technical Approach**

To evaluate potential health effects for design basis accidents, Section 7.1 of NUREG-1555 (U.S. NRC Mar 2000) specifically requires the applicant to account for the 50-percentile X/Q (relative concentration) values at appropriate distances from the release points of effluents to the atmosphere. These 50-percentile X/Q values are to be determined using onsite meteorological data and represent more realistic dispersion conditions for the VCS site area, relative to those presented in the site safety analysis report. The NRC-sponsored PAVAN model (NUREG/CR-2858) (U.S. NRC Nov 1982) has been used to generate these 50-percentile X/Q values.

Recent (July 1, 2007 through June 30, 2009) data from the VCS site pre-application meteorological monitoring program has been used for the quantitative evaluation of a design basis accident and atmospheric dispersion estimates at the proposed VCS site.

The PAVAN program implements the guidance provided in RG 1.145 (U.S. NRC Feb 1983). Mainly, the code computes X/Q values at the exclusion area boundary (EAB) and the boundary of the low population zone (LPZ) for each combination of wind speed and atmospheric stability class for each of 16 downwind direction sectors (i.e., north, north-northeast, northeast, etc.). The X/Q values calculated for each direction sector are then ranked in descending order, and an associated cumulative frequency distribution is derived based on the frequency distribution of wind speeds and stabilities for the complementary upwind direction sector (i.e., 180 degrees opposite). The X/Q values are also ranked independently of wind direction into a cumulative frequency distribution for the entire site.

The following input data and assumptions were used in the PAVAN modeling analysis:

- Meteorological data: 2-year (July 1, 2007 to June 30, 2009) onsite JFD of wind speed, wind direction, and atmospheric stability
- Wind sensor height: 10 meters
- Vertical temperature difference: as measured at the 10-meter and 60-meter levels of the onsite meteorological tower
- Number of wind speed categories: 12 (including calm and the 11 wind speed categories listed in Table 2.7-10)
- Type of release: ground level
- Release height: 10 meters (default height)
- Distances from release points to EAB for all downwind sectors
- Distances from release points to LPZ for all downwind sectors

The 2-year composite JFDs of wind speed, wind direction, and atmospheric stability class, input to the PAVAN dispersion modeling analysis, are presented in Table 2.7-10 (see also Subsection 2.7.4.4 for additional information).

The EAB for the VCS site is entirely contained within the site property line and is represented in Figure 2.7-17. No residential areas are located within this overall EAB.

As shown in Figure 2.7-17, the VCS site is conservatively treated as one unit when estimating the shortest distance to each boundary receptor in each direction. To represent the VCS site, a source boundary was created. Because the PAVAN model cannot produce 5 percent overall site limit X/Q values unless the distances from the release point to the EAB or LPZ are similar, the shortest distance from the source boundary to the LPZ was used for all 16 direction sectors (Figure 2.7-18).

For purposes of determining X/Qs and subsequent radiation doses with respect to the VCS, the EAB is represented by two 4000-foot-radius circle EABs combined into one oval EAB centered on the power block reference point (Figure 2.7-17). The LPZ boundary for the VCS site consists of one 5-mile-radius circle, centered at the power block reference point.

As NUREG/CR-2858 (U.S. NRC Nov 1982) indicates, ground-level releases include all release points or areas that are lower than two and one-half times the height of adjacent solid structures. It was assumed any reactor building plant stack would be below the threshold height. All accidental releases were assumed to be at ground level and were assigned the default release height of 10 meters. Compared with an elevated release, a ground-level release results in higher ground-level concentrations at downwind receptors as the result of shorter traveling distances.

The PAVAN model was also configured to calculate X/Q values assuming both wake credit allowed and wake credit not allowed. Obstructions to air flow have a wake region that extends 10 times the obstruction height downwind. The height is assumed to be 24.38 meters and the structural wake extends approximately 244 meters downwind. The EAB is at least 879 meters away from the source boundary. As a result, the entire EAB is located beyond the wake influence zone. Furthermore, the LPZ is a circle with a 5-mile (8047-meter) radius centered at the power block area reference point. Because the LPZ is located beyond the EAB, the “wake credit not allowed” scenario of the PAVAN modeling results was used for the X/Q analyses at both the EAB and the LPZ.

The distance between the EAB and the source boundary (Table 2.7-12) for the VCS site was entered as the receptor distance for each downwind sector in calculating the X/Q values at the EAB. The shortest distance between the source boundary and the LPZ was determined for all direction sectors; these distances are shown in Table 2.7-12. The shortest distance (i.e., 4.708 miles or 7576 meters to the north-northeast of the boundary) was input to the PAVAN model (Figure 2.7-18).

2.7.5.2 PAVAN Modeling Results

Based on the methodology provided in Subsection 2.7.5.1, the resulting 50-percentile X/Q values based on the upper envelope of the ordered X/Q-frequency values for the EAB and LPZ are shown in Table 2.7-13. The 50-percenticle X/Q values for the EAB and LPZ are 8.85×10^{-5} and 9.64×10^{-6} sec/m^3, respectively.

These model-predicted X/Q values represent a 0-to-2-hour time interval with no credit taken for building wake effects, as indicated previously. To estimate X/Qs for longer time intervals, the program calculates sector-dependent and overall site limit annual average X/Q values using the procedure described in NUREG/CR-2858 (U.S. NRC Nov 1982). The values for intermediate time periods at the LPZ (i.e., 8 hours, 16 hours, 72 hours, and 624 hours) were determined by logarithmic interpolation between the 50-percentile, 0-to-2-hour X/Q and the corresponding annual average X/Qs.

The highest annual average X/Q value was chosen as the end point for the interpolation; the highest annual average X/Q at the LPZ was the sector-dependant value. These results, along with the 50-percentile, 0-to-2-hour X/Q value at the EAB are summarized below.

Summary of Interpolated X/Q Values (sec/m^3) for Intermediate Time Periods

Source Location	Receptor Distance	50-Percentile 0–2 hr	0–8 hours (8 hours)	8–24 hour (16 hours)	1–4 days (72 hours)	4–30 days (624 hours)	Annual Average
Source Boundary	EAB	8.85×10^{-5}	—	—	—	—	—
Source Boundary	LPZ	—	5.30×10^{-6}	3.92×10^{-6}	2.05×10^{-6}	8.05×10^{-7}	2.57×10^{-7}

2.7.6 Long-Term (Routine) Diffusion Estimates

2.7.6.1 Regulatory Basis and Technical Approach

The NRC-sponsored XOQDOQ computer program (NUREG/CR-2919) (U.S. NRC Sep 1982) was used to estimate X/Q and D/Q values due to routine releases of gaseous effluents to the atmosphere. The XOQDOQ computer code has the primary function of calculating annual average X/Q values and annual average relative deposition (D/Q) values at receptors of interest (e.g., the EAB; the nearest milk cow/goat, residence, garden, meat animal). X/Q and D/Q values owing to intermittent releases, which occur during routine operation, may also be evaluated using the XOQDOQ model.

The XOQDOQ dispersion model implements the assumptions outlined in RG 1.111 (U.S. NRC Jul 1977). The program assumes that the material released to the atmosphere follows a Gaussian distribution around the plume centerline. In estimating concentrations for longer time periods, the Gaussian distribution is assumed to be evenly distributed within a given directional sector. A straight-line trajectory is assumed between the release point and all receptors.

The following input data and assumptions were used in the XOQDOQ modeling analysis:

- Meteorological data: 2-year (July 1, 2007, to June 30, 2009) onsite JFD of wind speed, wind direction, and atmospheric stability
- Wind sensor height: 10 meters
- Vertical temperature difference: (10 meters–60 meters)
- Number of wind speed categories: 12 (including calm and the 11 wind speed categories) listed in Table 2.7-10
- Type of release: Ground-level

- Release height: 10 meters (default height)
- Minimum building cross-sectional area: 1263 square meters
- Reactor building height: 24.38 meters above grade
- Distances from the source boundary to the nearest residence, vegetable garden, and meat animal, and the property boundary (see Table 2.7-14)
- No milk cows/goats are identified within 5 miles of the VCS site, and no dairies are identified within 50 miles

The XOQDOQ and PAVAN dispersion models used the same meteorological data set (two years—July 1, 2007 to June 30, 2009) previously indicated.

The reactor building design has been used to calculate the minimum building cross-sectional area, a required input to the model, as called for in NUREG/CR-2919 (U.S. NRC Sep 1982). Although the turbine building is larger, using the reactor building is more conservative because a smaller area results in higher X/Q values. The height of the reactor buildings for modeling purposes is 24.38 meters. The resulting cross-sectional area was determined by multiplying the height by the width of the reactor building (51.80 meters). The area used is 1263 square meters (from the mPower design).

Compared to an elevated release, a ground-level release usually results in higher concentrations at downwind receptors located at ground level because of less dilution from shorter traveling distances. Consequently, as a conservative approach and for the reasons described in Subsection 2.7.5.1, only ground-level releases were assumed in the XOQDOQ modeling analysis.

Potential releases were assumed to occur at any point on the source boundary as a conservative approach to minimizing the travel distance of any release to all receptors of interest. Source to receptor distances associated with the property boundary were calculated for the 16 standard direction radials (i.e., north, north-northeast, northeast, etc.). Values represent the shortest distance from the source boundary to the property boundary in each sector (see Table 2.7-12). Distances from a potential release point to the nearest residence, meat animal, and vegetable garden in each of the 16, 22.5-degree compass sectors (i.e., north, north-northeast, northeast, etc.) are listed in Table 2.7-15. Directional sectors without a receptor were not modeled. A total of 15 sectors were considered for analysis as residential, meat animal and vegetation receptors. Fourteen of these sectors contained all three receptors in the same location (at the same distance). The north-northwest sector contained a vegetable garden at a greater distance than the residential and meat animal receptors. No milk cow or goat receptors are located within 5 miles of the site and were not analyzed.

One other set of receptors of interest was identified to evaluate the impact of new units when a first unit is operational and a subsequent unit is under construction. Because of the relative orientation of the units, only three scenarios were considered (i.e, north-northeast, northeast, and east-northeast). A distance of 0.25 miles (Table 2.7-14) was used from the midpoints of each half of the power block area. The maximum X/Q for this scenario occurs in the north-northeast sector.

2.7.6.2 **XOQDOQ Modeling Results**

Among all of the modeled receptors of interest, the overall maximum annual average X/Q value, 1.6×10^{-5} sec/m^3 (no decay and 2.26 day decay, undepleted), occurred at the proposed new reactor under construction as the result of an assumed routine release from the first operating reactor, as previously described. The maximum annual average X/Q values (along with the downwind sectors and corresponding receptor distances relative to the source boundary) for the other sensitive receptor types are:

- 1.3×10^{-5} sec/m^3 at the property boundary in the southwest sector at a receptor distance of 0.62 mile
- 2.8×10^{-6} sec/m^3 for the nearest residence/meat animal in the north-northwest sector at receptor distances of 1.40 miles
- 2.0×10^{-6} sec/m^3 for the nearest vegetable garden receptor in the northwest sector at a receptor distance of 1.65 miles
- 1.6×10^{-5} sec/m^3 for the adjacent reactor (under construction) located to the north-northwest sector at a distance of 0.25 miles
- 1.8×10^{-5} sec/m^3 for the EAB located to the north-northwest sector at a distance of 0.60 miles.

Table 2.7-14 summarizes the maximum X/Q and D/Q values estimated by the XOQDOQ dispersion model for various radioactive decay and plume depletion scenarios at sensitive receptors of interest around the VCS site. Table 2.7-16 presents annual average X/Q and D/Q values for the north-northwest sector, at the 22 standard radial distances between 0.25 and 50 miles downwind and for the model's 10 standard distance-segment boundaries between 0.5 and 50 miles downwind. The north-northwest sector has the highest relative concentration values out to 5 miles downwind distances. The north-northwest sector has the highest relative deposition values at all downwind distances.

Detailed annual average X/Q and D/Q estimates generated by the XOQDOQ model for the receptors of interest, at the 22 standard radial distances and for the 10 standard distance-segment boundaries, are also provided in Table 2.7-18 through 2.7-25.

Table 2.7-17 presents X/Q and D/Q estimates at all of the receptors of interest identified in Table 2.7-15. Tables 2.7-18 and 2.7-19 list X/Q estimates with no radioactive decay and no plume depletion for each of the 16, 22.5-degree compass sectors at the 22 standard radial distances and for the 10 standard distance-segment boundaries, respectively. Tables 2.7-20 and 2.7-21 contain X/Q estimates that include radioactive decay with a half-life of 2.26 days for short-lived noble gases and no plume depletion. Tables 2.7-22 and 2.7-23 show X/Q estimates that include radioactive decay with a half-life of 8 days for all iodines released to the atmosphere, as well as incorporation of plume depletion. Finally, Tables 2.7-24 and 2.7-25 list modeled estimates of long-term average relative deposition at the 22 standard radial distances and for the 10 standard distance-segment boundaries, respectively.

2.7.7 **Noise**

The VCS site is located on an approximately 11,500-acre greenfield site approximately 13 miles south of the city of Victoria. The site is surrounded by farmlands, with the western border next to U.S. Highway 77 and the southern border running parallel to a railroad line. The site and surrounding area is rural in nature with pasture and shrub land.

The dominating preexisting sources of man-made noise at the site are the result of gas wells, a compressor station, and heavy equipment associated with a cattle ranch. Background noise measurements were conducted between February 26 and February 29, 2008, at selected locations around the VCS site boundary (Figure 2.7-16).

The hourly measurements made at location NSR-1 were primarily affected by the traffic on U.S. Highway 77, natural sounds, and wind-induced noise. The hourly energy equivalent sound pressure level was typically between 50 and 52 dBA, but did get as low as 40 dBA with the noise monitor location upwind from U.S. Highway 77.

Measurement location NSR-2 was selected primarily because of the presence of a residential structure located west of U.S. Highway 77. The monitor was positioned at approximately the same distance from Highway 77, but on the east side of the road. The house was found to be abandoned, but measurements at this location were continued as a reference point for the western boundary. At NSR-2 the primary noise source was traffic noise from U.S. Highway 77, and the hourly energy equivalent sound pressure levels were approximately 60 dBA.

Location NSR-3 is located in the southwestern corner of the site. The dominating noise source at this location is a nearby compressor station; NSR-3 is approximately 200 yards from the compressor station. The noise level at this location was within a constant range between 50–55 dBA.

Location NSR-4 was situated on the eastern side of the property boundary. The primary man-made source of noise at this location was from railroad traffic, occurring south of the measurement location. At those times when there was no rail traffic, the sound in this area was mainly caused by birds, insects, and wind-generated noise. The hourly energy equivalent noise level at this location fluctuated between 30 and 50 dBA.

At location NSR-5, which was adjacent to a residential home, the noise level was very low without wind-generated noise. The hourly energy equivalent sound pressure level was approximately 30 dBA at times, with no wind-generated noise.

Location NSR-6 was situated near the meteorological tower and the sound levels at this location were primarily from U.S. Highway 77. The hourly energy equivalent sound pressure level was approximately 55 dBA at this location.

Noise sources during the operational phase of the proposed new units will include transformers and other electrical equipment, circulating water pumps, mechanical draft cooling towers, and the public address system. However, the effects of noises generated by unit operation are mitigated by the undeveloped land surrounding the plant. Also, most equipment will be located within the plant buildings which serves to dampen noises.

During the construction phase of the new units, noise will be generated from construction equipment and site traffic. The construction noise will be associated with building the units, the site infrastructure, and the construction of the cooling basin. Based on a comprehensive construction noise study conducted for the Empire State Electric Energy Research Corporation by Bolt Beranek and Newman (Bolt Beranek and Newman May 1977), in a report titled *Power Plant Construction Noise Guide*, the noise associated with construction is divided into six different phases: excavation; concrete pouring; steel erection; mechanical; cleanup; and steam-blow. The last phase may not be applicable to the construction and startup of nuclear units. The long-term average A-weighted equivalent sound pressure levels, LAeq, are listed in the table that follows as a function of distance for each of these phases.

Mobile construction equipment will be used to construct the cooling basin. Residences near the construction site will experience short-term higher noise levels when construction equipment is working nearby. Estimates of long-term equivalent sound pressure levels were made for various distances from the construction area.

	Estimated Long-Term Equivalent Sound Pressure Level, LAeq		
Phase	**Northern Location (~6800 feet away)**	**West Boundary (~3900 feet away)**	**Eastern Location (~10,000 feet away)**
Excavation	40	50	35
Concrete Pouring	36	46	31
Steel Erection	40	50	35
Mechanical	35	45	30
Cleanup	30	40	25
Steam (or Air) Blows for Pipe Cleaning	80	90	75

2.7.8 References

ASCE 2005. American Society of Civil Engineers and Structural Engineering Institute, *ASCE Standard ASCE/SEI 7-05, Minimum Design Loads for Buildings and Other Structures, Revision of ASCE 7-02*, 2005.

Bolt Beranek and Newman May 1977. Bolt, Beranek, and Newman, Incorporated, *Power Plant Construction Noise Guide*, Report No. 3321, prepared for Empire State Electric Energy Research Corporation, New York, New York, May 1977.

Bomar 1983. George W. Bomar, *Texas Weather*, pp. 150–152 and 187–194, University of Texas Press, Austin, Texas, 1983.

LOSC Sep 2002. Louisiana Office of State Climatology, *Louisiana Monthly Climate Review, September 2002*, Volume 22, Number 9, LOSC, Department of Geography and Anthropology, Louisiana State University, September 2002.

NCDC Feb 2002. National Climatic Data Center, *Climatography of the United States, No. 81, 1971–2000, U.S. Monthly Climate Normals*, CD-ROM, NCDC, National Environmental Satellite, Data, and Information Service, National Oceanic and Atmospheric Administration, February 2002.

NCDC Jun 2002. National Climatic Data Center, *Climatography of the United States, No. 85, Divisional Normals and Standard Deviations of Temperature, Precipitation, and Heating and Cooling Degree Days 1971-2000 (and previous normals periods)*, Section 1, “Temperature,” and Section 2, “Precipitation,” NCDC, NESDIS, NOAA, June 15, 2002.

NCDC Sep 2002. National Climatic Data Center, *The Climate Atlas of the United States*, Version 2.0, CD-ROM, NCDC, Climate Services Division, NOAA, September 2002.

NCDC Nov 2002. National Climatic Data Center, *Cooperative Summary of the Day, TD3200, Period of Record through 2001 (Includes daily weather data from the Central United States)*, Version 1.0, CD-ROM, data listings for Palacios Municipal Airport, Beeville 5 NE, Port O' Connor, Point Comfort, Cuero, Maurbro, Yoakum, Edna Highway 59 Bridge, Rockport, Goliad, Sinton, Aransas Wildlife Refuge, Victoria Regional Airport, Refugio 2 NW, Karnes City 2N, Texas, NCDC, NOAA, data released November 2002.

NCDC Jun 2004. National Climatic Data Center, *Storm Data (and Unusual Weather Phenomena with Late Reports and Corrections)*, January 1959 (Volume 1, Number 1) to January 2004 (Volume 46, Number 1), NCDC, NESDIS, NOAA, June 2004.

NCDC Jul 2005. National Climatic Data Center, *Climatography of the United States, No. 20, 1971-2000, Monthly Station Climate Summaries,* CD-ROM, data summaries for Palacios Municipal Airport, Beeville 5 NE, Port O' Connor, Point Comfort, Cuero, Yoakum, Rockport, Goliad, Sinton, Aransas Wildlife Refuge, Victoria Regional Airport, Texas, NCDC, NESDIS, NOAA, July 2005.

NCDC Jul 2006. National Climatic Data Center, *U.S. Summary of Day Climate Data (DS 3200/3210), POR 2002-2005*, CD-ROM, data listings for Palacios Municipal Airport, Beeville 5 NE, Port O' Connor, Point Comfort, Cuero, Maurbro, Yoakum, Edna Highway 59 Bridge, Rockport, Goliad, Sinton, Aransas Wildlife Refuge, Victoria Regional Airport, Refugio 2 NW, Karnes City 2N, Texas, NCDC, NOAA, July 2006.

NCDC Apr 2008. National Climatic Data Center, *Storm Events for Texas, Hail Event, and Snow and Ice Event Summaries for Matagorda, Jackson, Lavaca, Karnes, Wharton, Victoria, Bee, Refugio, Goliad, San Patricio, Aransas, DeWitt, and Calhoun Counties in Texas*, NCDC, NOAA. Available at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms, accessed various dates through April 7, 2008.

NCDC Jun 2008a. National Climatic Data Center, *Storm Events for Texas, Tornado Event Summaries for Aransas, Atascosa, Austin, Bee, Bexar, Calhoun, Colorado, DeWitt, Fort Bend, Goliad, Gonzales, Guadalupe, Jackson, Jim Wells, Karnes, Kleberg, Lavaca, Live Oak, Matagorda, Nueces, Refugio, San Patricio, Victoria, Wharton, and Wilson Counties*, NCDC, NOAA. Available at http://www4.ncdc.noaa.gov/cgi win/wwcgi.dll?wwevent~storms, accessed various dates through June 3, 2008.

NCDC Jun 2008b. National Climatic Data Center, *Local Climatological Data Publications, Select State—Texas, Select Station—Victoria—, Select Month—2007 Annual*, NCDC, NOAA. Available at http://www7.ncdc.noaa.gov/IPS/lcd/lcd.html, accessed June 9, 2008.

NCDC Jun 2008c. National Climatic Data Center, *Storm Events for Texas, Hurricane and Tropical Storm Event, and Dust Storm Event Summaries,* NCDC, NOAA. Available at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms, accessed various dates through June 25, 2008.

NCDC Jun 2008d. National Climatic Data Center, *Cooperative Select State—Texas, Cooperative Select Station—Port O'Connor, Goliad, Aransas Wildlife Refuge*, NCDC, NOAA. Available at http://www7.ncdc.noaa.gov/IPS/coop/coop.html, accessed various dates through June 25, 2008.

NCDC Nov 2008a. National Climatic Data Center, Climate Data Online, Surface Data, Monthly, NCDC, NOAA. Available at http://cdo.ncdc.noaa.gov/cgi-bin/cdo/cdostnsearch.pl, accessed November 20, 2008.

NCDC Nov 2008b. National Climatic Data Center, Climate Data Online, Surface Data, Daily, NCDC, NOAA. Available at http://cdo.ncdc.noaa.gov/cdo/cdo, accessed November 24, 2008.

NCDC Sep 2009. National Climatic Data Center, U.S. Snow Climatology, NCDC NOAA,. Available at http://www.ncdc.noaa.gov/ussc/index.jsp, accessed September 29 and 30, 2009.

NOAA-CSC Sep 2009. National Oceanic and Atmospheric Administration—Coastal Services Center, *Historical Hurricane Tracks Storm Query, 1851 through 2008*. Available at http://maps.csc.noaa.gov/hurricanes/viewer.html, National Ocean Service, NOAA, accessed September 25, 2009.

NSSL 2006. National Severe Storms Laboratory, *10-Year U.S. Flash Density (1989–1999 Average U.S. Flashes per Square Kilometer per Year)*, prepared by Global Atmospherics, Inc., based on data provided by the National Lightning Detection Network, last modified January 10, 2006, NSSL, NOAA. Available at http://www.nssl.noaa.gov/primer/lightning/images/ltgflash_density.jpg, accessed June 19, 2008.

USDA Aug 1998. U.S. Department of Agriculture, Rural Utilities Service, *Summary of Items of Engineering Interest*, Page 8, August 1998. Available at www.usda.gov/rus/electric/engineering/en-in-98, accessed April 4, 2008.

USDA Apr 2003. U.S. Department of Agriculture, Sue A. Ferguson, et al., *Forest Service, Assessing Values of Air Quality and Visibility at Risk from Wildland Fires*, UDSA, Forest Service, Pacific Northwest Research Station, Research Paper PNW-RP-550, April 2003.

USDA Oct 2007. U.S. Department of Agriculture, *Forest Service, Ventilation Climate Information System*. Available at http://www.fs.fed.us/pnw/airfire/vcis/legend.html, U.S. Department of the Interior, USDA Joint Fire Science Program, accessed October 29, 2007.

U.S. NRC Jul 1977. U.S. Nuclear Regulatory Commission, *Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,* Regulatory Guide 1.111, Revision 1, July 1977.

U.S. NRC Sep 1982. U.S. Nuclear Regulatory Commission, *XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations*, NUREG/CR-2919, prepared for NRC by Battelle Pacific Northwest Laboratory, PNL-4380, September 1982.

U.S. NRC Nov 1982. U.S. Nuclear Regulatory Commission, *PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations*, NUREG/CR-2858, prepared for NRC by Battelle Pacific Northwest Laboratory, PNL-4413, November 1982.

U.S. NRC Feb 1983. U.S. Nuclear Regulatory Commission, *Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants*, Regulatory Guide 1.145, Revision 1, November 1982 (Reissued February 1983).

U.S. NRC Mar 2000. U.S. Nuclear Regulatory Commission, *Environmental Standard Review Plan, Standard Review Plans for Environmental Reviews for Nuclear Power Plants,* NUREG-1555, Revision 0, March 2000.

U.S. NRC Feb 2007. U.S. Nuclear Regulatory Commission, *Tornado Climatology of the Contiguous United States*, NUREG/CR-4461, Revision 2, PNNL-15112, Revision 1, February 2007.

U.S. NRC Mar 2007a. U.S. Nuclear Regulatory Commission, *Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants*, Regulatory Guide 1.76, Revision 1, March 2007.

U.S. NRC Mar 2007b. U.S. Nuclear Regulatory Commission, *Meteorological Monitoring Programs for Nuclear Power Plants,* Regulatory Guide 1.23, Revision 1, March 2007.

USU Jun 2008. Utah State University, Utah Climate Center, *Texas Climate for Palacios Municipal Airport, Beeville 5 NE, Port O' Connor, Point Comfort, Cuero, Maurbro, Yoakum, Edna Highway 59 Bridge, Rockport, Goliad, Sinton, Aransas Wildlife Refuge, Victoria Regional Airport, Refugio 2 NW, Karnes City 2N*. Available at http://climate.usurf.usu.edu/, accessed various dates through June 19, 2008.

U.S. Weather Bureau Sep 1961. U.S. Weather Bureau, *Hurricane Carla, September 4–14, 1961 (A Preliminary Report), Weekly Weather and Crop Bulletin*, reprinted and archived by National Hurricane Center. Available at http://www.nhc.noaa.gov/archive/storm_wallets/atlantic/atl1961/carla/prenhc/, accessed June 18, 2008.

Wang and Angell Apr 1999. Wang, J.X.L., and J.K. Angell, *Air Stagnation Climatology for the United States (1948–1998)*, NOAA Air Resources Laboratory Atlas No. 1, Air Resources Laboratory, Environmental Research Laboratories, Office of Oceanic and Atmospheric Research, Silver Spring, MD, April 1999.

Table 2.7-1
NWS and Cooperative Observing Stations Near the VCS Site

Station[a]	County	Approximate Distance (miles)	Direction Relative to Site	Elevation (feet)
Palacios Municipal Airport[b]	Matagorda	48	E	12
Beeville 5 NE	Bee	42	WSW	255
Port O'Connor	Calhoun	39	ESE	5
Point Comfort	Calhoun	29	E	20
Cuero	DeWitt	37	NNW	178
Maurbro	Jackson	40	ENE	30
Yoakum	Lavaca	46	N	295
Edna Highway 59 Bridge	Jackson	32	NE	68
Rockport	Aransas	40	S	9
Goliad	Goliad	22	W	142
Sinton	San Patricio	50	SW	53
Aransas Wildlife Refuge	Aransas	25	SE	15
Victoria Regional Airport[b]	Victoria	17	NNE	104
Refugio 2 NW	Refugio	25	SW	54
Karnes City 2N	Karnes	55	WNW	450

(a) Numeric and letter designators following a station name (e.g., Beeville 5 NE) indicate the station's approximate distance in miles (e.g., 5) and direction (e.g., northeast) relative to the place name (e.g., Beeville).

(b) National Weather Service First-Order Station.

Table 2.7-2
Local Climatological Data Summary for Victoria, Texas

NORMALS, MEANS, AND EXTREMES
VICTORIA (KVCT)

LATITUDE: 28 ° 51'N LONGITUDE: -96 ° 55'W ELEVATION (FT): GRND: 113 BARO: 106 TIME ZONE: CENTRAL (UTC -6) WBAN: 12912

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	62.8	66.6	73.4	79.2	85.1	90.3	93.4	93.7	89.9	83.0	73.0	65.2	79.6
	MEAN DAILY MAXIMUM	51	63.9	67.4	74.0	80.4	85.9	90.8	93.6	94.1	89.8	83.0	73.6	66.5	80.3
	HIGHEST DAILY MAXIMUM	47	88	95	97	98	101	106	104	107	111	99	93	88	111
	YEAR OF OCCURRENCE		1971	1986	1989	1963	1964	1998	1964	1962	2000	1991	1988	1964	SEP 2000
	MEAN OF EXTREME MAXS.	51	79.4	82.2	86.3	89.6	92.8	96.0	98.3	99.5	96.5	92.1	86.2	81.2	90.0
	NORMAL DAILY MINIMUM	30	43.6	46.7	53.9	60.1	68.1	73.3	75.0	74.6	70.3	61.6	52.3	45.2	60.4
	MEAN DAILY MINIMUM	51	43.7	46.7	53.4	61.1	68.0	73.1	75.0	74.6	70.5	61.6	52.4	45.5	60.5
	LOWEST DAILY MINIMUM	47	14	19	21	33	45	59	62	62	48	31	24	9	9
	YEAR OF OCCURRENCE		1982	1985	2002	1987	2005	1984	1967	2004	2000	1993	1976	1989	DEC 1989
	MEAN OF EXTREME MINS.	51	26.2	30.0	34.9	44.6	56.1	65.3	70.5	69.8	57.8	45.1	35.1	28.3	47.0
	NORMAL DRY BULB	30	53.2	56.7	63.7	69.7	76.6	81.8	84.2	84.2	80.1	72.3	62.7	55.2	70.0
	MEAN DRY BULB	51	53.8	57.0	63.7	70.8	77.0	82.1	84.3	84.4	80.2	72.3	63.0	56.0	70.4
	MEAN WET BULB	24	49.7	52.7	58.0	64.0	70.8	75.0	76.1	76.0	72.6	65.9	57.8	51.2	64.2
	MEAN DEW POINT	24	46.4	49.4	54.6	60.7	68.5	72.8	73.6	73.5	69.9	63.1	54.6	47.8	61.2
	NORMAL NO. DAYS WITH:														
	MAXIMUM >= 90	30	0.0	0.1	0.4	0.8	6.3	20.2	28.0	27.9	18.5	4.9	0.1	0.0	107.2
	MAXIMUM <= 32	30	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4
	MINIMUM <= 32	30	4.1	2.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	*	0.6	3.1	10.5
	MINIMUM <= 0	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H/C	NORMAL HEATING DEG. DAYS	30	372	249	113	28	1	0	0	0	1	22	145	317	1248
	NORMAL COOLING DEG. DAYS	30	18	26	84	181	368	514	601	597	454	248	83	29	3203
RH	NORMAL (PERCENT)	30	77	76	75	74	78	77	74	75	76	76	77	77	76
	HOUR 00 LST	30	85	85	84	85	89	90	89	88	88	88	87	85	87
	HOUR 06 LST	30	88	88	88	89	92	93	93	94	93	91	90	88	91
	HOUR 12 LST	30	65	63	60	59	62	60	55	56	59	58	61	64	60
	HOUR 18 LST	30	69	64	63	62	67	66	60	62	65	67	71	71	66
S	PERCENT POSSIBLE SUNSHINE														
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG (VISBY <= 1/4 MI)	43	7.2	5.5	5.3	4.1	2.5	0.8	0.5	0.6	1.4	3.7	6.3	6.4	44.3
	THUNDERSTORMS	48	1.6	1.7	3.2	3.7	6.2	6.8	7.6	9.7	7.9	3.9	2.1	1.5	55.9
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)				6.4			4.0							
	MIDNIGHT-MIDNIGHT (OKTAS)														
	MEAN NO. DAYS WITH:														
	CLEAR	1	3.0	5.0	8.0		5.0	9.0							
	PARTLY CLOUDY			1.0	3.0		9.0	6.0							
	CLOUDY	1	1.0	3.0	10.0		3.0	5.0							
PR	MEAN STATION PRESSURE (IN)	24	30.02	29.96	29.90	29.84	29.81	29.81	29.87	29.86	29.84	29.90	29.97	30.01	29.90
	MEAN SEA-LEVEL PRES. (IN)	24	30.14	30.08	30.02	29.96	29.93	29.93	29.99	29.98	29.96	30.02	30.09	30.14	30.02
WINDS	MEAN SPEED (MPH)	24	9.9	10.4	10.9	11.0	10.5	9.3	8.5	8.0	8.2	8.7	9.2	9.4	9.5
	PREVAIL.DIR (TENS OF DEGS)	28	36	36	17	17	17	17	19	19	14	36	36	36	17
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	12	43	43	45	47	41	43	62	43	41	43	41	40	62
	DIR. (TENS OF DEGS)		17	15	03	11	07	32	05	26	04	35	31	33	05
	YEAR OF OCCURRENCE		1996	2001	2006	2004	1999	2005	2003	1996	1998	1998	2006	1997	JUL 2003
	MAXIMUM 5-SECOND														
	SPEED (MPH)	12	52	52	55	64	59	51	83	45	53	52	51	47	83
	DIR. (TENS OF DEGS)		30	15	03	11	22	32	04	27	12	35	30	33	04
	YEAR OF OCCURRENCE		1998	2001	2006	2004	2004	2005	2003	1996	2001	1998	2003	1997	JUL 2003
PRECIPITATION	NORMAL (IN)	30	2.44	2.04	2.25	2.97	5.12	4.96	2.90	3.05	5.00	4.26	2.64	2.47	40.10
	MAXIMUM MONTHLY (IN)	47	7.76	9.08	11.61	11.70	14.66	13.50	20.34	8.97	19.05	12.44	16.14	6.97	20.34
	YEAR OF OCCURRENCE		1991	1992	1997	1997	1993	2004	2007	2001	1978	1997	2004	1975	JUL 2007
	MINIMUM MONTHLY (IN)	47	0.02	0.23	0.18	T	0.01	T	0.05	0.34	1.11	0.34	0.02	0.34	T
	YEAR OF OCCURRENCE		1971	1988	1971	1987	1998	1980	1997	2006	1982	1987	1981	2007	APR 1987
	MAXIMUM IN 24 HOURS (IN)	47	4.70	3.21	5.04	9.87	8.45	9.30	8.41	6.14	8.51	8.15	9.20	6.12	9.87
	YEAR OF OCCURRENCE		1991	1992	1997	1991	1972	1977	1990	1964	1967	1994	2004	1975	APR 1991
	NORMAL NO. DAYS WITH:														
	PRECIPITATION >= 0.01	30	8.8	7.3	6.9	6.4	7.4	8.4	7.2	8.8	9.9	7.3	7.5	8.1	94.0
	PRECIPITATION >= 1.00	30	0.6	0.6	0.7	0.8	1.7	1.7	0.9	0.9	1.5	1.3	0.6	0.6	11.9
SNOWFALL	NORMAL (IN)	30	0.1	0.*	0.*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.*	0.*	0.1
	MAXIMUM MONTHLY (IN)	36	2.1	1.0	T	0.0	T	0.0	0.0	T	0.0	0.0	0.2	T	2.1
	YEAR OF OCCURRENCE		1985	1973	1990		1993			1994			1976	1990	JAN 1985
	MAXIMUM IN 24 HOURS (IN)	36	2.1	1.0	T	0.0	T	0.0	0.0	T	0.0	0.0	0.2	T	2.1
	YEAR OF OCCURRENCE'		1985	1973	1990		1993			1994			1976	1990	JAN 1985
	MAXIMUM SNOW DEPTH (IN)	39	2	3	0	0	0	0	0	0	0	0	0	0	3
	YEAR OF OCCURRENCE		1985	1958											FEB 1958
	NORMAL NO. DAYS WITH:														
	SNOWFALL >= 1.0	30	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

Table 2.7-3
Climatological Normals at Selected NWS and Cooperative Observing Stations in the VCS Area

	Normal Annual Temperatures (°F)[(a)]				Normal Annual Precipitation	
Station	**Daily Maximum**	**Daily Minimum**	**Daily Range**	**Daily Mean**	**Rainfall[(a)] (inches)**	**Snowfall[(b)] (inches)**
Palacios Municipal Airport	77.2	61.1	16.1	69.2	45.40	0.1
Beeville 5 NE	80.8	59.6	21.2	70.2	33.48	0.1
Port O' Connor	76.4	65.0	11.4	70.7	34.78	0.1
Point Comfort	79.7	62.4	17.3	71.1	43.87	Trace
Cuero	81.7	57.5	24.2	69.6	36.08	0.1
Maurbro[(c)]	NA[(d)]	NA[(d)]	NA[(d)]	NA[(d)]	NA[(d)]	NA[(d)]
Yoakum	79.7	56.7	23.0	68.2	40.96	Trace
Edna Highway 59 Bridge	NA[(d)]	NA[(d)]	NA[(d)]	NA[(d)]	42.17	NA[(d)]
Rockport	77.9	62.9	15.0	70.4	35.96	Trace
Goliad	83.1	59.4	23.7	71.3	38.58	0.5
Sinton 3 NW	79.4	60.7	18.7	70.1	35.54	0.1
Aransas Wildlife Refuge	77.5	62.9	14.6	70.2	40.83	Trace
Victoria Regional Airport	79.6	60.4	19.2	70.0	40.10	0.3
Refugio 2 NW	81.9	60.0	21.9	71.0	40.00	NA[(d)]
Karnes City 2N	80.4	57.8	22.6	69.1	28.35	NA[(d)]

(a) NCDC Climatography No. 81 1971-2000 (NCDC Feb 2002).
(b) NCDC Climatography No. 20 1971-2000 (NCDC Jul 2005).
(c) Station decommissioned in 1966.
(d) NA = Measurements not made at this station.

Table 2.7-4 (Sheet 1 of 2)
Climatological Extremes at Selected NWS and Cooperative Observing Stations in the VCS Region

Station	Maximum Temperature (°F)	Minimum Temperature (°F)	Maximum 24- hr Rainfall (Inches)	Maximum Monthly Rainfall (Inches)	Historical Snowpack (Inches)[m]	100-year Return Snowfall (Inches)[m]	Maximum 24- hr Snowfall (Inches)	Maximum Monthly Snowfall (Inches)
Palacios Municipal Airport	107 [a],[b],[c] (09/05/2000)	9[a],[b],[c] (12/23/1989)	9.65[a],[b],[c] (05/07/1951)	24.28[b],[c] (10/1949)	NA	NA	4.0[b],[c] (02/12/1958)	4.0[b],[c] (02/1958)
Beeville 5 NE	111[a],[b],[c] (07/09/1939)	8[a],[b],[c] (12/25/1983)	10.61[a],[b],[c] (09/22/1967)	22.62[b],[c] (09/1967)	NA	NA	4.5[b],[c] (12/25/2004)[e]	6.5[b],[c] (01/1926)
Port O' Connor	105[a],[b],[c] (09/06/2000)	10[a],[b],[c] (12/23/1989)	12.50[a],[b],[c] (07/10/1976)	24.51[n] (10/1984)	0	NA	1.3[a],[b],[c] (02/09/1973)	1.3[a],[b],[c] (02/1973)
Point Comfort	107[a],[b],[c] (09/06/2000)	9[a],[b],[c] (12/23/1989)	14.65[a],[b],[c] (06/26/1960)	25.24[b],[c] (06/1960)	0	NA	Trace[a],[b] (11/28/1976)	Trace[a],[b] (11/1976)
Cuero	113[a],[b],[c] (09/05/2000)	7[a],[b],[c] (12/23/1989)	12.40[a],[b],[c] (06/30/1940)	21.27[b],[c] (09/1967)	4.0 (1/31/1949)	NA	6.5[b],[c] (02/13/1960)	6.5[b],[c] (02/1960)
Maurbro	107[b],[c] (07/27/1954)	8[b],[c] (01/31/1949)	14.80[b],[c] (06/26/1960)	22.47[b],[c] (06/1960)	Station Not Available	Station Not Available	4.0[b],[c] (02/13/1960)	4.0[b],[c] (02/1960)
Yoakum	111[a],[b],[c] (09/06/2000)[f]	6[a],[b],[c] (12/23/1989)	10.70[a],[b],[c] (04/25/1938)	18.33[a],[b],[c] (10/1994)	NA	NA	2.5[b],[c] (12/21/1929)	2.5[b],[c] (12/1929)
Edna Highway 59 Bridge	105[n] (08/12/1969)	17[n] (01/12/1973)	17.58[b],[c] (10/18/1994)	20.97[b],[c] (10/1994)	0	NA	0.0[c] (NA)	0.0[c] (NA)
Rockport	105[a],[b],[c] (09/06/2000)	12[a],[b],[c] (12/25/1983)	8.15[a],[b],[c] (09/19/1979)	20.85[b],[c] (09/1967)	0	NA	6.0[b],[c] (12/25/2004)	6.0[b],[c] (12/2004)
Goliad	112[a],[b],[c] (06/14/1998)[g]	7[a],[b],[c] (01/12/1962)	9.16[a],[b],[c] (09/21/1967)	22.19[b],[c] (09/1967)	4.0 (2/9/1973)	NA	12.0[b],[c] (12/25/2004)	12.0[b],[c],[d] (12/2004)
Sinton	109[a],[b],[c] (09/06/2000)	10[a],[b],[c] (12/23/1989)	12.35[a],[b],[c] (04/28/1930)	25.59[b],[c] (09/1967)	2.0 (2/9/1973)	NA	7.0[b],[c] (12/25/2004)	7.0[b],[c] (12/2004)
Aransas Wildlife Refuge	103[b],[l] (08/30/1954)[h]	9[a],[b],[c] (12/23/1989)	14.25[a],[b],[c] (11/01/1974)	22.65[d] (07/2007)	0	NA	5.5[b],[c],[d] (12/25/2004)	5.5[b],[c],[d] (12/2004)
Victoria Regional Airport	111[a],[b],[c] (09/05/2000)	9[a],[b],[c] (12/23/1989)	9.87[a],[b],[c] (04/05/1991)	20.34[c] (07/2007)	NA	NA	3.3[a],[b],[c] (02/12/1958)	3.4[a],[b],[c] (02/1958)

Table 2.7-4 (Sheet 2 of 2)
Climatological Extremes at Selected NWS and Cooperative Observing Stations in the VCS Region

Station	Maximum Temperature (°F)	Minimum Temperature (°F)	Maximum 24- hr Rainfall (Inches)	Maximum Monthly Rainfall (Inches)	Historical Snowpack (Inches)[m]	100-year Return Snowfall (Inches)[m]	Maximum 24- hr Snowfall (Inches)	Maximum Monthly Snowfall (Inches)
Refugio 2 NW	112[b],[c] (09/05/2000)	8[b],[c] (01/12/1962)[j]	13.38[b],[c] (10/16/1960)[i]	26.30[b],[c] (09/1971)[i]	2.0 (2/12/1960)	NA	9.5[b],[c] (12/25/2004)	9.5[b],[c] (12/2004)
Karnes City 2N	111[b],[c] (09/06/2000)	7[b],[c] (12/23/1989)	11.00[b],[c] (08/31/1981)	22.60[b],[c] (09/1967)	2.0 (1/11/1973)	NA	5.0[b],[c] (12/25/2004)	5.0[b],[c] (12/2004)[k]

(a) NCDC Monthly Station Climate Summaries, Climatography of the United States No. 20 1971-2000 (NCDC Jul 2005).
(b) NCDC Cooperative Summaries of the Day TD 3200 & DS 3200 & 3200/3210 (NCDC Nov 2002).
(c) Utah State University Climate Center (USU Jun 2008).
(d) NCDC Cooperative Observer Records for Texas (NCDC Jun 2008d).
(e) Occurs on multiple dates: 01/23/1926, 12/25/2004, (most recent date shown in table).
(f) Occurs on multiple dates: 06/15/1998, 09/06/2000; (most recent date shown in table).
(g) Occurs on multiple dates: 07/09/1939, 08/13/1962, 06/14/1998; (most recent date shown in table).
(h) Occurs on multiple dates: 06/27/1953, 08/301954; (most recent date shown in table).
(i) Occurred at retired Refugio Co-op observing station (#417529), period of record Jan 1, 1948 – Nov 30, 1984.
(j) Not reported here. Less than 6 years of data available.
(k) Occurs for multiple months: 12/2004, 01/1926; (most recent month shown in table).
(l) Occurred at retired Arkansas Wildlife Refuge Co-op observing station (#410437), period of record Jun 1, 1940 – Dec 31, 1970.
(m) NCDC United States Snow Climatology.
(n) NCDC Climate Data Online (NCDC Nov 2008b).
NA — No value calculated in database

Table 2.7-5 (Sheet 1 of 2)
Morning and Afternoon Mixing Heights, Wind Speeds, and Ventilation Indices for the VCS Site Area Table

Period	Statistic[(a)]	Mixing Height (m, AGL)[(b)]		Wind Speed – (m/sec)		Ventilation Index – (m^2/sec)[(c)]	
		AM	PM	AM	PM	AM	PM
January	Min Max Mean	275 561 430	586 1134 881	2.9 4.0 3.6	2.5 3.5 3.2	914 (P) 2374 (F) 1628 (M)	1273 (M) 3754 (G) 2800 (F)
February	Min Max Mean	305 590 448	765 1289 1011	2.7 4.1 3.6	2.4 3.6 3.2	1096 (P) 2269 (M) 1707 (M)	2259 (M) 4082 (G) 3138 (F)
March	Min Max Mean	290 802 544	931 1552 1168	3.2 4.2 3.8	2.7 3.8 3.4	1018 (P) 3193 (F) 2167 (M)	3235 (F) 4999 (G) 3857 (G)
April	Min Max Mean	312 922 642	916 1562 1182	3.4 4.2 3.9	2.9 4.2 3.6	1217 (M) 4035 (G) 2688 (F)	3280 (F) 5518 (G) 4171 (G)
May	Min Max Mean	401 972 640	894 1638 1251	3.3 4.6 3.9	2.6 4.3 3.6	1394 (M) 4062 (G) 2668 (F)	3140 (F) 5857 (G) 4353 (G)
June	Min Max Mean	213 1132 490	1090 1929 1458	3.2 4.5 3.7	2.6 3.9 3.4	643 (P) 4307 (G) 1961 (M)	3625 (G) 7006 (G) 4916 (G)
July	Min Max Mean	196 670 367	1149 2020 1597	2.9 4.5 3.5	3.0 4.0 3.4	640 (P) 2594 (F) 1308 (M)	3757 (G) 7766 (G) 5428 (G)
August	Min Max Mean	200 658 356	1247 2151 1647	2.5 4.0 3.3	2.7 4.0 3.3	537 (P) 2302 (M) 1205 (M)	3776 (G) 7669 (G) 5502 (G)
September	Min Max Mean	182 650 363	1116 1852 1433	2.7 4.2 3.3	2.8 4.0 3.3	538 (P) 2690 (F) 1273 (M)	3236 (F) 6924 (G) 4679 (G)
October	Min Max Mean	194 567 348	1001 1759 1314	2.4 4.3 3.4	2.5 3.9 3.2	648 (P) 2414 (F) 1282 (M)	3171 (F) 5643 (G) 4046 (G)
November	Min Max Mean	287 587 418	764 1345 1085	3.0 4.1 3.5	2.6 3.7 3.2	976 (P) 2352 (F) 1578 (M)	2552 (F) 4470 (G) 3477 (F)
December	Min Max Mean	275 631 405	594 1129 891	3.0 4.1 3.5	2.4 3.5 3.1	1075 (P) 2775 (F) 1526 (M)	1751 (M) 3702 (G) 2819 (F)

Table 2.7-5 (Sheet 2 of 2)
Morning and Afternoon Mixing Heights, Wind Speeds, and Ventilation Indices for the VCS Site Area Table

Period	Statistic[(a)]	Mixing Height (m, AGL)[(b)]		Wind Speed – (m/sec)		Ventilation Index – (m^2/sec)[(c)]	
		AM	PM	AM	PM	AM	PM
Winter	Mean	428	928	3.6	3.2	1620 (M)	2919 (F)
Spring	Mean	609	1200	3.9	3.5	2508 (F)	4127 (G)
Summer	Mean	404	1567	3.5	3.4	1491 (M)	5282 (G)
Autumn	Mean	376	1277	3.4	3.3	1378 (M)	4067 (G)
Annual	Mean	454	1243	3.6	3.4	1749 (F)	4099 (G)

(a) Monthly minimum, maximum and mean values are based directly on summaries available from USDA - Forest Service Ventilation Climate Information System (VCIS) (USDA 2007). Seasonal and annual mean values represent weighted averages based on the number of days in the appropriate months.

(b) AGL = above ground level.

(c) Classifications of ventilation potential from Ventilation Index: P = Poor (0 to 1175 m^2/sec); M = Marginal (1176 to 2350 m^2/sec); F = Fair (2351 to 3525 m^2/sec); G = Good (> 3525 m^2/sec).

Table 2.7-6
Seasonal and Annual Mean Wind Speeds for the VCS Site Pre-Application Phase Monitoring Program (July 1, 2007 through June 30, 2009) and the Victoria, Texas, NWS Station

Primary Tower Elevation	Location	Winter	Spring	Summer	Autumn	Annual
Upper Level (60 m) (m/sec)	VCS Site	6.7	7.0	5.4	5.3	6.1
Lower Level (10 m) (m/sec)	VCS Site	4.5	4.9	3.6	3.2	4.0
Single Level (10 m) (m/sec)	Victoria Regional Airport [(a)]	4.4	4.8	3.8	3.9	4.2

(a) NCDC Jun 2008b

Winter = December, January, February
Spring = March, April, May
Summer = June, July, August
Autumn = September, October, November

Table 2.7-7 (Sheet 1 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—10-Meter Level

Site ID: VICT Period of Record: 07/01/2007 01:00 to 06/30/2008 24:00
Number of Sectors Included: 1 Width in Degrees 22.5
10m Wind Speed (MPH) 10m Wind Direction (deg)

Speed Greater Than or Equal to: 5.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	634	505	303	215	364	448	1300	1421	553	137	57	37	47	62	170	264
2	449	289	124	79	171	196	856	971	320	56	19	10	14	23	92	141
4	274	136	26	21	51	63	448	507	137	13	3	4	6	3	29	61
8	136	46	0	6	12	10	146	151	13	1	0	0	2	0	4	18
12	67	14	0	1	1	1	44	54	0	0	0	0	0	0	0	5
18	22	0	0	0	0	0	14	7	0	0	0	0	0	0	0	0
24	8	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to: 10.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	337	183	62	40	87	151	719	863	321	50	16	8	19	29	85	133
2	252	126	27	8	53	64	505	621	196	16	4	1	3	14	50	84
4	164	63	5	0	24	19	257	341	87	2	0	0	0	2	16	38
8	67	18	0	0	7	4	65	104	8	0	0	0	0	0	2	11
12	28	2	0	0	0	0	14	31	0	0	0	0	0	0	0	2
18	8	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-7 (Sheet 2 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—10-Meter Level

Speed Greater Than or Equal to: 15.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	109	31	11	2	10	31	265	394	142	7	1	2	5	10	48	66
2	75	19	5	0	4	16	169	280	98	3	0	0	1	3	27	41
4	44	7	1	0	0	8	71	159	42	0	0	0	0	0	9	20
8	21	2	0	0	0	4	18	48	2	0	0	0	0	0	2	4
12	11	0	0	0	0	0	4	14	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to: 20.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	16	2	1	0	0	5	36	113	52	1	0	0	2	3	25	29
2	11	0	0	0	0	3	19	78	30	0	0	0	0	1	12	21
4	7	0	0	0	0	1	7	37	10	0	0	0	0	0	3	9
8	3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-7 (Sheet 3 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—10-Meter Level

Speed Greater Than or Equal to: 25.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	3	0	0	0	0	0	2	15	1	0	0	0	0	3	7	0
2	1	0	0	0	0	0	1	10	0	0	0	0	0	1	4	0
4	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to: 30.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-7 (Sheet 4 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—10-Meter Level

Site ID: VICT Period of Record:07/01/2008 01:00 to 06/30/2009 24:00
Number of Sectors Included: 1 Width in Degrees 22.5
10m Wind Speed (MPH) 10m Wind Direction (deg)

Speed Greater Than or Equal to: 5.0, mph
Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	683	474	325	234	379	394	1131	1329	710	196	122	62	114	102	152	278
2	494	265	142	98	197	169	765	948	483	93	52	21	49	36	76	152
4	305	116	35	18	91	38	413	548	262	23	13	2	13	7	29	64
8	139	27	0	0	26	1	134	214	86	5	0	0	0	2	3	14
12	68	5	0	0	13	0	60	107	36	0	0	0	0	0	0	4
18	17	0	0	0	2	0	39	60	9	0	0	0	0	0	0	0
24	2	0	0	0	0	0	33	26	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	27	12	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	21	6	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to:10.0, mph
Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	400	137	91	50	120	135	695	844	477	70	22	11	14	23	70	137
2	309	77	48	25	69	61	491	605	330	30	11	6	3	10	42	72
4	208	37	12	7	45	10	267	326	177	4	1	1	0	5	20	28
8	102	10	0	0	25	0	86	116	46	0	0	0	0	1	3	3
12	45	4	0	0	13	0	49	54	18	0	0	0	0	0	0	0
18	10	0	0	0	2	0	39	31	5	0	0	0	0	0	0	0
24	0	0	0	0	0	0	33	16	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	27	6	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0

Table 2.7-7 (Sheet 5 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—10-Meter Level

Speed Greater Than or Equal to:15.0, mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	188	27	8	5	33	32	293	420	253	18	5	3	3	15	36	59
2	137	13	0	2	25	11	195	278	173	8	3	1	0	9	22	32
4	80	7	0	0	16	0	105	132	88	0	0	0	0	5	8	13
8	19	3	0	0	6	0	36	28	9	0	0	0	0	1	1	0
12	5	0	0	0	2	0	17	3	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to:20.0, mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	37	6	1	2	5	1	40	135	86	7	0	0	0	5	12	13
2	20	5	0	1	3	0	25	93	54	2	0	0	0	3	9	3
4	7	3	0	0	0	0	12	50	25	0	0	0	0	1	5	0
8	0	0	0	0	0	0	6	7	0	0	0	0	0	0	1	0
12	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-7 (Sheet 6 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—10-Meter Level

Speed Greater Than or Equal to:25.0, mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	7	0	1	1	0	0	2	5	7	0	0	0	0	0	5	1
2	2	0	0	0	0	0	0	4	3	0	0	0	0	0	4	0
4	0	0	0	0	0	0	0	2	1	0	0	0	0	0	2	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to:30.0, mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-8 (Sheet 1 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—60-Meter Level

Site ID: VICT   Period of Record: 07/01/2007 01:00 to 06/30/2008 24:00
Number of Sectors Included: 1 Width in Degrees 22.5
60m Wind Speed (MPH)   60m Wind Direction (deg)

Speed Greater Than or Equal to: 5.0 mph
Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	660	565	470	363	453	642	1312	1912	960	246	124	66	66	65	162	259
2	490	353	250	176	225	354	909	1442	636	125	50	25	23	25	91	163
4	309	173	83	55	87	124	479	894	325	34	16	3	9	3	37	81
8	162	56	13	10	18	24	150	383	83	2	5	0	3	0	5	24
12	89	22	1	1	6	4	56	176	18	0	0	0	0	0	0	6
18	36	3	0	0	0	0	15	54	0	0	0	0	0	0	0	0
24	14	0	0	0	0	0	6	24	0	0	0	0	0	0	0	0
30	2	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to: 10.0 mph
Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	537	420	261	214	267	436	1136	1725	800	161	67	38	42	43	107	175
2	413	280	142	109	145	233	804	1322	528	82	27	17	17	19	66	115
4	263	151	52	37	62	75	430	829	252	21	9	3	8	3	26	57
8	133	54	13	4	18	12	142	353	55	0	4	0	3	0	4	20
12	72	21	1	0	6	0	53	162	12	0	0	0	0	0	0	6
18	32	3	0	0	0	0	15	51	0	0	0	0	0	0	0	0
24	14	0	0	0	0	0	6	23	0	0	0	0	0	0	0	0
30	2	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-8 (Sheet 2 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—60-Meter Level

Speed Greater Than or Equal to: 15.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	329	227	75	43	68	125	588	1043	388	61	17	16	16	28	72	98
2	239	151	35	16	37	58	399	751	250	29	5	6	5	11	43	62
4	137	67	5	0	17	11	193	438	121	4	3	0	1	1	17	32
8	60	18	0	0	5	0	53	178	30	0	0	0	0	0	3	13
12	28	0	0	0	0	0	12	90	8	0	0	0	0	0	0	4
18	8	0	0	0	0	0	1	38	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to: 20.0 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	119	34	14	4	9	13	174	365	173	14	0	1	2	7	37	42
2	84	17	7	0	4	6	113	262	116	5	0	0	0	2	23	27
4	51	8	1	0	0	2	50	148	57	0	0	0	0	0	8	12
8	25	0	0	0	0	0	14	53	6	0	0	0	0	0	3	2
12	12	0	0	0	0	0	1	14	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-8 (Sheet 3 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—60-Meter Level

Speed Greater Than or Equal to: 25.0 mph

	Direction															
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	28	5	1	0	0	4	30	125	74	0	0	0	0	4	21	8
2	18	2	0	0	0	1	18	84	45	0	0	0	0	2	13	2
4	9	0	0	0	0	0	9	40	18	0	0	0	0	0	5	0
8	0	0	0	0	0	0	1	5	0	0	0	0	0	0	1	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to: 30.0 mph

	Direction															
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	3	0	1	0	0	0	3	25	8	0	0	0	0	2	8	0
2	1	0	0	0	0	0	2	15	1	0	0	0	0	1	6	0
4	0	0	0	0	0	0	0	7	0	0	0	0	0	0	4	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-8 (Sheet 4 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—60-Meter Level

Site ID: VICT Period of Record: 07/01/2008 01:00 to 06/30/2009 24:00
Number of Sectors Included: 1 Width in Degrees 22.5
60m Wind Speed (MPH) 60m Wind Direction (deg)

60m Wind Speed (MPH) 60m Wind Direction (deg)

Speed Greater Than or Equal to: 5.0, mph
Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	725	532	474	354	424	536	1166	1715	1220	354	175	114	106	107	162	217
2	564	318	273	169	228	297	777	1237	876	193	81	51	40	46	74	125
4	385	132	105	41	76	117	387	701	493	55	23	15	9	18	21	55
8	217	21	14	1	17	21	107	224	181	5	2	2	0	3	1	9
12	139	9	0	0	4	4	24	67	92	1	0	0	0	0	0	0
18	73	0	0	0	0	0	3	4	42	0	0	0	0	0	0	0
24	26	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0
30	11	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
36	5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to:10.0, mph
Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	609	366	312	204	262	398	995	1573	1045	230	89	61	55	70	98	136
2	491	219	185	94	152	236	675	1144	755	132	43	30	20	32	50	80
4	349	91	72	25	61	96	333	645	427	42	14	12	4	11	18	36
8	206	21	8	1	17	16	87	199	163	5	2	2	0	3	1	5
12	129	9	0	0	4	4	16	58	85	1	0	0	0	0	0	0
18	63	0	0	0	0	0	0	2	38	0	0	0	0	0	0	0
24	19	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0
30	8	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
36	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-8 (Sheet 5 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—60-Meter Level

Speed Greater Than or Equal to:15.0, mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	382	169	109	51	93	144	599	962	636	117	35	16	19	42	58	58
2	311	104	60	26	57	76	390	643	450	69	21	8	6	20	27	39
4	224	43	18	10	26	30	190	299	263	20	11	2	0	7	4	18
8	125	12	3	0	8	3	39	60	104	1	2	0	0	0	0	0
12	68	6	0	0	2	0	8	11	56	0	0	0	0	0	0	0
18	25	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0
24	11	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
30	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to:20.0, mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	177	45	9	5	30	15	181	326	306	36	6	3	6	20	21	16
2	133	24	4	2	18	3	118	216	222	17	2	1	2	10	11	9
4	82	15	2	0	5	0	58	96	120	2	0	0	0	4	4	1
8	30	5	0	0	1	0	14	17	29	0	0	0	0	0	0	0
12	10	0	0	0	0	0	5	5	13	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-8 (Sheet 6 of 6)
Wind Direction Persistence/Wind Speed Distributions for the VCS Site—60-Meter Level

Speed Greater Than or Equal to:25.0, mph

	Direction															
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	53	13	1	1	5	1	25	113	122	12	0	0	1	4	12	1
2	34	9	0	0	3	0	14	70	82	5	0	0	0	1	8	0
4	16	4	0	0	0	0	5	25	41	1	0	0	0	0	4	0
8	5	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater Than or Equal to:30.0, mph

	Direction															
Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	9	0	1	0	3	0	2	13	31	1	0	0	0	0	5	0
2	4	0	0	0	2	0	0	5	18	0	0	0	0	0	4	0
4	0	0	0	0	0	0	0	2	8	0	0	0	0	0	2	0
8	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.7-9
Seasonal and Annual Vertical Stability Class and 10-Meter Level Wind Speed Distributions for the VCS Site (July 1, 2007 – June 30, 2009)

Vertical Stability Categories [1]							
Period	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Winter							
Frequency (%)	5.62	6.03	6.17	34.96	20.18	11.82	15.21
Wind Speed (m/sec)	7.1	6.1	5.7	5.3	4.0	2.7	2.3
Spring							
Frequency (%)	12.29	7.10	7.83	33.05	18.52	9.41	11.79
Wind Speed (m/sec)	7.3	6.2	5.9	5.7	4.0	2.5	2.1
Summer							
Frequency (%)	9.75	6.64	7.55	22.08	24.83	22.28	6.87
Wind Speed (m/sec)	6.7	5.6	4.8	4.2	2.9	1.9	1.7
Autumn							
Frequency (%)	4.54	5.77	8.19	19.81	19.12	16.44	26.13
Wind Speed (m/sec)	5.7	4.8	4.1	4.1	3.3	2.3	2.0
Annual							
Frequency (%)	8.07	6.39	7.44	27.46	20.67	15.00	14.96
Wind Speed (m/sec)	6.7	5.7	5.1	4.8	3.6	2.3	2.0

Table 2.7-10 (Sheet 1 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
All Stabilities
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	35	94	174	315	247	202	205	314	72	28	1686
NNE	0	23	95	188	396	268	160	140	78	16	0	1364
NE	1	34	98	168	377	160	78	60	41	4	1	1022
ENE	1	42	69	139	260	117	59	42	16	1	1	747
E	0	33	96	148	348	187	113	72	70	6	2	1075
ESE	0	37	96	150	344	213	141	106	91	12	0	1190
SE	0	34	91	186	539	395	391	371	616	185	17	2825
SSE	0	39	74	170	573	404	353	458	636	319	95	3121
S	0	35	60	101	238	194	199	191	261	171	54	1504
SSW	0	17	42	42	107	100	60	47	24	8	4	451
SW	0	22	31	39	101	47	27	16	8	1	0	292
WSW	0	17	37	38	54	30	12	7	7	0	0	202
W	0	17	37	43	82	41	25	13	5	4	0	267
WNW	1	28	41	53	83	39	18	13	21	9	3	309
NW	2	23	52	78	129	52	25	35	56	24	24	500
NNW	0	18	106	162	197	100	71	71	86	55	16	882
Tot	5	454	1119	1879	4143	2594	1934	1847	2330	887	245	17437

Hours of Calm 33
Hours of Variable Direction 28
Hours of Valid Data 17498
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-10 (Sheet 2 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class A Extremely Unstable based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	0	0	2	8	19	25	69	13	13	149
NNE	0	0	0	0	5	15	13	23	22	4	0	82
NE	0	0	0	2	1	6	4	12	6	1	0	32
ENE	0	0	0	0	1	11	6	7	3	0	0	28
E	0	0	0	0	5	8	7	9	5	1	0	35
ESE	0	0	0	0	2	10	8	17	22	2	0	61
SE	0	0	0	0	2	14	26	43	133	65	7	290
SSE	0	0	0	0	3	7	11	70	177	100	45	413
S	0	0	0	0	2	2	9	18	51	45	13	140
SSW	0	0	0	0	2	2	4	4	6	4	0	22
SW	0	0	0	0	0	1	1	5	3	0	0	10
WSW	0	0	0	0	0	2	3	2	1	0	0	8
W	0	0	0	0	0	0	3	1	0	0	0	4
WNW	0	0	0	0	0	0	2	2	4	6	2	16
NW	0	0	0	0	0	0	2	10	23	3	14	52
NNW	0	0	0	0	1	2	7	11	21	17	6	65
Tot	0	0	0	2	26	88	125	259	546	261	100	1407

Hours of Calm 0
Hours of Variable Direction 0
Hours of Valid Data 1407
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-10 (Sheet 3 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class B Moderately Unstable based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	0	1	6	19	17	16	24	4	1	88
NNE	0	0	0	0	5	25	14	10	10	3	0	67
NE	0	0	0	2	11	11	11	9	6	1	0	51
ENE	0	0	0	1	5	10	13	9	3	0	1	42
E	0	0	0	0	16	16	14	8	11	1	0	66
ESE	0	0	0	0	10	18	16	16	15	4	0	79
SE	0	0	0	1	14	7	24	38	88	27	3	202
SSE	0	0	0	0	4	12	17	56	76	38	14	217
S	0	0	0	1	3	5	32	21	35	27	6	130
SSW	0	0	0	1	6	15	11	9	5	3	2	52
SW	0	0	0	0	4	5	5	4	1	0	0	19
WSW	0	0	0	0	3	4	1	1	1	0	0	10
W	0	0	0	0	1	2	4	2	1	0	0	10
WNW	0	0	0	1	1	4	1	1	6	0	1	15
NW	0	0	0	0	2	4	4	2	8	4	3	27
NNW	0	0	0	0	5	7	4	5	8	7	3	39
Tot	0	0	0	8	96	164	188	207	298	119	34	1114

Hours of Calm 0
Hours of Variable Direction 4
Hours of Valid Data 1118
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-10 (Sheet 4 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class C Slightly Unstable based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	0	1	21	31	22	15	15	11	3	119
NNE	0	1	4	7	17	24	10	16	8	3	0	90
NE	0	0	1	6	20	23	10	6	4	0	0	70
ENE	0	0	0	5	18	14	10	5	1	1	0	54
E	0	0	1	4	23	24	14	10	9	2	0	87
ESE	0	0	0	4	15	17	22	15	12	0	0	85
SE	0	0	1	3	10	22	32	35	85	14	0	202
SSE	0	0	1	0	17	20	19	59	68	35	12	231
S	0	0	0	1	5	20	24	20	30	32	16	148
SSW	0	0	2	2	10	12	8	7	1	0	2	44
SW	0	0	0	2	13	12	8	3	2	1	0	41
WSW	0	0	0	4	2	2	2	2	0	0	0	12
W	0	0	1	4	4	5	7	2	1	0	0	24
WNW	0	0	0	1	5	4	3	1	1	1	0	16
NW	0	0	0	4	6	6	4	6	2	4	2	34
NNW	0	0	1	3	7	6	8	6	4	4	1	40
Tot	0	1	12	51	193	242	203	208	243	108	36	1297

Hours of Calm 0
Hours of Variable Direction 6
Hours of Valid Data 1303
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-10 (Sheet 5 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class D Neutral based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	1	15	25	60	77	97	111	129	28	10	553
NNE	0	4	9	27	96	82	76	71	30	4	0	399
NE	0	2	13	27	80	48	28	26	23	1	1	249
ENE	0	3	5	18	53	33	18	16	4	0	0	150
E	0	2	9	13	44	57	53	38	42	1	2	261
ESE	0	1	8	4	43	60	58	51	38	6	0	269
SE	0	2	7	14	50	77	146	180	285	75	7	843
SSE	0	2	2	16	51	75	136	199	273	142	24	920
S	0	5	5	3	36	60	76	100	125	67	19	496
SSW	0	0	3	13	21	39	24	21	11	1	0	133
SW	0	1	3	7	29	12	8	4	2	0	0	66
WSW	0	0	5	9	14	7	4	1	3	0	0	43
W	0	1	3	11	11	12	8	3	1	4	0	54
WNW	0	0	5	8	14	8	7	5	6	1	0	54
NW	0	2	4	13	37	17	9	9	13	8	2	114
NNW	0	1	12	12	25	27	31	25	31	15	6	185
Tot	0	27	108	220	664	691	779	860	1016	353	71	4789

Hours of Calm	2
Hours of Variable Direction	6
Hours of Valid Data	4797
Hours of Missing Data . . .	46
Hours in Period	17544

Table 2.7-10 (Sheet 6 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class E Slightly Stable based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	<0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
				Wind Speed Range (m/s)								
N	0	6	16	31	54	60	40	38	77	16	1	339
NNE	0	2	22	38	74	60	41	19	7	2	0	265
NE	0	5	20	40	83	41	19	7	2	1	0	218
ENE	0	10	20	34	65	23	9	5	5	0	0	171
E	0	8	16	31	100	56	24	7	3	1	0	246
ESE	0	5	13	26	75	75	37	6	3	0	0	240
SE	0	2	22	35	121	195	160	74	24	4	0	637
SSE	0	9	7	27	171	219	162	74	42	4	0	715
S	0	3	10	16	76	79	57	32	20	0	0	293
SSW	0	2	5	3	18	19	9	6	1	0	0	63
SW	0	3	8	11	16	6	3	0	0	0	0	47
WSW	0	1	9	3	9	5	1	1	2	0	0	31
W	0	4	8	5	6	8	2	4	2	0	0	39
WNW	1	4	10	12	8	6	2	4	4	1	0	52
NW	1	4	11	10	11	12	3	5	10	5	3	75
NNW	0	3	25	13	36	22	18	24	21	12	0	174
Tot	2	71	222	335	923	886	587	306	223	46	4	3605

Hours of Calm 2
Hours of Variable Direction 5
Hours of Valid Data 3612
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-10 (Sheet 7 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class F Moderately Stable based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	12	21	50	66	35	7	0	0	0	0	191
NNE	0	4	26	51	98	48	4	1	1	0	0	233
NE	0	9	27	41	85	11	5	0	0	0	0	178
ENE	0	12	27	46	63	12	3	0	0	0	0	163
E	0	9	41	54	84	18	1	0	0	0	0	207
ESE	0	17	38	68	108	21	0	1	0	0	0	253
SE	0	12	36	95	220	60	2	1	1	0	0	427
SSE	0	14	40	81	226	43	8	0	0	0	0	412
S	0	10	26	44	63	19	1	0	0	0	0	163
SSW	0	5	16	12	25	3	4	0	0	0	0	65
SW	0	9	5	6	13	4	2	0	0	0	0	39
WSW	0	7	6	8	8	7	1	0	0	0	0	37
W	0	6	9	5	14	6	0	1	0	0	0	41
WNW	0	3	10	6	9	6	1	0	0	0	0	35
NW	0	7	14	17	17	9	3	2	0	0	0	69
NNW	0	3	18	27	35	16	3	0	1	0	0	103
Tot	0	139	360	611	1134	318	45	6	3	0	0	2616

Hours of Calm 6
Hours of Variable Direction 2
Hours of Valid Data 2624
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-10 (Sheet 8 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (10-meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class G Extremely Stable based on Lapse Rate
Elevations:: Winds 10m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	16	42	66	106	17	0	0	0	0	0	247
NNE	0	12	34	65	101	14	2	0	0	0	0	228
NE	1	18	37	50	97	20	1	0	0	0	0	224
ENE	1	17	17	35	55	14	0	0	0	0	0	139
E	0	14	29	46	76	8	0	0	0	0	0	173
ESE	0	14	37	48	91	12	0	0	1	0	0	203
SE	0	18	25	38	122	20	1	0	0	0	0	224
SSE	0	14	24	46	101	28	0	0	0	0	0	213
S	0	17	19	36	53	9	0	0	0	0	0	134
SSW	0	10	16	11	25	10	0	0	0	0	0	72
SW	0	9	15	13	26	7	0	0	0	0	0	70
WSW	0	9	17	14	18	3	0	0	0	0	0	61
W	0	6	16	18	46	8	1	0	0	0	0	95
WNW	0	21	16	25	46	11	2	0	0	0	0	121
NW	1	10	23	34	56	4	0	1	0	0	0	129
NNW	0	11	50	107	88	20	0	0	0	0	0	276
Tot	3	216	417	652	1107	205	7	1	1	0	0	2609

Hours of Calm 23
Hours of Variable Direction 5
Hours of Valid Data 2637
Hours of Missing Data . . . 46
Hours in Period 17544

Table 2.7-11 (Sheet 1 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
All Stabilities
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	4	15	32	84	121	154	200	404	260	176	1450
NNE	0	5	13	30	117	140	172	183	353	115	33	1161
NE	0	4	16	27	129	181	182	172	232	49	6	998
ENE	0	1	14	34	95	151	174	158	131	21	1	780
E	0	6	10	20	121	168	182	181	178	50	13	929
ESE	0	6	22	29	96	166	227	270	361	57	9	1243
SE	0	3	10	23	89	170	253	456	941	421	155	2521
SSE	0	3	6	21	90	153	315	563	1465	655	401	3672
S	0	6	12	20	92	158	272	395	635	318	319	2227
SSW	0	4	11	14	67	103	109	113	129	64	25	639
SW	0	3	9	15	59	68	64	45	51	22	0	336
WSW	0	2	14	24	33	40	24	34	43	7	2	223
W	0	3	8	13	37	34	30	33	31	8	5	202
WNW	0	1	5	11	20	32	24	21	40	25	16	195
NW	0	8	13	21	54	60	32	30	73	41	39	371
NNW	0	5	19	25	62	74	88	64	104	57	31	529
Tot	0	64	197	359	1245	1819	2302	2918	5171	2170	1231	17476

Hours of Calm 6
Hours of Variable Direction 15
Hours of Valid Data 17497
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 2 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class A Extremely Unstable based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	0	0	0	4	9	16	51	44	26	150
NNE	0	0	0	0	1	9	9	17	27	15	6	84
NE	0	0	0	1	1	6	4	5	20	1	0	38
ENE	0	0	0	0	1	4	11	4	6	1	0	27
E	0	0	0	0	5	4	7	10	10	2	1	39
ESE	0	0	0	0	1	2	8	7	18	4	0	40
SE	0	0	0	0	0	2	15	22	86	100	27	252
SSE	0	0	0	0	0	5	14	22	133	136	106	416
S	0	0	0	0	1	1	3	12	41	60	73	191
SSW	0	0	0	0	1	2	3	2	5	6	7	26
SW	0	0	0	0	0	0	1	1	6	1	0	9
WSW	0	0	0	0	0	0	1	3	5	0	0	9
W	0	0	0	0	0	2	0	3	1	0	0	6
WNW	0	0	0	0	0	0	0	2	4	1	5	12
NW	0	0	0	0	0	0	0	3	20	7	16	46
NNW	0	0	0	0	1	0	5	11	21	20	4	62
Tot	0	0	0	1	12	41	90	140	454	398	271	1407

Hours of Calm 0
Hours of Variable Direction 0
Hours of Valid Data 1407
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 3 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class B Moderately Unstable based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	0	1	3	15	14	12	20	15	7	87
NNE	0	0	0	0	2	14	17	6	12	7	3	61
NE	0	0	0	1	7	10	9	8	13	1	2	51
ENE	0	0	0	0	6	9	11	13	7	3	0	49
E	0	0	0	0	7	13	15	10	13	5	2	65
ESE	0	0	0	0	5	13	15	6	14	8	0	61
SE	0	0	0	0	3	11	13	33	62	48	26	196
SSE	0	0	0	0	6	3	16	12	75	50	44	206
S	0	0	0	0	4	2	13	28	48	29	34	158
SSW	0	0	0	0	6	6	15	10	14	6	10	67
SW	0	0	0	0	2	1	7	4	2	1	0	17
WSW	0	0	0	0	1	5	2	0	2	1	0	11
W	0	0	0	0	0	2	1	5	2	0	0	10
WNW	0	0	0	0	0	1	3	0	2	2	1	9
NW	0	0	0	0	3	5	3	3	8	5	2	29
NNW	0	0	0	0	2	4	7	2	10	7	6	38
Tot	0	0	0	2	57	114	161	152	304	188	137	1115

Hours of Calm 0
Hours of Variable Direction 3
Hours of Valid Data 1118
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 4 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class C Slightly Unstable based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	<0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	1	1	16	17	24	17	19	13	11	119
NNE	0	1	2	2	19	11	14	8	20	4	4	85
NE	0	0	1	3	13	21	18	8	5	3	0	72
ENE	0	0	0	3	17	9	10	8	5	1	1	54
E	0	0	0	1	13	26	14	11	14	3	3	85
ESE	0	0	1	4	9	17	13	14	15	5	0	78
SE	0	0	1	2	10	13	18	30	75	36	9	194
SSE	0	0	1	0	9	11	16	19	83	41	37	217
S	0	0	1	0	4	14	16	20	44	26	56	181
SSW	0	0	1	0	4	14	9	10	9	1	4	52
SW	0	0	0	2	6	10	9	5	2	1	0	35
WSW	0	0	2	5	4	3	0	4	2	1	1	22
W	0	0	0	0	6	4	5	4	2	0	0	21
WNW	0	0	0	2	3	3	4	0	1	2	0	15
NW	0	0	0	3	8	6	2	2	4	3	1	29
NNW	0	0	1	2	5	6	7	3	5	4	5	38
Tot	0	1	12	30	146	185	179	163	305	144	132	1297

Hours of Calm 0
Hours of Variable Direction 6
Hours of Valid Data 1303
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 5 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class D Neutral based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	0	4	17	37	44	54	67	136	101	76	536
NNE	0	2	4	14	52	54	55	54	114	34	9	392
NE	0	3	8	12	60	57	42	23	53	22	3	283
ENE	0	1	5	16	30	33	27	17	21	4	0	154
E	0	2	7	9	38	33	26	41	45	27	6	234
ESE	0	0	4	4	19	35	33	53	86	22	7	263
SE	0	0	3	6	29	45	59	90	238	192	80	742
SSE	0	1	2	8	14	38	59	82	287	257	203	951
S	0	2	3	5	26	30	41	68	149	122	150	596
SSW	0	2	4	3	19	29	24	26	37	17	4	165
SW	0	0	4	4	22	18	11	6	10	0	0	75
WSW	0	2	2	9	13	9	5	5	1	2	0	48
W	0	0	3	5	12	10	8	5	2	3	1	49
WNW	0	0	1	3	9	10	9	4	7	3	3	49
NW	0	1	6	12	18	24	5	5	15	7	9	102
NNW	0	0	10	8	18	26	21	16	29	13	13	154
Tot	0	16	70	135	416	495	479	562	1230	826	564	4793

Hours of Calm 0
Hours of Variable Direction 4
Hours of Valid Data 4797
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 6 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class E Slightly Stable based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	1	5	5	15	18	26	34	64	71	56	295
NNE	0	0	3	6	22	29	31	40	64	32	10	237
NE	0	0	3	5	21	41	41	49	55	6	1	222
ENE	0	0	3	7	20	46	41	36	20	5	0	178
E	0	2	1	0	16	39	49	42	42	6	1	198
ESE	0	1	8	10	13	27	50	82	78	7	2	278
SE	0	0	0	7	16	35	48	115	239	30	12	502
SSE	0	0	1	5	20	33	65	165	414	101	11	815
S	0	2	3	7	16	30	58	103	162	55	6	442
SSW	0	1	3	5	8	13	10	21	19	15	0	95
SW	0	2	1	2	8	18	14	8	9	1	0	63
WSW	0	0	2	5	4	7	3	5	2	2	1	31
W	0	1	1	3	6	6	4	4	4	2	2	33
WNW	0	0	3	2	1	9	3	5	3	5	2	33
NW	0	1	4	2	7	8	8	7	4	9	10	60
NNW	0	2	3	10	16	15	21	15	30	13	3	128
Tot	0	13	44	81	209	374	472	731	1209	360	117	3610

Hours of Calm 0
Hours of Variable Direction 2
Hours of Valid Data 3612
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 7 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class F Moderately Stable based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	2	1	4	7	12	15	29	56	7	0	133
NNE	0	1	2	5	11	9	19	22	56	14	1	140
NE	0	0	2	1	13	19	41	51	44	6	0	177
ENE	0	0	0	2	10	31	35	39	21	3	0	141
E	0	2	0	6	20	28	46	25	26	1	0	154
ESE	0	1	1	4	23	35	57	66	61	1	0	249
SE	0	1	1	5	11	35	47	85	101	4	1	291
SSE	0	1	0	5	23	41	99	190	262	15	0	636
S	0	2	2	5	21	39	80	118	93	8	0	368
SSW	0	0	3	4	10	16	28	25	17	4	0	107
SW	0	0	3	4	8	12	9	9	4	6	0	55
WSW	0	0	2	1	7	4	5	7	4	0	0	30
W	0	1	2	3	4	4	5	6	11	1	0	37
WNW	0	1	0	0	6	3	1	2	10	3	0	26
NW	0	2	1	0	5	10	5	5	7	4	0	39
NNW	0	0	2	0	6	9	11	7	3	0	0	38
Tot	0	14	22	49	185	307	503	686	776	77	2	2621

Hours of Calm 2
Hours of Variable Direction 0
Hours of Valid Data 2623
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-11 (Sheet 8 of 8)
Joint Frequency Distribution of Wind Speed and Wind Direction (60-Meter Level) by Atmospheric Stability Class for the VCS Site (July 1, 2007 through June 30, 2009)

Site:: Exelon Victoria County
Period:: Months Jul - Jun for years 2007 - 2009
Stability Class G Extremely Stable based on Lapse Rate
Elevations:: Winds 60m Stability 60m

Wind Direction Sector	Wind Speed Range (m/s) <0.50	0.5-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-4.0	4.1-5.0	5.1-6.0	6.1-8.0	8.1-10.0	>10.00	Total
N	0	1	4	4	6	11	12	25	58	9	0	130
NNE	0	1	2	3	10	14	27	36	60	9	0	162
NE	0	1	2	4	14	27	27	28	42	10	0	155
ENE	0	0	6	6	11	19	39	41	51	4	0	177
E	0	0	2	4	22	25	25	42	28	6	0	154
ESE	0	4	8	7	26	37	51	42	89	10	0	274
SE	0	2	5	3	20	29	53	81	140	11	0	344
SSE	0	1	2	3	18	22	46	73	211	55	0	431
S	0	0	3	3	20	42	61	46	98	18	0	291
SSW	0	1	0	2	19	23	20	19	28	15	0	127
SW	0	1	1	3	13	9	13	12	18	12	0	82
WSW	0	0	6	4	4	12	8	10	27	1	0	72
W	0	1	2	2	9	6	7	6	9	2	2	46
WNW	0	0	1	4	1	6	4	8	13	9	5	51
NW	0	4	2	4	13	7	9	5	15	6	1	66
NNW	0	3	3	5	14	14	16	10	6	0	0	71
Tot	0	20	49	61	220	303	418	484	893	177	8	2633

Hours of Calm 4
Hours of Variable Direction 0
Hours of Valid Data 2637
Hours of Missing Data . . . 47
Hours in Period 17544

Table 2.7-12
Property Boundary, EAB, and LPZ Distances from the Source Boundary

Direction	Property Boundary Distance (m)	EAB Distance (m)	LPZ Distance (m)
S	2079	1087	7,797
SSW	1417	944	7,622
SW	1003	928	7,611
WSW	889	884	7,601
W	1033	965	7,740
WNW	1107	956	7,777
NW	1305	956	7,783
NNW	1387	959	7,766
N	1401	951	7,701
NNE	1701	879	7,576
NE	2776	947	7,623
ENE	2818	983	7,669
E	3961	1,111	7,854
ESE	5392	1,108	7,920
SE	6176	1,108	7,934
SSE	3248	1,111	7,899

Table 2.7-13
PAVAN Output – 50% X/Q Values (s/m^3) at the EAB & LPZ

Directional Dependant 50% X/Q	EAB	LPZ
S	3.124E-05	1.738E-06
SSW	5.522E-05	3.127E-06
SW	7.098E-05	4.974E-06
WSW	7.960E-05	5.734E-06
W	6.149E-05	4.109E-06
WNW	6.470E-05	4.173E-06
NW	3.957E-05	1.794E-06
NNW	3.398E-05	1.502E-06
N	3.201E-05	1.374E-06
NNE	4.849E-05	2.258E-06
NE	6.079E-05	4.258E-06
ENE	**8.846E-05**	8.308E-06
E	8.594E-05	9.179E-06
ESE	8.647E-05	**9.642E-06**
SE	4.472E-05	3.406E-06
SSE	5.907E-05	4.960E-06
Overall Site 50% X/Q	4.044E-05	2.249E-06

Max 50% X/Q	**8.846E-05**	**9.642E-06**

Table 2.7-14
XOQDOQ-Predicted Maximum X/Q and D/Q Values at Receptors of Interest

	Type of Location	Direction from Site	Distance (miles)	χ/Q (sec/m^3)
No Decay	EAB	NNW	0.60	1.790E-05
	Property Boundary	SW	0.62	1.274E-05
	Resident	NNW	1.40	2.843E-06
	Meat Animal	NNW	1.40	2.843E-06
	Vegetable Garden	NW	1.65	1.983E-06
	Construction Worker	NNE	0.25	1.603E-05
2.26 Day Decay	EAB	NNW	0.60	1.787E-05
	Property Boundary	SW	0.62	1.265E-05
	Resident	NNW	1.40	2.831E-06
	Meat Animal	NNW	1.40	2.843E-06
	Vegetable Garden	NW	1.65	1.973E-06
	Construction Worker	NNE	0.25	1.602E-05
8 Day Decay	EAB	NNW	0.60	1.616E-05
	Property Boundary	SW	0.62	1.146E-05
	Resident	NNW	1.40	2.424E-06
	Meat Animal	NNW	1.40	2.843E-06
	Vegetable Garden	NW	1.65	1.668E-06
	Construction Worker	NNE	0.25	1.517E-05
		Direction from Site	**Distance (miles)**	**D/Q (1/m^2)**
	EAB	NNW	0.60	1.048E-07
	Property Boundary	SW	0.62	5.315E-08
	Resident	NNW	1.40	1.448E-08
	Meat Animal	NNW	1.40	1.448E-08
	Vegetable Garden	NW	1.65	8.836E-09
	Construction Worker	NNE	0.25	5.979E-08

Table 2.7-15
Shortest Distances Between the VCS Source Boundary and Receptors of Interest by Downwind Direction Sector

Distance (Meters)	Type of Receptor	Directional Sector
4,773	Residence, Meat, Garden	N
2,261	Residence, Meat	NNW
4,033	Garden	NNW
2,651	Residence, Meat, Garden	NW
7,267	Residence, Meat, Garden	WNW
7,227	Residence, Meat, Garden	W
9,838	Residence, Meat, Garden	WSW
3,467	Residence, Meat, Garden	SW
3,656	Residence, Meat, Garden	SSW
9,524	Residence, Meat, Garden	S
6,795	Residence, Meat, Garden	SSE
N/A	N/A	SE
8,430	Residence, Meat, Garden	ESE
12,929	Residence, Meat, Garden	E
9,172	Residence, Meat, Garden	ENE
3,479	Residence, Meat, Garden	NE
6,687	Residence, Meat, Garden	NNE

Table 2.7-16 (Sheet 1 of 2)
XOQDOQ-Predicted Maximum Annual Average X/Q and D/Q Values at the Standard Radial Distances and Distance-Segment Boundaries

No Decay Undepleted	DISTANCE IN MILES FROM SITE										
NNW	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
X/Q (s/m^3)	6.889E-05	2.348E-05	1.255E-05	6.238E-06	2.444E-06	1.309E-06	8.258E-07	5.750E-07	4.277E-07	3.335E-07	2.693E-07
	DISTANCE IN MILES FROM SITE										
NNW	5	7.5*	10*	15*	20*	25*	30*	35*	40*	45*	50*
X/Q (s/m^3)	2.235E-07	1.164E-07	7.632E-08	4.459E-08	3.063E-08	2.294E-08	1.814E-08	1.489E-08	1.256E-08	1.082E-08	9.465E-09
	SEGMENT BOUNDARIES IN MILES FROM SITE										
NNW	.5-1	1-2	2-3	3-4	4-5	5-10**	10-20*	20-30*	30-40*	40-50*	
X/Q (s/m^3)	1.217E-05	2.783E-06	8.544E-07	4.339E-07	2.714E-07	1.223E-07	4.544E-08	2.307E-08	1.493E-08	1.083E-08	

* Represents NW Directional Sector ** Represents NW and NNW Directional Sector

2.26 Day Decay Undepleted	DISTANCE IN MILES FROM SITE										
NNW	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
X/Q (s/m^3)	6.884E-05	2.344E-05	1.252E-05	6.220E-06	2.433E-06	1.302E-06	8.198E-07	5.700E-07	4.234E-07	3.296E-07	2.658E-07
	DISTANCE IN MILES FROM SITE										
NNW	5	7.5*	10*	15*	20*	25*	30*	35*	40*	45*	50*
X/Q (s/m^3)	2.202E-07	1.138E-07	7.403E-08	4.259E-08	2.880E-08	2.124E-08	1.654E-08	1.337E-08	1.111E-08	9.417E-09	8.116E-09
	SEGMENT BOUNDARIES IN MILES FROM SITE										
NNW	.5-1	1-2	2-3	3-4	4-5	5-10**	10-20*	20-30*	30-40*	40-50*	
X/Q (s/m^3)	1.215E-05	2.772E-06	8.484E-07	4.295E-07	2.678E-07	1.197E-07	4.345E-08	2.138E-08	1.341E-08	9.436E-09	

* Represents NW Directional Sector ** Represents NW and NNW Directional Sector

Table 2.7-16 (Sheet 2 of 2)
XOQDOQ-Predicted Maximum Annual Average X/Q and D/Q Values at the Standard Radial Distances and Distance-Segment Boundaries

8.00 Day Decay Depleted	DISTANCE IN MILES FROM SITE										
NNW	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
X/Q (s/m^3)	6.519E-05	2.143E-05	1.117E-05	5.456E-06	2.073E-06	1.082E-06	6.675E-07	4.556E-07	3.328E-07	2.552E-07	2.029E-07
	DISTANCE IN MILES FROM SITE										
NNW	5	7.5*	10*	15*	20*	25*	30*	35*	40*	45*	50*
X/Q (s/m^3)	1.659E-07	8.152E-08	5.083E-08	2.737E-08	1.758E-08	1.242E-08	9.320E-09	7.291E-09	5.881E-09	4.854E-09	4.081E-09
	SEGMENT BOUNDARIES IN MILES FROM SITE										
NNW	.5-1	1-2	2-3	3-4	4-5	5-10*	10-20*	20-30*	30-40*	40-50*	
X/Q (s/m^3)	1.091E-05	2.385E-06	6.934E-07	3.383E-07	2.047E-07	8.659E-08	2.823E-08	1.255E-08	7.334E-09	4.872E-09	

* Represents NW Direction

Relative Deposition						
DISTANCE IN MILES FROM SITE						
NNW	0.25	0.5	0.75	1	1.5	2
D/Q ($1/m^2$)	4.138E-07	1.399E-07	7.184E-08	3.415E-08	1.227E-08	6.084E-09
DISTANCE IN MILES FROM SITE						
NNW	2.5	3	3.5	4	4.5	5
D/Q ($1/m^2$)	3.582E-09	2.346E-09	1.651E-09	1.223E-09	9.426E-10	7.489E-10
DISTANCE IN MILES FROM SITE						
NNW	7.5	10	15	20	25	30
D/Q ($1/m^2$)	3.327E-10	2.015E-10	1.019E-10	6.165E-11	4.133E-11	2.962E-11
DISTANCE IN MILES FROM SITE						
NNW	35	40	45	50		
D/Q ($1/m^2$)	2.224E-11	1.729E-11	1.381E-11	1.127E-11		

Table 2.7-17 (Sheet 1 of 2)
Long-Term Average X/Q and D/Q Values for Routine Releases at Specific Receptors of Interest

Release Point - Ground Level - No Intermittent Releases
CORRECTED USING STANDARD OPEN TERRAIN FACTORS
SPECIFIC POINTS OF INTEREST

0RELEASE ID	TYPE OF LOCATION	DIRECTION FROM SITE	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
A	Res/Meat	S	5.92	9524.	1.3E-07	1.2E-07	9.1E-08	2.8E-10
A	Res/Meat	SSW	2.27	3656.	7.1E-07	7.0E-07	5.8E-07	2.0E-09
A	Res/Meat	SW	2.15	3467.	9.2E-07	8.9E-07	7.5E-07	1.7E-09
A	Res/Meat	WSW	6.11	9838.	1.1E-07	1.0E-07	7.8E-08	1.2E-10
A	Res/Meat	W	4.49	7227.	1.7E-07	1.7E-07	1.3E-07	3.3E-10
A	Res/Meat	WNW	4.52	7267.	1.9E-07	1.8E-07	1.4E-07	3.6E-10
A	Res/Meat	NW	1.65	2651.	2.0E-06	2.0E-06	1.7E-06	8.8E-09
A	Res/Meat	NNW	1.40	2261.	2.8E-06	2.8E-06	2.4E-06	1.4E-08
A	Res/Meat	N	2.97	4773.	3.2E-07	3.2E-07	2.5E-07	1.2E-09
A	Res/Meat	NNE	4.16	6687.	7.5E-08	7.3E-08	5.7E-08	1.6E-10
A	Res/Meat	NE	2.16	3479.	2.2E-07	2.2E-07	1.8E-07	4.7E-10
A	Res/Meat	ENE	5.70	9172.	3.3E-08	3.2E-08	2.4E-08	3.7E-11
A	Res/Meat	E	8.03	12929.	2.4E-08	2.3E-08	1.6E-08	2.5E-11
A	Res/Meat	ESE	5.24	8430.	6.1E-08	6.0E-08	4.5E-08	6.7E-11
A	Res/Meat	SSE	4.22	6795.	1.8E-07	1.8E-07	1.4E-07	3.1E-10
A	Veg	S	5.92	9524.	1.3E-07	1.2E-07	9.1E-08	2.8E-10
A	Veg	SSW	2.27	3656.	7.1E-07	7.0E-07	5.8E-07	2.0E-09
A	Veg	SW	2.15	3467.	9.2E-07	8.9E-07	7.5E-07	1.7E-09
A	Veg	WSW	6.11	9838.	1.1E-07	1.0E-07	7.8E-08	1.2E-10
A	Veg	W	4.49	7227.	1.7E-07	1.7E-07	1.3E-07	3.3E-10
A	Veg	WNW	4.52	7267.	1.9E-07	1.8E-07	1.4E-07	3.6E-10
A	Veg	NW	1.65	2651.	2.0E-06	2.0E-06	1.7E-06	8.8E-09
A	Veg	NNW	2.51	4033.	8.2E-07	8.2E-07	6.6E-07	3.6E-09
A	Veg	N	2.97	4773.	3.2E-07	3.2E-07	2.5E-07	1.2E-09
A	Veg	NNE	4.16	6687.	7.5E-08	7.3E-08	5.7E-08	1.6E-10
A	Veg	NE	2.16	3479.	2.2E-07	2.2E-07	1.8E-07	4.7E-10
A	Veg	ENE	5.70	9172.	3.3E-08	3.2E-08	2.4E-08	3.7E-11
A	Veg	E	8.03	12929.	2.4E-08	2.3E-08	1.6E-08	2.5E-11
A	Veg	ESE	5.24	8430.	6.1E-08	6.0E-08	4.5E-08	6.7E-11
A	Veg	SSE	4.22	6795.	1.8E-07	1.8E-07	1.4E-07	3.1E-10
A	Property Bndry	S	1.29	2079.	2.5E-06	2.5E-06	2.1E-06	9.6E-09

Table 2.7-17 (Sheet 2 of 2)
Long-Term Average X/Q and D/Q Values for Routine Releases at Specific Receptors of Interest

A	Property Bndry	SSW	.88	1417.	5.8E-06	5.8E-06	5.1E-06	2.1E-08
A	Property Bndry	SW	.62	1003.	1.3E-05	1.3E-05	1.1E-05	3.2E-08
A	Property Bndry	WSW	.55	889.	1.3E-05	1.2E-05	1.1E-05	2.9E-08
A	Property Bndry	W	.64	1033.	9.6E-06	9.5E-06	8.6E-06	3.2E-08
A	Property Bndry	WNW	.69	1107.	9.4E-06	9.4E-06	8.4E-06	3.2E-08
A	Property Bndry	NW	.81	1305.	1.0E-05	1.0E-05	9.1E-06	5.3E-08
A	Property Bndry	NNW	.86	1387.	8.9E-06	8.9E-06	7.9E-06	5.0E-08
A	Property Bndry	N	.87	1401.	4.7E-06	4.7E-06	4.2E-06	2.4E-08
A	Property Bndry	NNE	1.06	1701.	1.3E-06	1.3E-06	1.1E-06	4.3E-09
A	Property Bndry	NE	1.72	2776.	3.6E-07	3.6E-07	3.0E-07	8.1E-10
A	Property Bndry	ENE	1.75	2818.	3.0E-07	3.0E-07	2.5E-07	5.4E-10
A	Property Bndry	E	2.46	3961.	1.8E-07	1.8E-07	1.5E-07	3.2E-10
A	Property Bndry	ESE	3.35	5392.	1.3E-07	1.3E-07	1.1E-07	1.8E-10
A	Property Bndry	SE	3.84	6176.	1.9E-07	1.7E-07	1.4E-07	2.2E-10
A	Property Bndry	SSE	2.02	3248.	7.5E-07	7.5E-07	6.2E-07	1.7E-09
A	EAB	S	.68	1087.	1.1E-05	1.0E-05	9.4E-06	4.6E-08
A	EAB	SSW	.59	944.	1.3E-05	1.2E-05	1.1E-05	4.7E-08
A	EAB	SW	.58	928.	1.4E-05	1.4E-05	1.3E-05	3.7E-08
A	EAB	WSW	.55	884.	1.3E-05	1.3E-05	1.1E-05	2.9E-08
A	EAB	W	.60	965.	1.1E-05	1.1E-05	9.6E-06	3.6E-08
A	EAB	WNW	.59	956.	1.2E-05	1.2E-05	1.1E-05	4.0E-08
A	EAB	NW	.59	956.	1.8E-05	1.8E-05	1.6E-05	9.6E-08
A	EAB	NNW	.60	959.	1.8E-05	1.8E-05	1.6E-05	1.1E-07
A	EAB	N	.59	951.	9.8E-06	9.7E-06	8.8E-06	5.1E-08
A	EAB	NNE	.55	879.	4.7E-06	4.6E-06	4.2E-06	1.8E-08
A	EAB	NE	.59	947.	3.5E-06	3.5E-06	3.2E-06	1.0E-08
A	EAB	ENE	.61	983.	2.8E-06	2.8E-06	2.5E-06	6.5E-09
A	EAB	E	.69	1111.	2.8E-06	2.8E-06	2.5E-06	7.1E-09
A	EAB	ESE	.69	1108.	3.7E-06	3.7E-06	3.3E-06	8.2E-09
A	EAB	SE	.69	1108.	6.6E-06	6.5E-06	5.9E-06	1.4E-08
A	EAB	SSE	.69	1111.	7.8E-06	7.7E-06	6.9E-06	2.3E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	24.4
EXIT VELOCITY	(METERS)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	1263.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

Table 2.7-18
Long-Term Average X/Q Values (sec/m^3) for Routine Releases at Distances Between 0.25 and 50 Miles, No Decay, Undepleted

NO DECAY, UNDEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS
ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	5.016E-05	1.657E-05	8.970E-06	4.501E-06	1.783E-06	9.620E-07	6.099E-07	4.265E-07	3.184E-07	2.491E-07	2.017E-07
SSW	4.755E-05	1.585E-05	8.577E-06	4.302E-06	1.702E-06	9.181E-07	5.818E-07	4.067E-07	3.036E-07	2.374E-07	1.922E-07
SW	5.390E-05	1.765E-05	9.693E-06	4.907E-06	1.965E-06	1.068E-06	6.811E-07	4.784E-07	3.585E-07	2.813E-07	2.285E-07
WSW	4.361E-05	1.443E-05	7.918E-06	4.006E-06	1.603E-06	8.715E-07	5.556E-07	3.902E-07	2.924E-07	2.295E-07	1.863E-07
W	4.121E-05	1.393E-05	7.543E-06	3.781E-06	1.496E-06	8.068E-07	5.114E-07	3.575E-07	2.669E-07	2.087E-07	1.690E-07
WNW	4.491E-05	1.523E-05	8.274E-06	4.158E-06	1.650E-06	8.921E-07	5.664E-07	3.965E-07	2.963E-07	2.320E-07	1.880E-07
NW	6.804E-05	2.319E-05	1.242E-05	6.188E-06	2.429E-06	1.303E-06	8.225E-07	5.731E-07	4.266E-07	3.329E-07	2.689E-07
NNW	6.889E-05	2.348E-05	1.255E-05	6.238E-06	2.444E-06	1.309E-06	8.258E-07	5.750E-07	4.277E-07	3.335E-07	2.693E-07
N	3.753E-05	1.257E-05	6.749E-06	3.368E-06	1.325E-06	7.118E-07	4.498E-07	3.137E-07	2.337E-07	1.824E-07	1.475E-07
NNE	1.603E-05	5.301E-06	2.870E-06	1.441E-06	5.708E-07	3.081E-07	1.954E-07	1.366E-07	1.020E-07	7.984E-08	6.466E-08
NE	1.355E-05	4.453E-06	2.427E-06	1.223E-06	4.867E-07	2.635E-07	1.675E-07	1.174E-07	8.782E-08	6.880E-08	5.579E-08
ENE	1.142E-05	3.754E-06	2.064E-06	1.046E-06	4.193E-07	2.281E-07	1.455E-07	1.023E-07	7.668E-08	6.019E-08	4.889E-08
E	1.380E-05	4.514E-06	2.483E-06	1.259E-06	5.048E-07	2.747E-07	1.753E-07	1.232E-07	9.237E-08	7.251E-08	5.891E-08
ESE	1.844E-05	5.962E-06	3.296E-06	1.676E-06	6.749E-07	3.682E-07	2.354E-07	1.658E-07	1.244E-07	9.781E-08	7.954E-08
SE	3.254E-05	1.046E-05	5.801E-06	2.957E-06	1.195E-06	6.533E-07	4.183E-07	2.949E-07	2.216E-07	1.743E-07	1.418E-07
SSE	3.846E-05	1.245E-05	6.874E-06	3.493E-06	1.405E-06	7.664E-07	4.898E-07	3.447E-07	2.587E-07	2.033E-07	1.653E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	1.678E-07	8.810E-08	5.808E-08	3.420E-08	2.362E-08	1.777E-08	1.411E-08	1.162E-08	9.824E-09	8.479E-09	7.436E-09
SSW	1.598E-07	8.386E-08	5.526E-08	3.251E-08	2.244E-08	1.687E-08	1.338E-08	1.102E-08	9.314E-09	8.037E-09	7.046E-09
SW	1.905E-07	1.010E-07	6.699E-08	3.979E-08	2.764E-08	2.088E-08	1.663E-08	1.374E-08	1.164E-08	1.007E-08	8.850E-09
WSW	1.554E-07	8.232E-08	5.461E-08	3.242E-08	2.251E-08	1.700E-08	1.354E-08	1.118E-08	9.474E-09	8.193E-09	7.197E-09
W	1.406E-07	7.378E-08	4.863E-08	2.861E-08	1.975E-08	1.485E-08	1.178E-08	9.695E-09	8.196E-09	7.071E-09	6.198E-09
WNW	1.565E-07	8.235E-08	5.438E-08	3.208E-08	2.217E-08	1.669E-08	1.325E-08	1.092E-08	9.234E-09	7.971E-09	6.991E-09
NW	2.233E-07	1.164E-07	7.632E-08	4.459E-08	3.063E-08	2.294E-08	1.814E-08	1.489E-08	1.256E-08	1.082E-08	9.465E-09
NNW	2.235E-07	1.163E-07	7.617E-08	4.443E-08	3.048E-08	2.281E-08	1.803E-08	1.479E-08	1.247E-08	1.073E-08	9.386E-09
N	1.225E-07	6.399E-08	4.203E-08	2.463E-08	1.695E-08	1.272E-08	1.007E-08	8.279E-09	6.991E-09	6.025E-09	5.278E-09
NNE	5.381E-08	2.831E-08	1.869E-08	1.103E-08	7.629E-09	5.748E-09	4.567E-09	3.764E-09	3.186E-09	2.752E-09	2.415E-09
NE	4.647E-08	2.452E-08	1.622E-08	9.604E-09	6.659E-09	5.025E-09	3.998E-09	3.299E-09	2.795E-09	2.416E-09	2.122E-09
ENE	4.078E-08	2.163E-08	1.436E-08	8.536E-09	5.932E-09	4.484E-09	3.572E-09	2.951E-09	2.502E-09	2.165E-09	1.902E-09
E	4.914E-08	2.607E-08	1.731E-08	1.030E-08	7.160E-09	5.414E-09	4.315E-09	3.566E-09	3.024E-09	2.617E-09	2.300E-09
ESE	6.640E-08	3.535E-08	2.352E-08	1.403E-08	9.769E-09	7.396E-09	5.900E-09	4.879E-09	4.141E-09	3.585E-09	3.153E-09
SE	1.185E-07	6.322E-08	4.215E-08	2.519E-08	1.757E-08	1.332E-08	1.064E-08	8.803E-09	7.477E-09	6.478E-09	5.700E-09
SSE	1.380E-07	7.338E-08	4.882E-08	2.909E-08	2.025E-08	1.533E-08	1.223E-08	1.011E-08	8.579E-09	7.426E-09	6.530E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	24.4
EXIT VELOCITY	(METERS)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	1263.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

Table 2.7-19
Long-Term Average X/Q Values (sec/m3) for Routine Releases at the Standard Distance Segments Between 0.5 and 50 Miles, No Decay, Undepleted

NO DECAY, UNDEPLETED
CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES FROM THE SITE .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	8.673E-06	2.022E-06	6.304E-07	3.229E-07	2.032E-07	9.246E-08	3.481E-08	1.787E-08	1.164E-08	8.491E-09
SSW	8.294E-06	1.931E-06	6.015E-07	3.078E-07	1.936E-07	8.803E-08	3.309E-08	1.696E-08	1.104E-08	8.048E-09
SW	9.335E-06	2.220E-06	7.033E-07	3.634E-07	2.301E-07	1.058E-07	4.043E-08	2.098E-08	1.377E-08	1.009E-08
WSW	7.625E-06	1.812E-06	5.737E-07	2.964E-07	1.876E-07	8.623E-08	3.295E-08	1.709E-08	1.120E-08	8.204E-09
W	7.291E-06	1.697E-06	5.286E-07	2.706E-07	1.702E-07	7.744E-08	2.912E-08	1.493E-08	9.720E-09	7.081E-09
WNW	7.991E-06	1.871E-06	5.853E-07	3.004E-07	1.893E-07	8.639E-08	3.263E-08	1.678E-08	1.094E-08	7.982E-09
NW	1.204E-05	2.764E-06	8.509E-07	4.328E-07	2.710E-07	1.223E-07	4.544E-08	2.307E-08	1.493E-08	1.083E-08
NNW	1.217E-05	2.783E-06	8.544E-07	4.339E-07	2.714E-07	1.223E-07	4.528E-08	2.294E-08	1.483E-08	1.075E-08
N	6.539E-06	1.507E-06	4.652E-07	2.370E-07	1.486E-07	6.723E-08	2.508E-08	1.279E-08	8.301E-09	6.034E-09
NNE	2.775E-06	6.474E-07	2.019E-07	1.035E-07	6.514E-08	2.970E-08	1.122E-08	5.777E-09	3.773E-09	2.756E-09
NE	2.342E-06	5.511E-07	1.731E-07	8.903E-08	5.619E-08	2.571E-08	9.766E-09	5.050E-09	3.307E-09	2.419E-09
ENE	1.987E-06	4.736E-07	1.503E-07	7.771E-08	4.923E-08	2.265E-08	8.673E-09	4.505E-09	2.957E-09	2.167E-09
E	2.390E-06	5.701E-07	1.810E-07	9.361E-08	5.932E-08	2.730E-08	1.046E-08	5.440E-09	3.574E-09	2.620E-09
ESE	3.168E-06	7.611E-07	2.430E-07	1.261E-07	8.009E-08	3.699E-08	1.425E-08	7.431E-09	4.890E-09	3.590E-09
SE	5.571E-06	1.346E-06	4.316E-07	2.245E-07	1.428E-07	6.614E-08	2.557E-08	1.338E-08	8.822E-09	6.486E-09
SSE	6.611E-06	1.585E-06	5.055E-07	2.622E-07	1.664E-07	7.681E-08	2.955E-08	1.540E-08	1.013E-08	7.436E-09

Table 2.7-20
Long-Term Average X/Q Values (sec/m3) for Routine Releases at Distances Between 0.25 and 50 Miles, 2.26-Day Decay, Undepleted

2.260 DAY DECAY, UNDEPLETED
CORRECTED USING STANDARD OPEN TERRAIN FACTORS
ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	5.012E-05	1.654E-05	8.948E-06	4.486E-06	1.774E-06	9.556E-07	6.048E-07	4.222E-07	3.147E-07	2.457E-07	1.986E-07
SSW	4.752E-05	1.583E-05	8.557E-06	4.288E-06	1.694E-06	9.122E-07	5.772E-07	4.028E-07	3.002E-07	2.343E-07	1.894E-07
SW	5.374E-05	1.755E-05	9.606E-06	4.848E-06	1.929E-06	1.042E-06	6.599E-07	4.606E-07	3.430E-07	2.674E-07	2.158E-07
WSW	4.345E-05	1.433E-05	7.834E-06	3.949E-06	1.568E-06	8.460E-07	5.352E-07	3.731E-07	2.775E-07	2.161E-07	1.742E-07
W	4.118E-05	1.391E-05	7.523E-06	3.768E-06	1.488E-06	8.010E-07	5.068E-07	3.537E-07	2.635E-07	2.057E-07	1.663E-07
WNW	4.487E-05	1.521E-05	8.252E-06	4.144E-06	1.642E-06	8.857E-07	5.613E-07	3.923E-07	2.926E-07	2.286E-07	1.850E-07
NW	6.799E-05	2.316E-05	1.240E-05	6.170E-06	2.418E-06	1.295E-06	8.164E-07	5.681E-07	4.222E-07	3.289E-07	2.653E-07
NNW	6.884E-05	2.344E-05	1.252E-05	6.220E-06	2.433E-06	1.302E-06	8.198E-07	5.700E-07	4.234E-07	3.296E-07	2.658E-07
N	3.750E-05	1.254E-05	6.732E-06	3.357E-06	1.318E-06	7.069E-07	4.459E-07	3.104E-07	2.308E-07	1.799E-07	1.452E-07
NNE	1.602E-05	5.291E-06	2.862E-06	1.435E-06	5.675E-07	3.057E-07	1.934E-07	1.350E-07	1.006E-07	7.858E-08	6.351E-08
NE	1.353E-05	4.444E-06	2.419E-06	1.218E-06	4.836E-07	2.613E-07	1.657E-07	1.159E-07	8.649E-08	6.761E-08	5.470E-08
ENE	1.140E-05	3.746E-06	2.057E-06	1.041E-06	4.165E-07	2.261E-07	1.439E-07	1.009E-07	7.547E-08	5.910E-08	4.790E-08
E	1.378E-05	4.505E-06	2.476E-06	1.254E-06	5.018E-07	2.725E-07	1.735E-07	1.217E-07	9.109E-08	7.137E-08	5.787E-08
ESE	1.841E-05	5.943E-06	3.281E-06	1.666E-06	6.687E-07	3.638E-07	2.319E-07	1.628E-07	1.219E-07	9.552E-08	7.746E-08
SE	3.238E-05	1.036E-05	5.719E-06	2.901E-06	1.161E-06	6.284E-07	3.984E-07	2.781E-07	2.070E-07	1.613E-07	1.300E-07
SSE	3.843E-05	1.243E-05	6.856E-06	3.481E-06	1.398E-06	7.610E-07	4.855E-07	3.411E-07	2.555E-07	2.004E-07	1.627E-07

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	1.649E-07	8.586E-08	5.611E-08	3.247E-08	2.204E-08	1.629E-08	1.271E-08	1.029E-08	8.551E-09	7.254E-09	6.254E-09
SSW	1.573E-07	8.183E-08	5.347E-08	3.094E-08	2.100E-08	1.553E-08	1.212E-08	9.816E-09	8.164E-09	6.929E-09	5.977E-09
SW	1.789E-07	9.197E-08	5.929E-08	3.340E-08	2.212E-08	1.602E-08	1.228E-08	9.789E-09	8.038E-09	6.750E-09	5.770E-09
WSW	1.442E-07	7.369E-08	4.724E-08	2.632E-08	1.727E-08	1.240E-08	9.430E-09	7.470E-09	6.098E-09	5.094E-09	4.335E-09
W	1.380E-07	7.180E-08	4.689E-08	2.709E-08	1.836E-08	1.355E-08	1.056E-08	8.534E-09	7.085E-09	6.004E-09	5.169E-09
WNW	1.537E-07	8.015E-08	5.244E-08	3.037E-08	2.062E-08	1.524E-08	1.189E-08	9.615E-09	7.988E-09	6.773E-09	5.835E-09
NW	2.200E-07	1.138E-07	7.403E-08	4.259E-08	2.880E-08	2.124E-08	1.654E-08	1.337E-08	1.111E-08	9.417E-09	8.116E-09
NNW	2.202E-07	1.137E-07	7.393E-08	4.247E-08	2.870E-08	2.115E-08	1.647E-08	1.331E-08	1.105E-08	9.368E-09	8.072E-09
N	1.204E-07	6.231E-08	4.056E-08	2.334E-08	1.577E-08	1.162E-08	9.041E-09	7.298E-09	6.053E-09	5.124E-09	4.409E-09
NNE	5.275E-08	2.747E-08	1.795E-08	1.038E-08	7.035E-09	5.193E-09	4.044E-09	3.266E-09	2.710E-09	2.294E-09	1.973E-09
NE	4.546E-08	2.373E-08	1.553E-08	8.990E-09	6.099E-09	4.503E-09	3.506E-09	2.831E-09	2.347E-09	1.986E-09	1.707E-09
ENE	3.986E-08	2.090E-08	1.372E-08	7.971E-09	5.414E-09	4.001E-09	3.116E-09	2.517E-09	2.087E-09	1.765E-09	1.517E-09
E	4.817E-08	2.531E-08	1.664E-08	9.704E-09	6.617E-09	4.908E-09	3.837E-09	3.110E-09	2.588E-09	2.197E-09	1.895E-09
ESE	6.449E-08	3.386E-08	2.224E-08	1.292E-08	8.775E-09	6.484E-09	5.051E-09	4.080E-09	3.385E-09	2.865E-09	2.464E-09
SE	1.076E-07	5.485E-08	3.502E-08	1.933E-08	1.256E-08	8.945E-09	6.756E-09	5.320E-09	4.322E-09	3.597E-09	3.052E-09
SSE	1.355E-07	7.146E-08	4.711E-08	2.758E-08	1.886E-08	1.403E-08	1.099E-08	8.928E-09	7.445E-09	6.333E-09	5.472E-09

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	.00	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	24.4
EXIT VELOCITY	(METERS)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	1263.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

Table 2.7-21
Long-Term Average X/Q Values (sec/m3) for Routine Releases at the Standard Distance Segments Between 0.5 and 50 Miles, 2.26-Day Decay, Undepleted

2.260 DAY DECAY, UNDEPLETED
CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	8.653E-06	2.013E-06	6.253E-07	3.191E-07	2.001E-07	9.021E-08	3.309E-08	1.639E-08	1.032E-08	7.268E-09
SSW	8.275E-06	1.923E-06	5.968E-07	3.044E-07	1.908E-07	8.599E-08	3.153E-08	1.563E-08	9.846E-09	6.942E-09
SW	9.257E-06	2.183E-06	6.820E-07	3.478E-07	2.174E-07	9.675E-08	3.414E-08	1.615E-08	9.832E-09	6.769E-09
WSW	7.550E-06	1.776E-06	5.533E-07	2.814E-07	1.755E-07	7.759E-08	2.695E-08	1.251E-08	7.507E-09	5.110E-09
W	7.273E-06	1.689E-06	5.240E-07	2.673E-07	1.675E-07	7.545E-08	2.761E-08	1.364E-08	8.561E-09	6.015E-09
WNW	7.971E-06	1.862E-06	5.802E-07	2.967E-07	1.863E-07	8.417E-08	3.094E-08	1.533E-08	9.644E-09	6.786E-09
NW	1.202E-05	2.753E-06	8.448E-07	4.283E-07	2.674E-07	1.197E-07	4.345E-08	2.138E-08	1.341E-08	9.436E-09
NNW	1.215E-05	2.772E-06	8.484E-07	4.295E-07	2.678E-07	1.197E-07	4.334E-08	2.129E-08	1.335E-08	9.386E-09
N	6.524E-06	1.500E-06	4.613E-07	2.342E-07	1.463E-07	6.555E-08	2.380E-08	1.170E-08	7.321E-09	5.134E-09
NNE	2.768E-06	6.440E-07	2.000E-07	1.021E-07	6.399E-08	2.885E-08	1.057E-08	5.224E-09	3.276E-09	2.298E-09
NE	2.335E-06	5.479E-07	1.713E-07	8.769E-08	5.510E-08	2.491E-08	9.158E-09	4.530E-09	2.840E-09	1.990E-09
ENE	1.981E-06	4.707E-07	1.486E-07	7.650E-08	4.824E-08	2.192E-08	8.112E-09	4.024E-09	2.524E-09	1.769E-09
E	2.384E-06	5.670E-07	1.792E-07	9.234E-08	5.828E-08	2.654E-08	9.874E-09	4.935E-09	3.119E-09	2.201E-09
ESE	3.154E-06	7.547E-07	2.395E-07	1.235E-07	7.801E-08	3.550E-08	1.315E-08	6.522E-09	4.093E-09	2.870E-09
SE	5.497E-06	1.311E-06	4.116E-07	2.099E-07	1.310E-07	5.776E-08	1.981E-08	9.034E-09	5.350E-09	3.610E-09
SSE	6.594E-06	1.578E-06	5.012E-07	2.590E-07	1.638E-07	7.488E-08	2.805E-08	1.410E-08	8.952E-09	6.343E-09

Table 2.7-22
Long-Term Average X/Q Values (sec/m3) for Routine Releases at Distances Between 0.25 and 50 Miles, 8.00-Day Decay, Depleted

RELEASE POINT - GROUND LEVEL - NO INTERMITTENT RELEASES
8.000 DAY DECAY, DEPLETED
0ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	2.648E-06	8.060E-07	4.232E-07	2.695E-07	1.433E-07	9.106E-08	6.388E-08	4.780E-08	3.738E-08	3.019E-08	2.499E-08
SSW	3.019E-06	9.278E-07	4.889E-07	3.113E-07	1.648E-07	1.044E-07	7.300E-08	5.452E-08	4.256E-08	3.433E-08	2.838E-08
SW	4.054E-06	1.271E-06	6.756E-07	4.303E-07	2.266E-07	1.427E-07	9.932E-08	7.378E-08	5.733E-08	4.604E-08	3.792E-08
WSW	3.199E-06	1.003E-06	5.359E-07	3.431E-07	1.817E-07	1.149E-07	8.025E-08	5.980E-08	4.658E-08	3.748E-08	3.093E-08
W	2.794E-06	8.598E-07	4.608E-07	2.974E-07	1.598E-07	1.021E-07	7.188E-08	5.396E-08	4.230E-08	3.422E-08	2.838E-08
WNW	1.809E-06	5.461E-07	2.900E-07	1.872E-07	1.010E-07	6.487E-08	4.588E-08	3.463E-08	2.728E-08	2.217E-08	1.845E-08
NW	2.846E-06	8.447E-07	4.400E-07	2.816E-07	1.540E-07	9.996E-08	7.131E-08	5.423E-08	4.298E-08	3.511E-08	2.936E-08
NNW	6.779E-06	1.974E-06	1.004E-06	6.364E-07	3.511E-07	2.301E-07	1.655E-07	1.269E-07	1.014E-07	8.335E-08	7.009E-08
N	9.937E-06	2.865E-06	1.436E-06	9.052E-07	4.959E-07	3.243E-07	2.331E-07	1.797E-07	1.441E-07	1.189E-07	1.003E-07
NNE	1.095E-05	3.161E-06	1.605E-06	1.019E-06	5.568E-07	3.629E-07	2.600E-07	1.997E-07	1.597E-07	1.315E-07	1.107E-07
NE	1.506E-05	4.313E-06	2.169E-06	1.372E-06	7.478E-07	4.871E-07	3.491E-07	2.686E-07	2.152E-07	1.774E-07	1.496E-07
ENE	1.427E-05	4.059E-06	2.013E-06	1.264E-06	6.822E-07	4.424E-07	3.163E-07	2.441E-07	1.961E-07	1.621E-07	1.370E-07
E	1.303E-05	3.739E-06	1.863E-06	1.172E-06	6.331E-07	4.106E-07	2.936E-07	2.265E-07	1.819E-07	1.504E-07	1.270E-07
ESE	6.342E-06	1.832E-06	9.173E-07	5.771E-07	3.131E-07	2.035E-07	1.456E-07	1.120E-07	8.967E-08	7.393E-08	6.232E-08
SE	3.542E-06	1.038E-06	5.284E-07	3.340E-07	1.801E-07	1.162E-07	8.263E-08	6.298E-08	5.005E-08	4.099E-08	3.435E-08
SSE	2.236E-06	6.691E-07	3.472E-07	2.205E-07	1.180E-07	7.542E-08	5.320E-08	4.007E-08	3.152E-08	2.559E-08	2.128E-08

0ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES FROM THE SITE

SECTOR	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	2.112E-08	1.108E-08	6.966E-09	3.614E-09	2.269E-09	1.575E-09	1.165E-09	8.998E-10	7.179E-10	5.870E-10	4.893E-10
SSW	2.395E-08	1.250E-08	7.833E-09	4.044E-09	2.531E-09	1.753E-09	1.294E-09	9.987E-10	7.959E-10	6.503E-10	5.417E-10
SW	3.188E-08	1.641E-08	1.018E-08	5.179E-09	3.213E-09	2.209E-09	1.622E-09	1.245E-09	9.886E-10	8.048E-10	6.684E-10
WSW	2.605E-08	1.348E-08	8.390E-09	4.284E-09	2.655E-09	1.824E-09	1.338E-09	1.027E-09	8.147E-10	6.628E-10	5.501E-10
W	2.400E-08	1.261E-08	7.932E-09	4.106E-09	2.564E-09	1.772E-09	1.306E-09	1.006E-09	8.002E-10	6.527E-10	5.429E-10
WNW	1.565E-08	8.330E-09	5.289E-09	2.774E-09	1.747E-09	1.215E-09	9.002E-10	6.963E-10	5.560E-10	4.549E-10	3.794E-10
NW	2.501E-08	1.351E-08	8.672E-09	4.611E-09	2.931E-09	2.052E-09	1.528E-09	1.187E-09	9.517E-10	7.811E-10	6.533E-10
NNW	6.001E-08	3.302E-08	2.146E-08	1.161E-08	7.461E-09	5.270E-09	3.952E-09	3.089E-09	2.489E-09	2.052E-09	1.723E-09
N	8.615E-08	4.794E-08	3.141E-08	1.718E-08	1.113E-08	7.903E-09	5.953E-09	4.670E-09	3.774E-09	3.120E-09	2.626E-09
NNE	9.492E-08	5.252E-08	3.427E-08	1.864E-08	1.204E-08	8.529E-09	6.412E-09	5.023E-09	4.054E-09	3.348E-09	2.815E-09
NE	1.284E-07	7.135E-08	4.670E-08	2.552E-08	1.652E-08	1.174E-08	8.839E-09	6.933E-09	5.602E-09	4.631E-09	3.897E-09
ENE	1.178E-07	6.601E-08	4.347E-08	2.396E-08	1.561E-08	1.114E-08	8.424E-09	6.629E-09	5.372E-09	4.452E-09	3.755E-09
E	1.092E-07	6.112E-08	4.020E-08	2.212E-08	1.439E-08	1.026E-08	7.748E-09	6.092E-09	4.933E-09	4.085E-09	3.443E-09
ESE	5.347E-08	2.971E-08	1.944E-08	1.062E-08	6.878E-09	4.884E-09	3.677E-09	2.883E-09	2.329E-09	1.924E-09	1.619E-09
SE	2.934E-08	1.603E-08	1.037E-08	5.584E-09	3.584E-09	2.530E-09	1.896E-09	1.481E-09	1.192E-09	9.826E-10	8.248E-10
SSE	1.805E-08	9.623E-09	6.122E-09	3.224E-09	2.042E-09	1.426E-09	1.060E-09	8.227E-10	6.587E-10	5.402E-10	4.515E-10

Table 2.7-23
Long-Term Average X/Q Values (sec/m3) for Routine Releases at the Standard Distance Segments Between 0.5 and 50 Miles, 8.00-Day Decay, Depleted

RELEASE POINT - GROUND LEVEL - NO INTERMITTENT RELEASES
8.000 DAY DECAY, DEPLETED
0CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

	SEGMENT BOUNDARIES IN MILES FROM THE SITE									
DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.400E-07	1.481E-07	6.470E-08	3.762E-08	2.510E-08	1.148E-08	3.761E-09	1.596E-09	9.062E-10	5.896E-10
SSW	5.075E-07	1.705E-07	7.397E-08	4.284E-08	2.850E-08	1.297E-08	4.214E-09	1.777E-09	1.006E-09	6.532E-10
SW	6.990E-07	2.346E-07	1.007E-07	5.773E-08	3.809E-08	1.708E-08	5.415E-09	2.242E-09	1.255E-09	8.088E-10
WSW	5.539E-07	1.879E-07	8.131E-08	4.689E-08	3.106E-08	1.401E-08	4.473E-09	1.851E-09	1.035E-09	6.661E-10
W	4.768E-07	1.647E-07	7.277E-08	4.255E-08	2.849E-08	1.306E-08	4.271E-09	1.797E-09	1.013E-09	6.557E-10
WNW	3.012E-07	1.041E-07	4.644E-08	2.743E-08	1.851E-08	8.606E-09	2.877E-09	1.231E-09	7.011E-10	4.569E-10
NW	4.595E-07	1.583E-07	7.212E-08	4.320E-08	2.946E-08	1.392E-08	4.767E-09	2.077E-09	1.195E-09	7.843E-10
NNW	1.056E-06	3.607E-07	1.673E-07	1.018E-07	7.029E-08	3.388E-08	1.195E-08	5.327E-09	3.107E-09	2.060E-09
N	1.518E-06	5.106E-07	2.361E-07	1.447E-07	1.006E-07	4.908E-08	1.765E-08	7.983E-09	4.695E-09	3.131E-09
NNE	1.690E-06	5.734E-07	2.633E-07	1.604E-07	1.110E-07	5.383E-08	1.918E-08	8.617E-09	5.051E-09	3.360E-09
NE	2.291E-06	7.707E-07	3.537E-07	2.161E-07	1.500E-07	7.307E-08	2.623E-08	1.185E-08	6.970E-09	4.647E-09
ENE	2.135E-06	7.049E-07	3.210E-07	1.969E-07	1.373E-07	6.750E-08	2.458E-08	1.125E-08	6.663E-09	4.466E-09
E	1.973E-06	6.540E-07	2.980E-07	1.827E-07	1.273E-07	6.251E-08	2.270E-08	1.036E-08	6.123E-09	4.098E-09
ESE	9.693E-07	3.230E-07	1.476E-07	9.005E-08	6.248E-08	3.043E-08	1.092E-08	4.933E-09	2.899E-09	1.931E-09
SE	5.552E-07	1.859E-07	8.373E-08	5.029E-08	3.446E-08	1.647E-08	5.759E-09	2.557E-09	1.489E-09	9.863E-10
SSE	3.624E-07	1.218E-07	5.387E-08	3.170E-08	2.136E-08	9.940E-09	3.343E-09	1.444E-09	8.281E-10	5.425E-10

Table 2.7-24
Long-Term Average D/Q Values (1/m^2) for Routine Releases at Distances Between 0.25 and 50 Miles

RELEASE POINT - GROUND LEVEL - NO INTERMITTENT RELEASES

********************* RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS *****************

DIRECTION FROM SITE	DISTANCES IN MILES .25	.50	.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	2.283E-08	7.719E-09	3.963E-09	2.434E-09	1.213E-09	7.359E-10	4.975E-10	3.605E-10	2.741E-10	2.160E-10	1.748E-10
SSW	3.141E-08	1.062E-08	5.453E-09	3.348E-09	1.669E-09	1.012E-09	6.845E-10	4.960E-10	3.772E-10	2.972E-10	2.406E-10
SW	5.235E-08	1.770E-08	9.090E-09	5.582E-09	2.783E-09	1.688E-09	1.141E-09	8.269E-10	6.287E-10	4.953E-10	4.010E-10
WSW	3.863E-08	1.306E-08	6.708E-09	4.119E-09	2.053E-09	1.245E-09	8.420E-10	6.102E-10	4.640E-10	3.655E-10	2.959E-10
W	2.498E-08	8.448E-09	4.338E-09	2.664E-09	1.328E-09	8.054E-10	5.445E-10	3.946E-10	3.000E-10	2.364E-10	1.914E-10
WNW	1.310E-08	4.430E-09	2.274E-09	1.397E-09	6.963E-10	4.223E-10	2.855E-10	2.069E-10	1.573E-10	1.239E-10	1.003E-10
NW	1.755E-08	5.935E-09	3.047E-09	1.871E-09	9.328E-10	5.658E-10	3.825E-10	2.772E-10	2.108E-10	1.661E-10	1.344E-10
NNW	3.395E-08	1.148E-08	5.895E-09	3.620E-09	1.805E-09	1.095E-09	7.400E-10	5.363E-10	4.078E-10	3.212E-10	2.601E-10
N	4.295E-08	1.452E-08	7.457E-09	4.579E-09	2.283E-09	1.384E-09	9.360E-10	6.783E-10	5.158E-10	4.063E-10	3.290E-10
NNE	5.254E-08	1.777E-08	9.122E-09	5.601E-09	2.792E-09	1.694E-09	1.145E-09	8.298E-10	6.309E-10	4.971E-10	4.024E-10
NE	6.756E-08	2.285E-08	1.173E-08	7.203E-09	3.591E-09	2.178E-09	1.473E-09	1.067E-09	8.114E-10	6.392E-10	5.175E-10
ENE	6.307E-08	2.133E-08	1.095E-08	6.724E-09	3.352E-09	2.033E-09	1.375E-09	9.961E-10	7.574E-10	5.967E-10	4.831E-10
E	5.559E-08	1.880E-08	9.652E-09	5.926E-09	2.955E-09	1.792E-09	1.212E-09	8.779E-10	6.676E-10	5.259E-10	4.258E-10
ESE	2.452E-08	8.293E-09	4.258E-09	2.615E-09	1.304E-09	7.906E-10	5.345E-10	3.873E-10	2.945E-10	2.320E-10	1.878E-10
SE	2.074E-08	7.013E-09	3.601E-09	2.211E-09	1.102E-09	6.686E-10	4.520E-10	3.276E-10	2.491E-10	1.962E-10	1.589E-10
SSE	1.723E-08	5.826E-09	2.991E-09	1.837E-09	9.158E-10	5.554E-10	3.755E-10	2.721E-10	2.069E-10	1.630E-10	1.320E-10

0DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	1.446E-10	7.088E-11	4.447E-11	2.248E-11	1.360E-11	9.122E-12	6.536E-12	4.908E-12	3.816E-12	3.048E-12	2.488E-12
SSW	1.990E-10	9.752E-11	6.119E-11	3.093E-11	1.872E-11	1.255E-11	8.993E-12	6.753E-12	5.250E-12	4.194E-12	3.423E-12
SW	3.317E-10	1.626E-10	1.020E-10	5.155E-11	3.120E-11	2.092E-11	1.499E-11	1.126E-11	8.752E-12	6.991E-12	5.706E-12
WSW	2.448E-10	1.200E-10	7.527E-11	3.804E-11	2.303E-11	1.544E-11	1.106E-11	8.306E-12	6.458E-12	5.159E-12	4.211E-12
W	1.583E-10	7.757E-11	4.867E-11	2.460E-11	1.489E-11	9.983E-12	7.154E-12	5.372E-12	4.177E-12	3.336E-12	2.723E-12
WNW	8.300E-11	4.067E-11	2.552E-11	1.290E-11	7.807E-12	5.235E-12	3.751E-12	2.817E-12	2.190E-12	1.749E-12	1.428E-12
NW	1.112E-10	5.449E-11	3.419E-11	1.728E-11	1.046E-11	7.013E-12	5.025E-12	3.773E-12	2.934E-12	2.344E-12	1.913E-12
NNW	2.151E-10	1.054E-10	6.615E-11	3.343E-11	2.024E-11	1.357E-11	9.722E-12	7.300E-12	5.676E-12	4.534E-12	3.701E-12
N	2.721E-10	1.333E-10	8.367E-11	4.229E-11	2.560E-11	1.716E-11	1.230E-11	9.234E-12	7.180E-12	5.735E-12	4.681E-12
NNE	3.329E-10	1.631E-10	1.024E-10	5.173E-11	3.131E-11	2.099E-11	1.504E-11	1.130E-11	8.783E-12	7.016E-12	5.726E-12
NE	4.281E-10	2.098E-10	1.316E-10	6.653E-11	4.027E-11	2.700E-11	1.935E-11	1.453E-11	1.129E-11	9.022E-12	7.364E-12
ENE	3.996E-10	1.958E-10	1.229E-10	6.210E-11	3.759E-11	2.520E-11	1.806E-11	1.356E-11	1.054E-11	8.422E-12	6.874E-12
E	3.522E-10	1.726E-10	1.083E-10	5.474E-11	3.313E-11	2.221E-11	1.592E-11	1.195E-11	9.293E-12	7.423E-12	6.059E-12
ESE	1.554E-10	7.615E-11	4.778E-11	2.415E-11	1.462E-11	9.800E-12	7.022E-12	5.273E-12	4.100E-12	3.275E-12	2.673E-12
SE	1.314E-10	6.439E-11	4.040E-11	2.042E-11	1.236E-11	8.287E-12	5.938E-12	4.459E-12	3.467E-12	2.769E-12	2.261E-12
SSE	1.092E-10	5.350E-11	3.357E-11	1.697E-11	1.027E-11	6.885E-12	4.933E-12	3.704E-12	2.880E-12	2.301E-12	1.878E-12

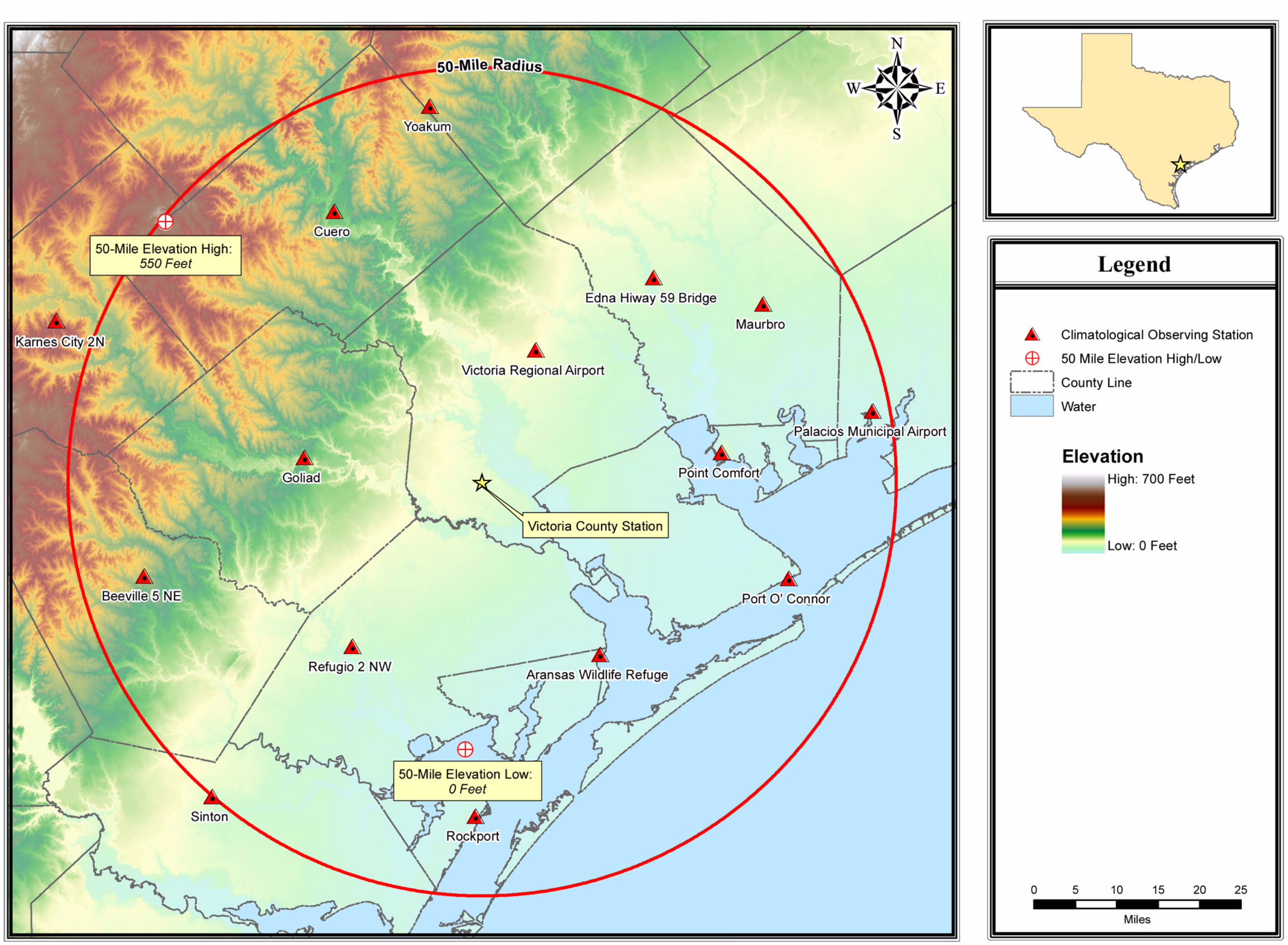
Table 2.7-25
Long-Term Average D/Q Values ($1/m^2$) for Routine Releases at the Standard Distance Segments Between 0.5 and 50 Miles

RELEASE POINT - GROUND LEVEL - NO INTERMITTENT RELEASES

0************************ RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS ************************

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	4.118E-09	1.272E-09	5.063E-10	2.767E-10	1.758E-10	7.553E-11	2.342E-11	9.283E-12	4.957E-12	3.068E-12
SSW	5.666E-09	1.751E-09	6.966E-10	3.807E-10	2.419E-10	1.039E-10	3.223E-11	1.277E-11	6.820E-12	4.222E-12
SW	9.445E-09	2.918E-09	1.161E-09	6.345E-10	4.033E-10	1.732E-10	5.372E-11	2.129E-11	1.137E-11	7.037E-12
WSW	6.970E-09	2.153E-09	8.569E-10	4.682E-10	2.976E-10	1.278E-10	3.964E-11	1.571E-11	8.390E-12	5.193E-12
W	4.507E-09	1.392E-09	5.541E-10	3.028E-10	1.925E-10	8.267E-11	2.563E-11	1.016E-11	5.425E-12	3.358E-12
WNW	2.363E-09	7.301E-10	2.905E-10	1.588E-10	1.009E-10	4.334E-11	1.344E-11	5.327E-12	2.845E-12	1.761E-12
NW	3.166E-09	9.782E-10	3.893E-10	2.127E-10	1.352E-10	5.807E-11	1.801E-11	7.137E-12	3.811E-12	2.359E-12
NNW	6.125E-09	1.892E-09	7.531E-10	4.115E-10	2.616E-10	1.123E-10	3.484E-11	1.381E-11	7.373E-12	4.564E-12
N	7.748E-09	2.394E-09	9.525E-10	5.205E-10	3.308E-10	1.421E-10	4.407E-11	1.746E-11	9.326E-12	5.773E-12
NNE	9.478E-09	2.928E-09	1.165E-09	6.367E-10	4.047E-10	1.738E-10	5.390E-11	2.136E-11	1.141E-11	7.062E-12
NE	1.219E-08	3.766E-09	1.498E-09	8.189E-10	5.205E-10	2.236E-10	6.932E-11	2.748E-11	1.467E-11	9.081E-12
ENE	1.138E-08	3.515E-09	1.399E-09	7.644E-10	4.858E-10	2.087E-10	6.471E-11	2.565E-11	1.370E-11	8.477E-12
E	1.003E-08	3.098E-09	1.233E-09	6.737E-10	4.282E-10	1.839E-10	5.704E-11	2.261E-11	1.207E-11	7.472E-12
ESE	4.424E-09	1.367E-09	5.439E-10	2.972E-10	1.889E-10	8.115E-11	2.516E-11	9.973E-12	5.326E-12	3.296E-12
SE	3.742E-09	1.156E-09	4.600E-10	2.514E-10	1.598E-10	6.862E-11	2.128E-11	8.434E-12	4.504E-12	2.788E-12
SSE	3.108E-09	9.603E-10	3.821E-10	2.088E-10	1.327E-10	5.701E-11	1.768E-11	7.007E-12	3.742E-12	2.316E-12



Source Data: ESRI, Data & Maps and StreetMap USA, 2005.
Climatography of the United States, No. 20, 1971-2000, Monthly Station Climate Summaries (NCDC 2005).
National Climatic Data Center, Climate-Radar Data Inventories, http://www.ncdc.noaa.gov/oa/climate/stationlocator.html (NCDC 2007)

Projection: Texas South Central State Plane
Datum: North American Datum 1983

Drawing No.: EXELON_FIG_T_050MI_000
Revision: 006 *Date:* 9/28/09

Figure 2.7-1 Climatological Observing Stations Near the Victoria County Station

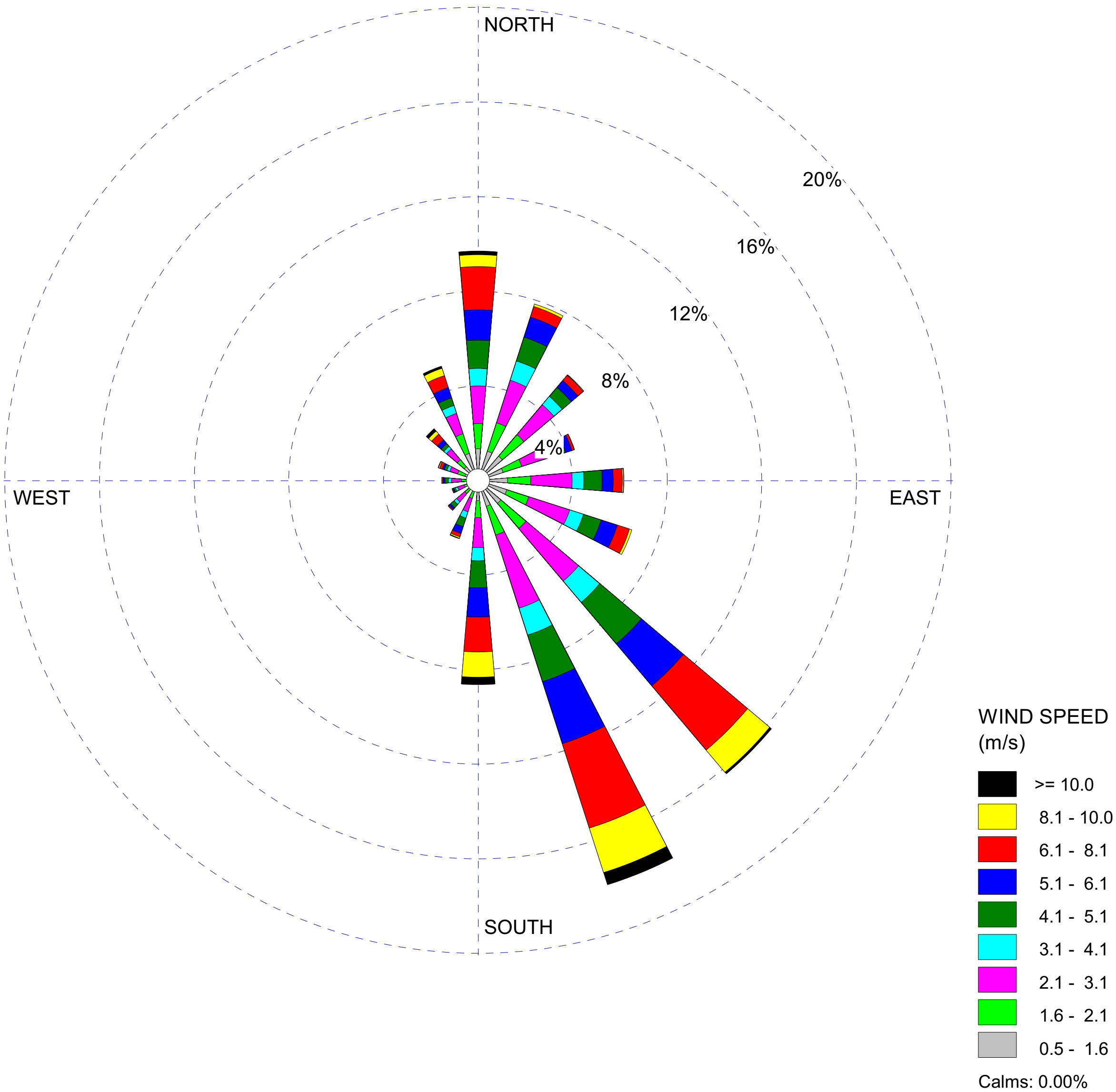


Figure 2.7-2 10-Meter Level Wind Rose—Annual VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

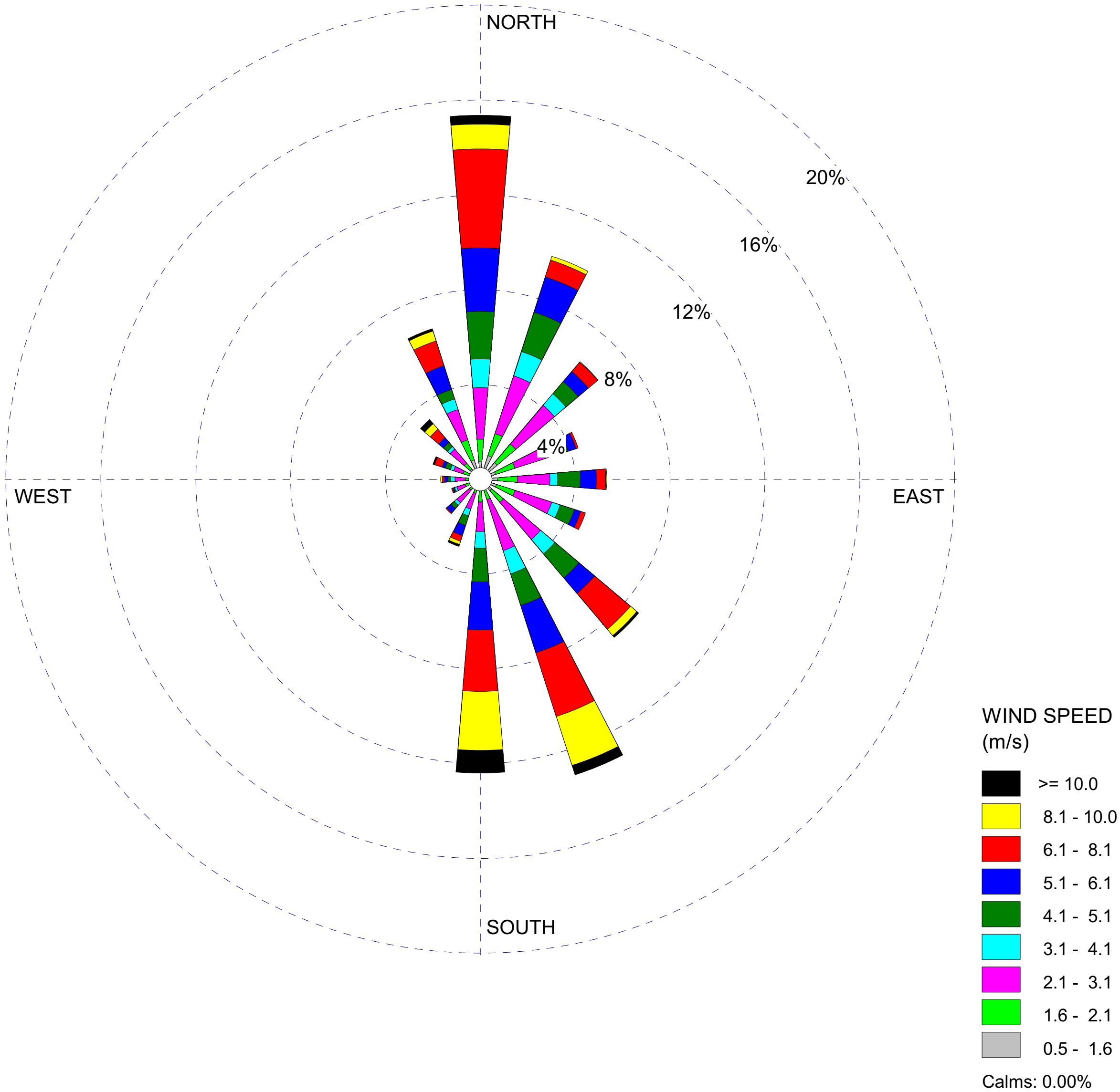


Figure 2.7-3 10-Meter Level Wind Rose—Winter VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

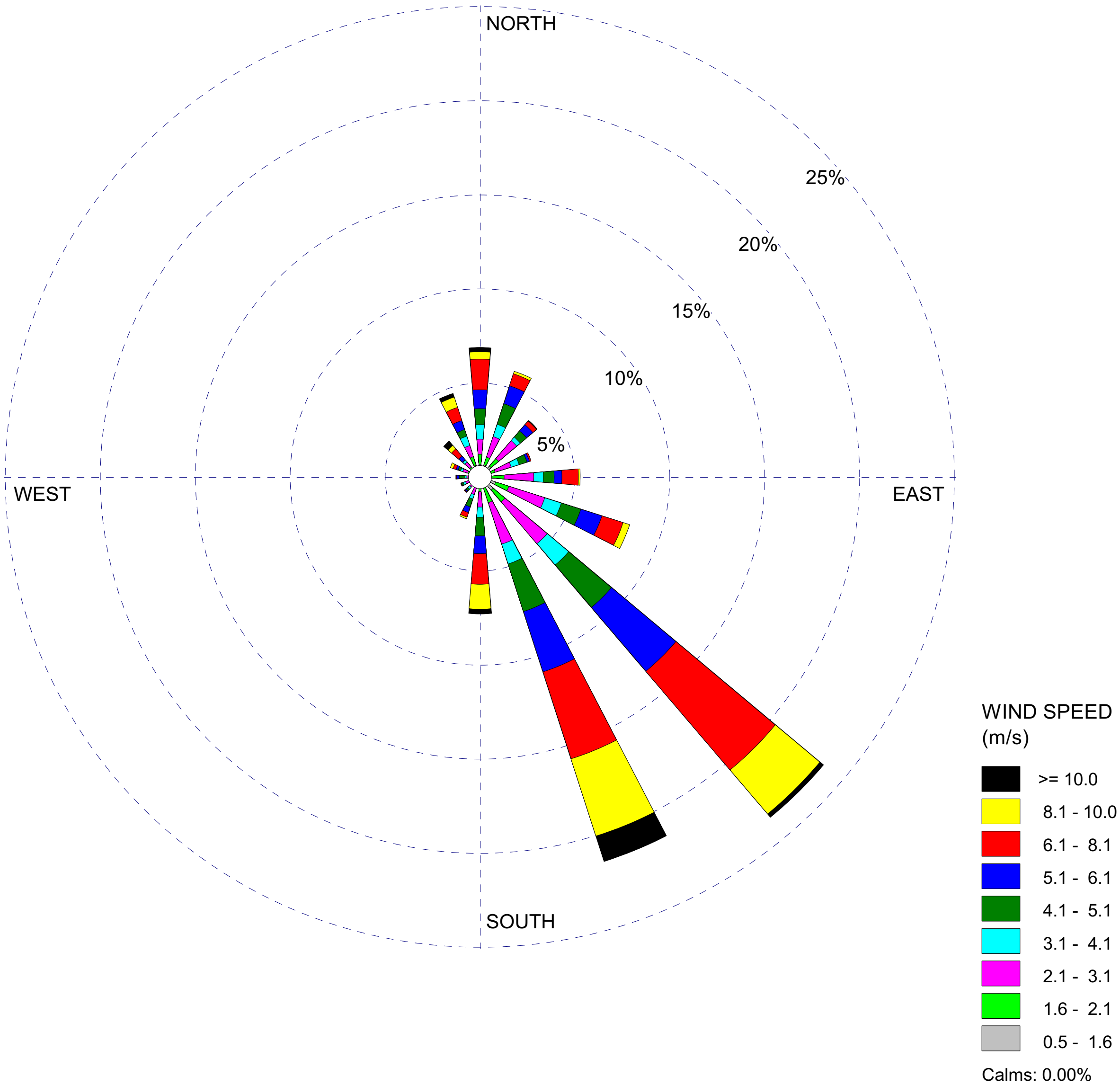


Figure 2.7-4 10-Meter Level Wind Rose—Spring VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

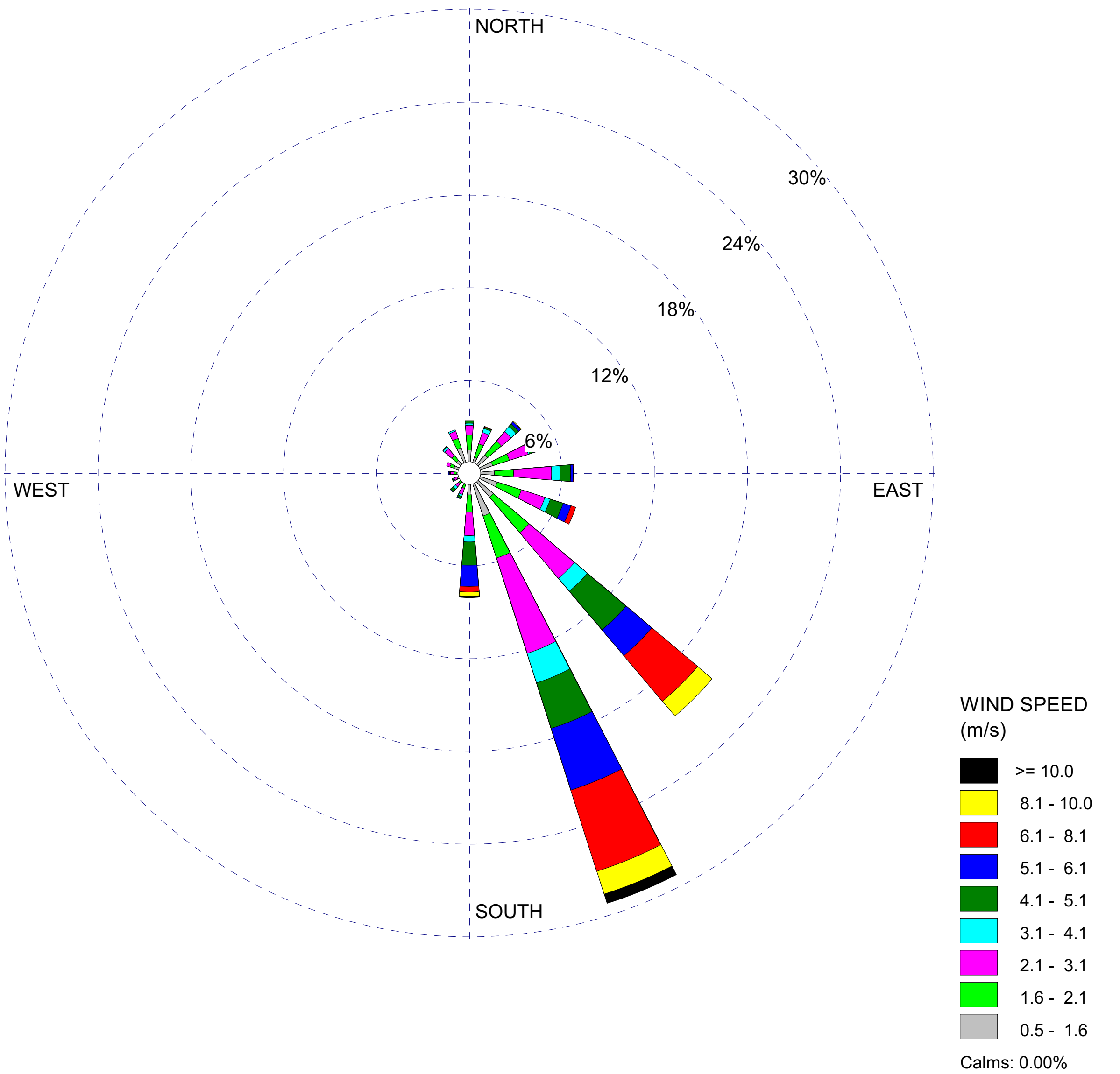


Figure 2.7-5 10-Meter Level Wind Rose—Summer VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

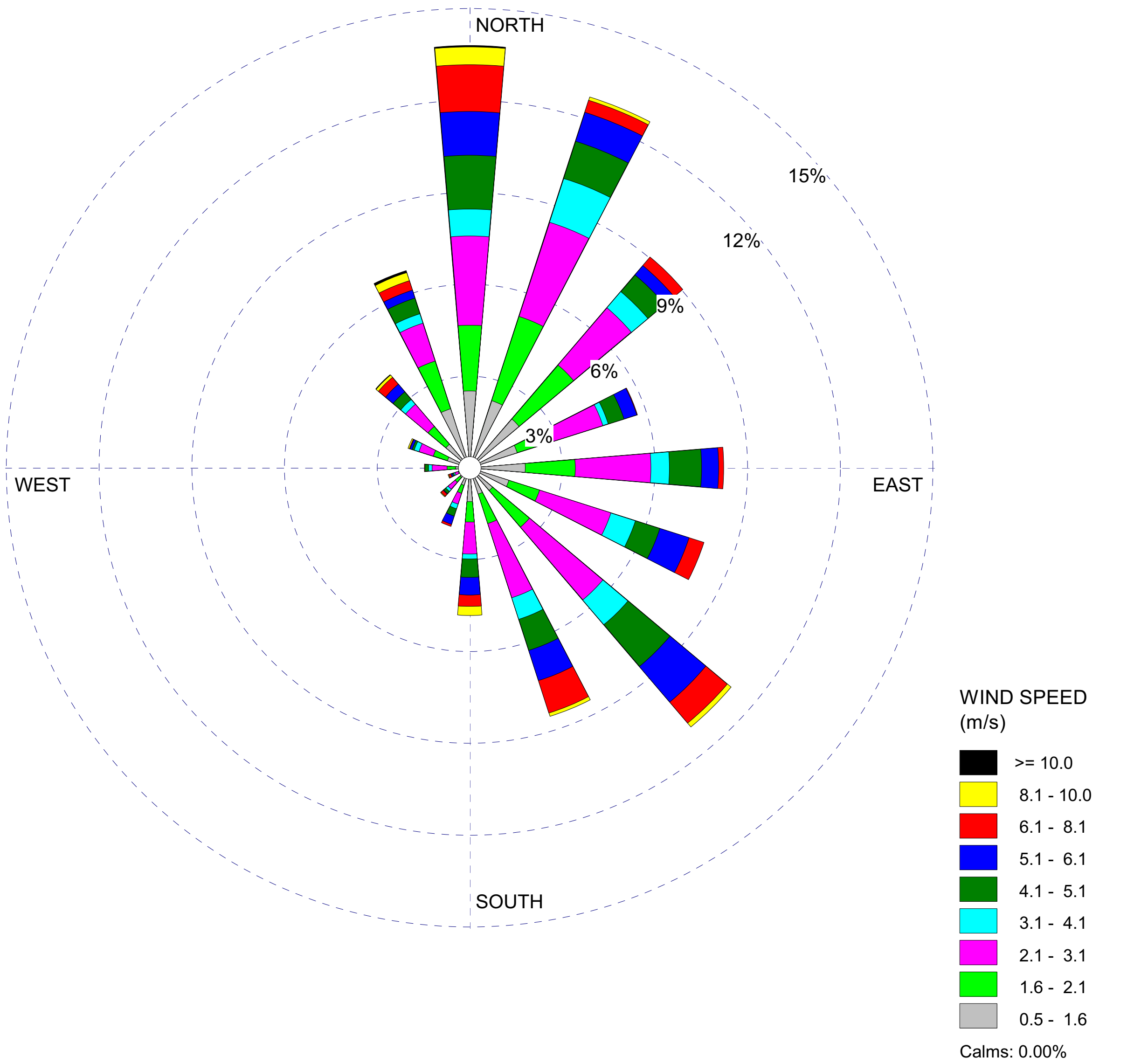


Figure 2.7-6 10-Meter Level Wind Rose—Autumn VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

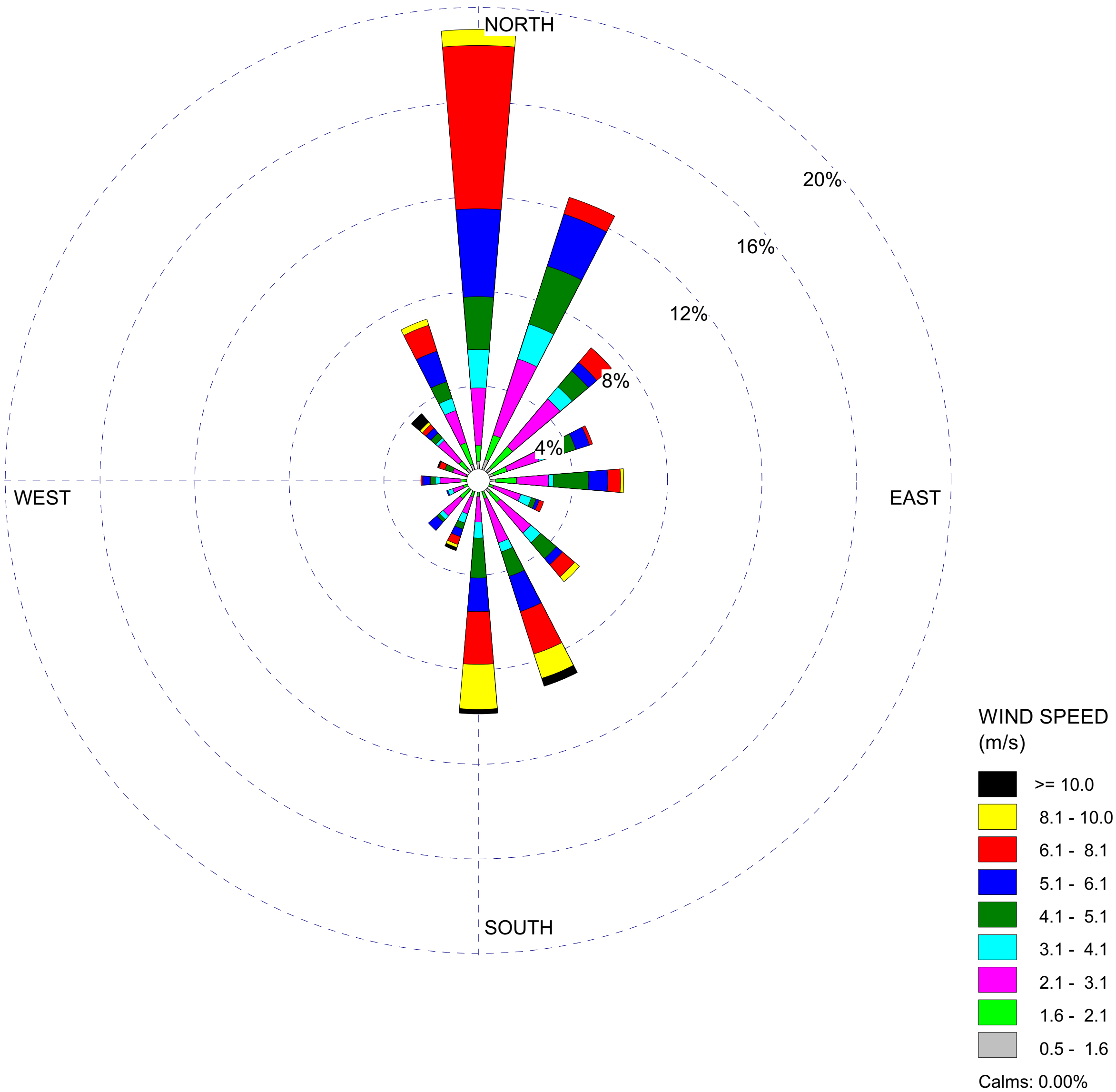


Figure 2.7-7 (Sheet 1 of 12) 10-Meter Level Wind Rose—January
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

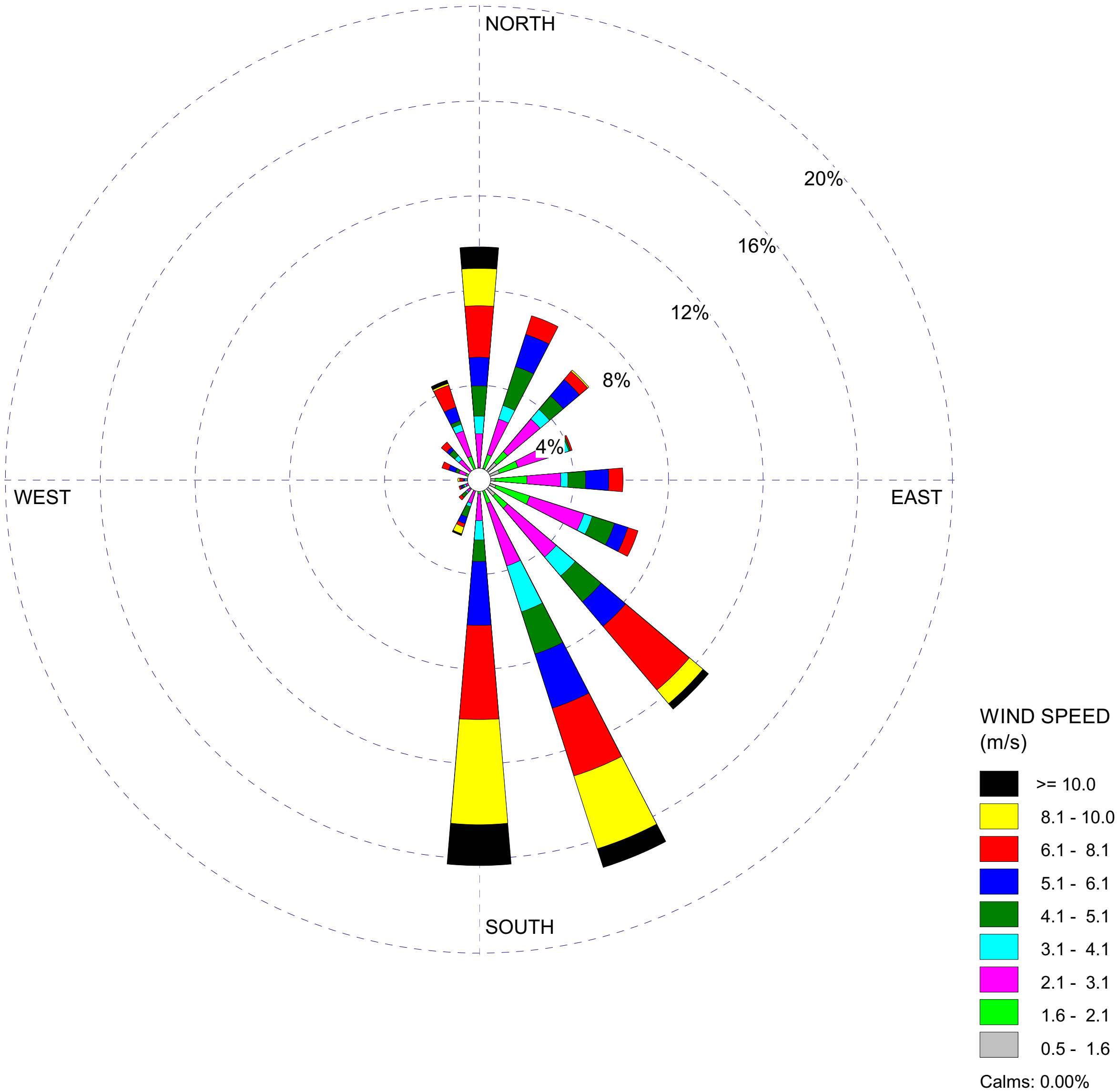


Figure 2.7-7 (Sheet 2 of 12) 10-Meter Level Wind Rose—February VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

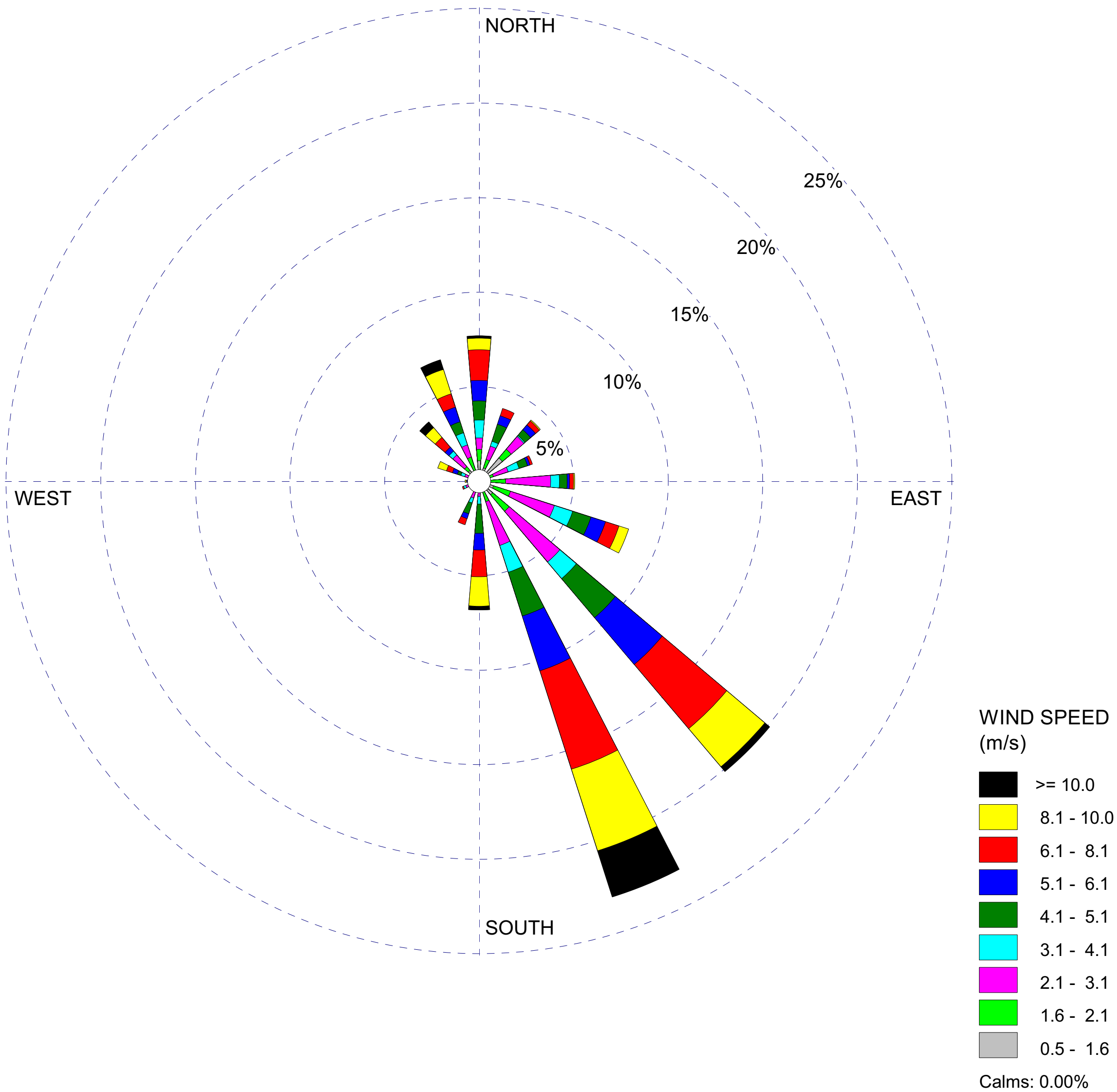


Figure 2.7-7 (Sheet 3 of 12) 10-Meter Level Wind Rose—March
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

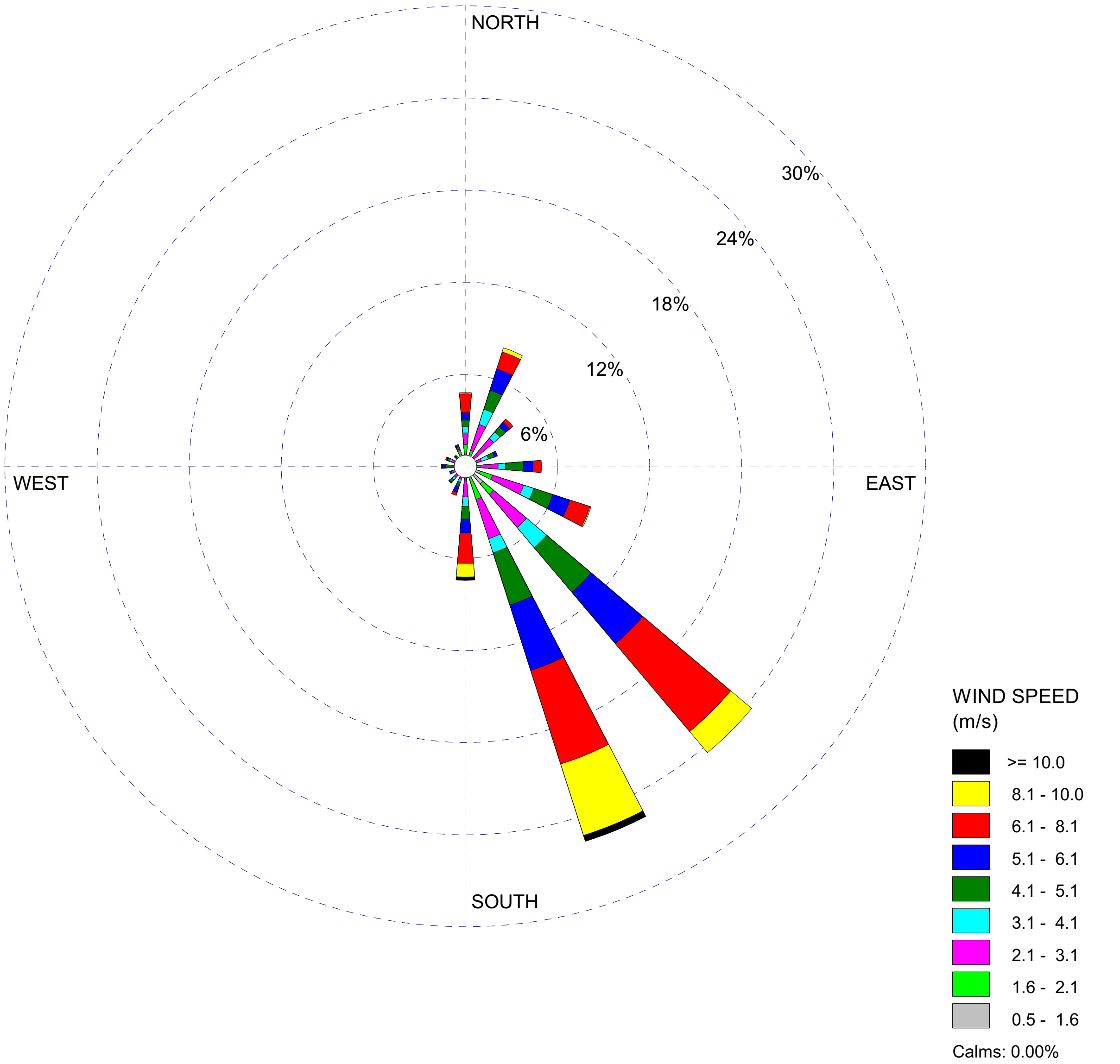


Figure 2.7-7 (Sheet 4 of 12) 10-Meter Level Wind Rose—April VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

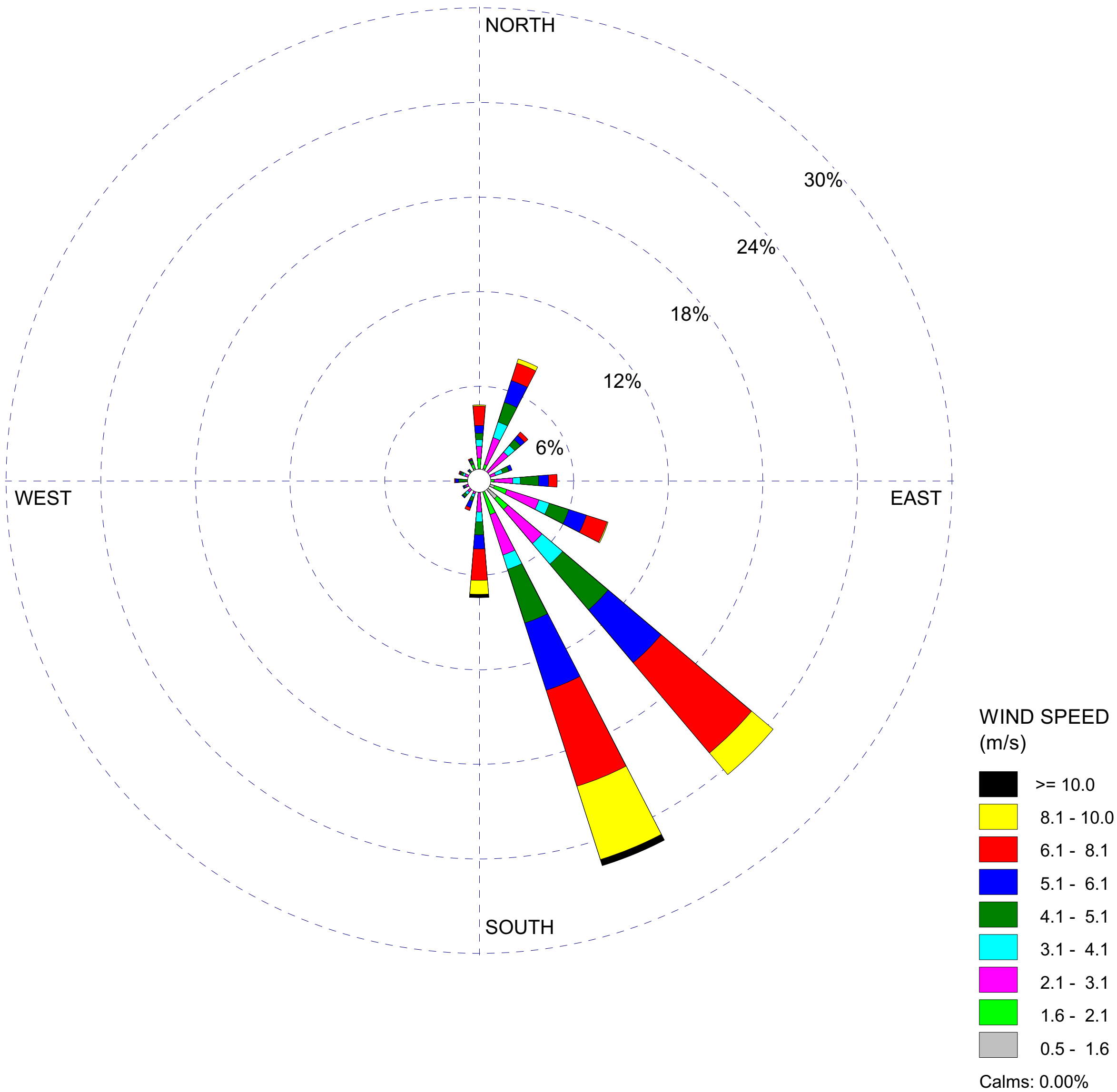


Figure 2.7-7 (Sheet 5 of 12) 10-Meter Level Wind Rose—May
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

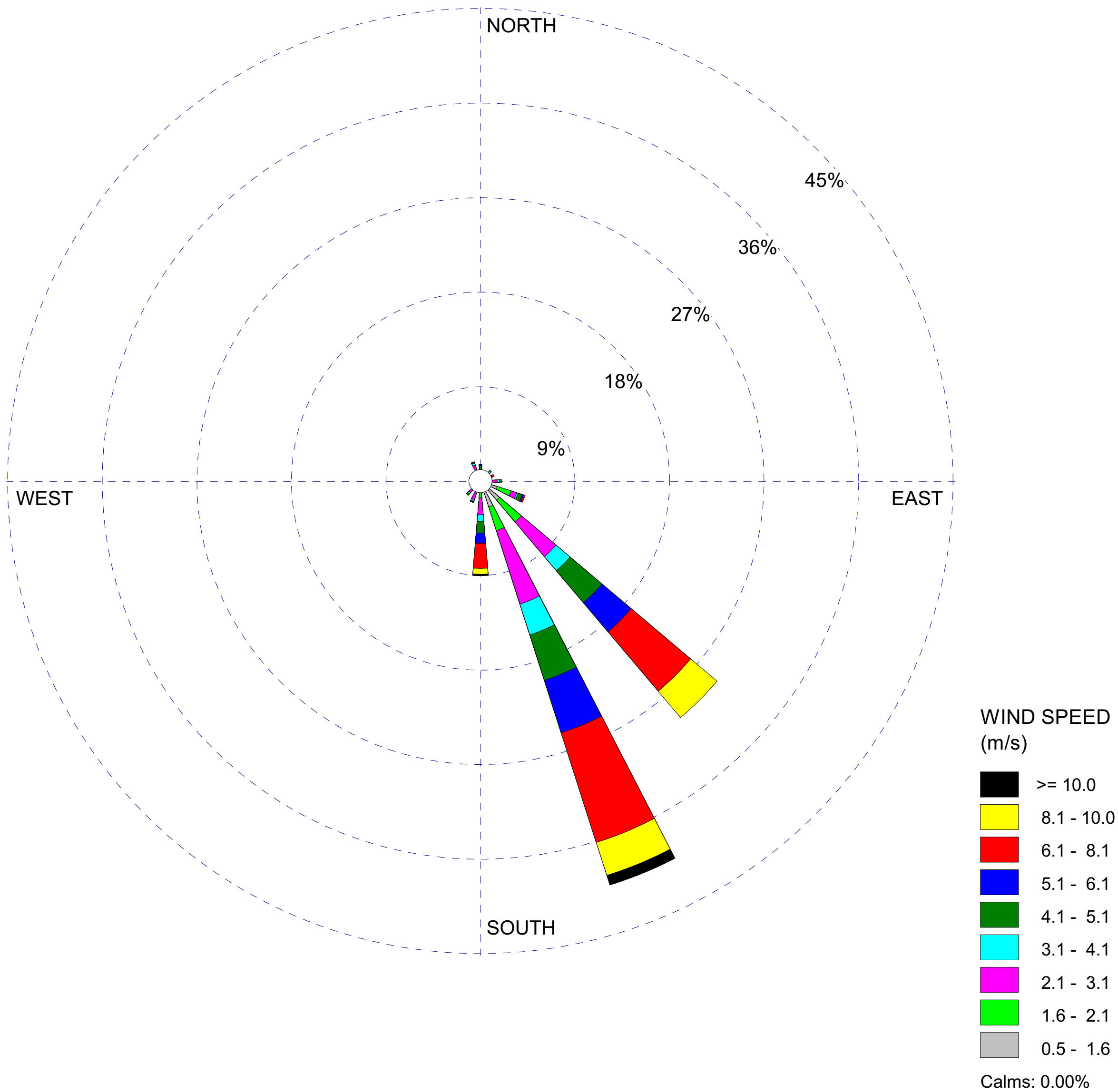


Figure 2.7-7 (Sheet 6 of 12) 10-Meter Level Wind Rose—June
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

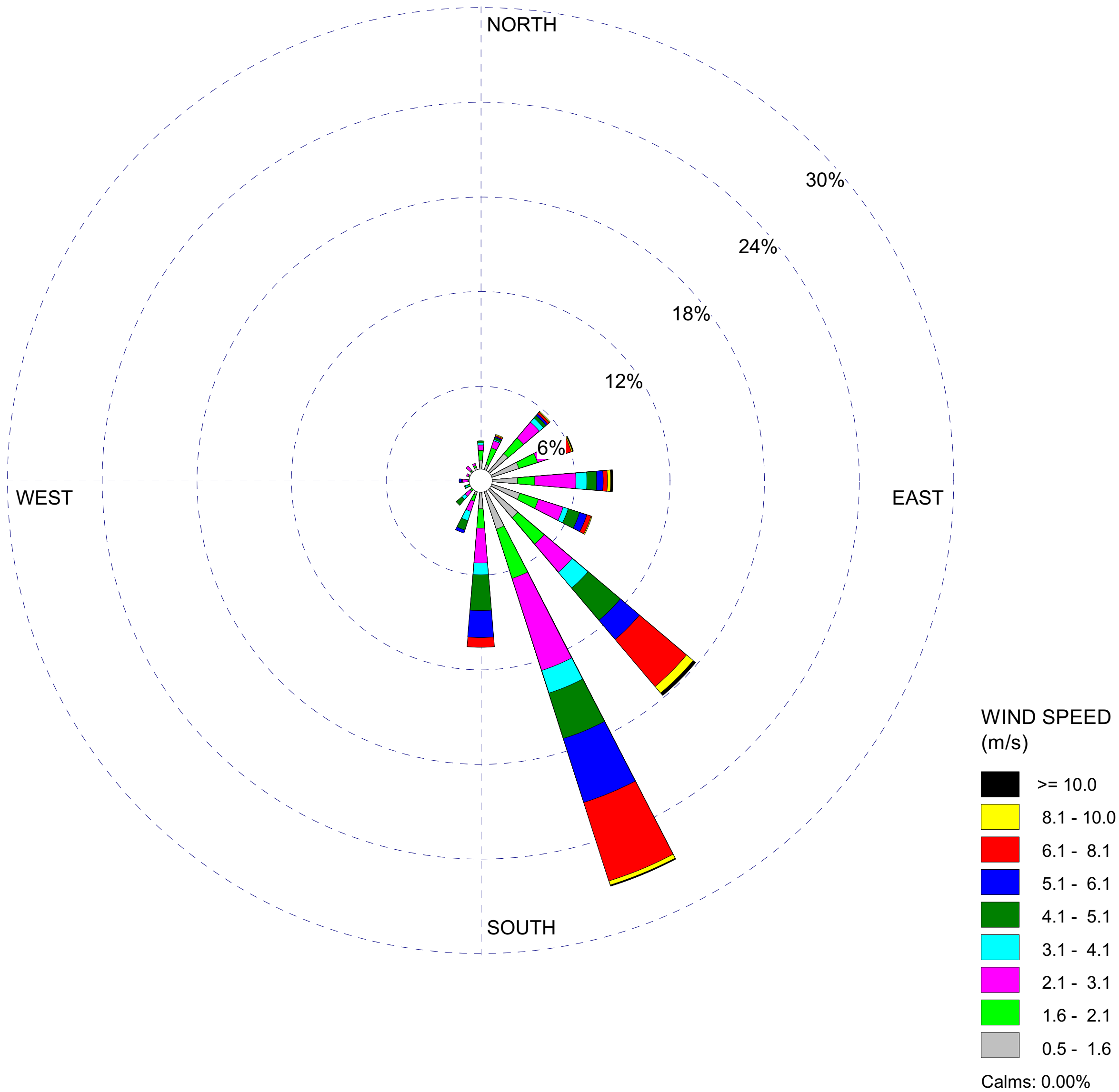


Figure 2.7-7 (Sheet 7 of 12) 10-Meter Level Wind Rose—July
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

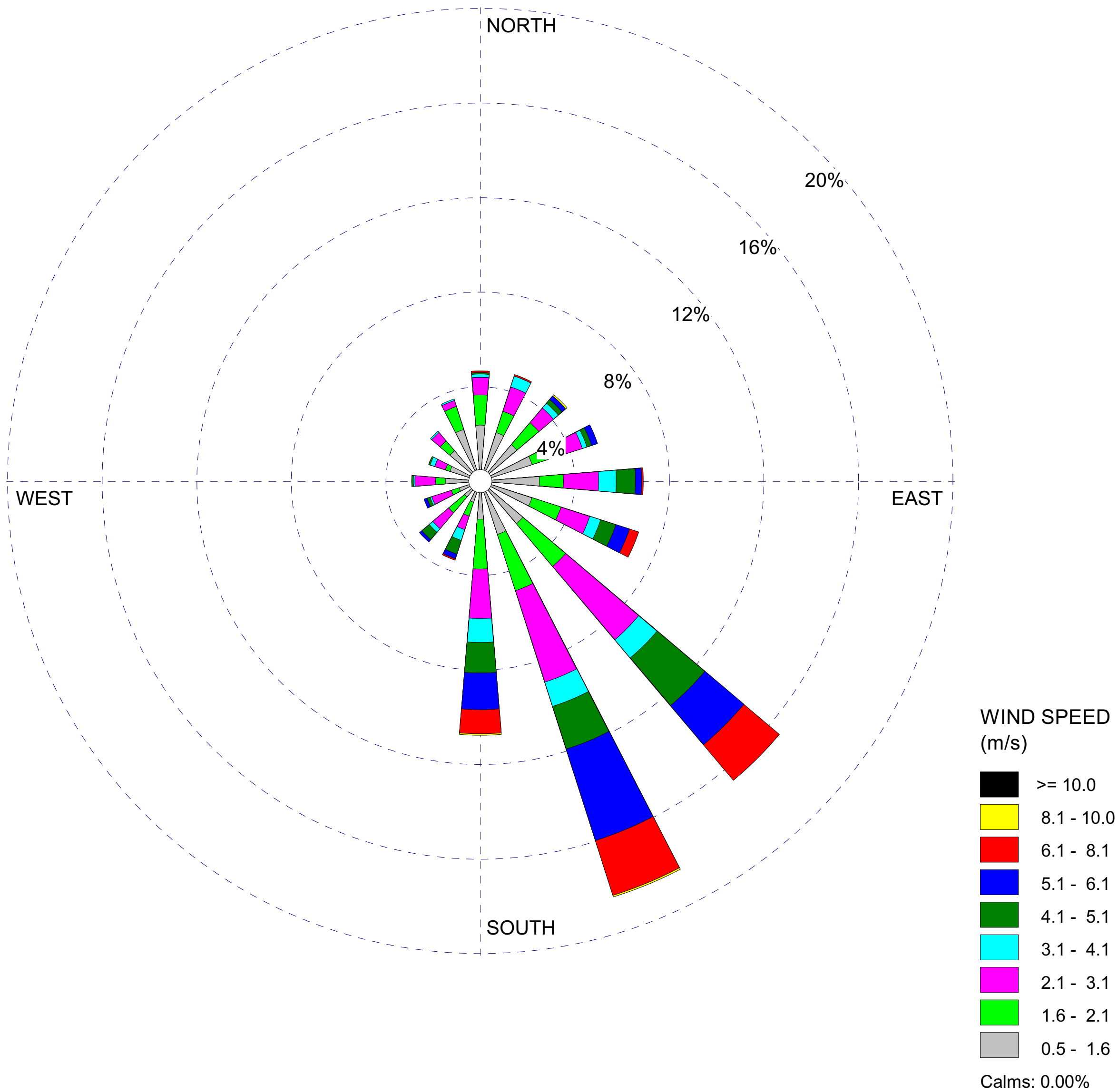


Figure 2.7-7 (Sheet 8 of 12) 10-Meter Level Wind Rose—August
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

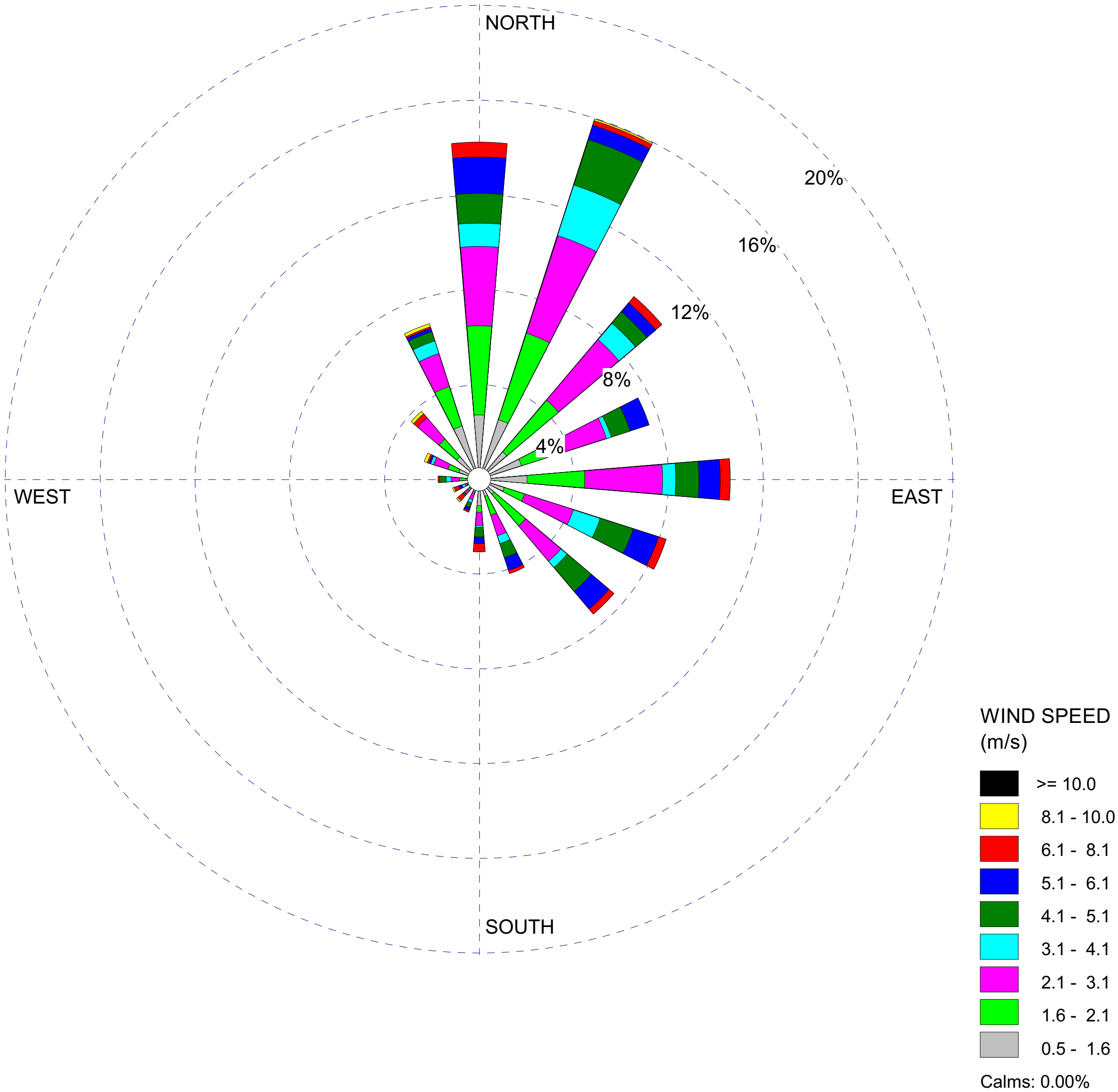


Figure 2.7-7 (Sheet 9 of 12) 10-Meter Level Wind Rose—September
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

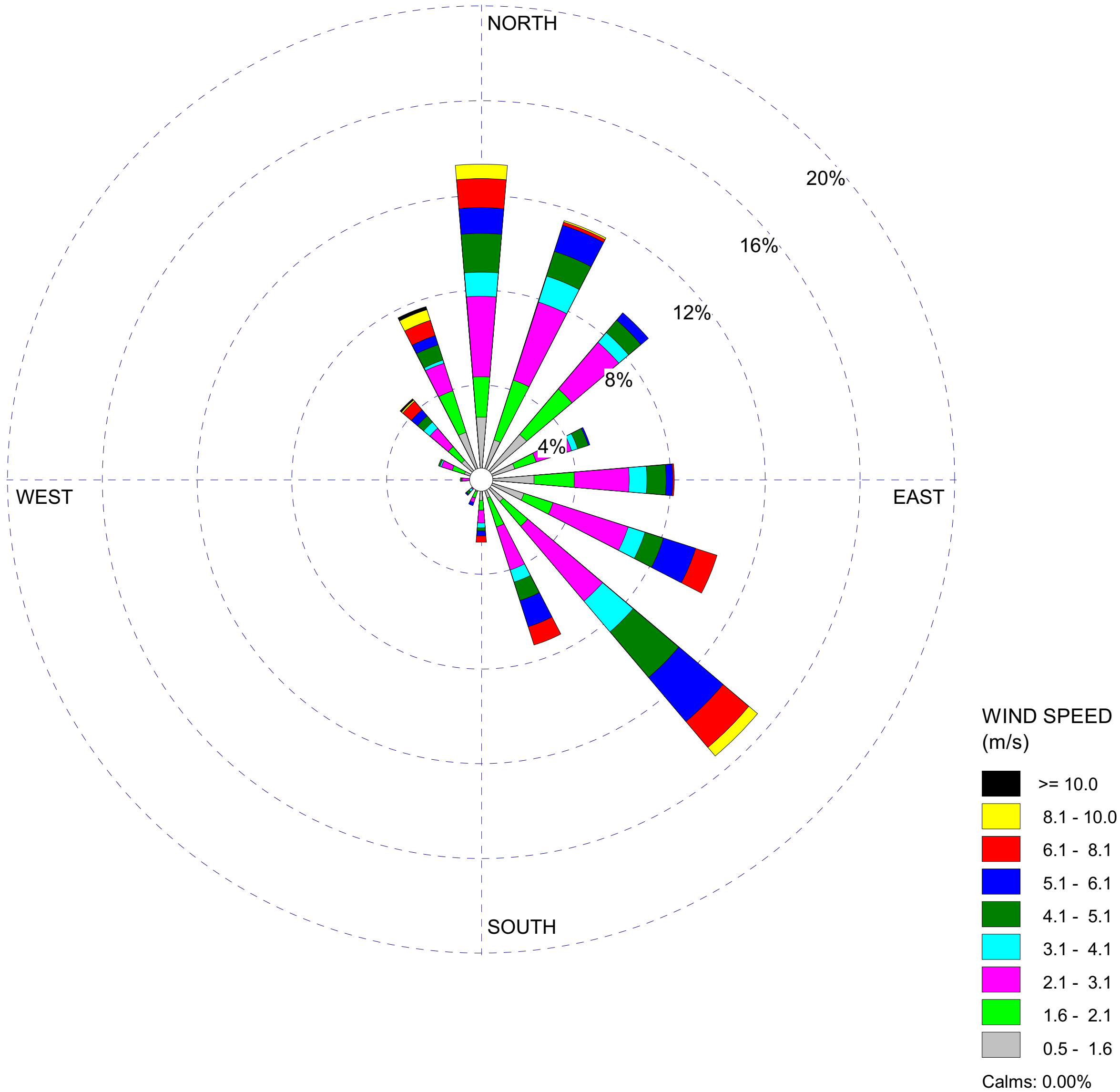


Figure 2.7-7 (Sheet 10 of 12) 10-Meter Level Wind Rose—October
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

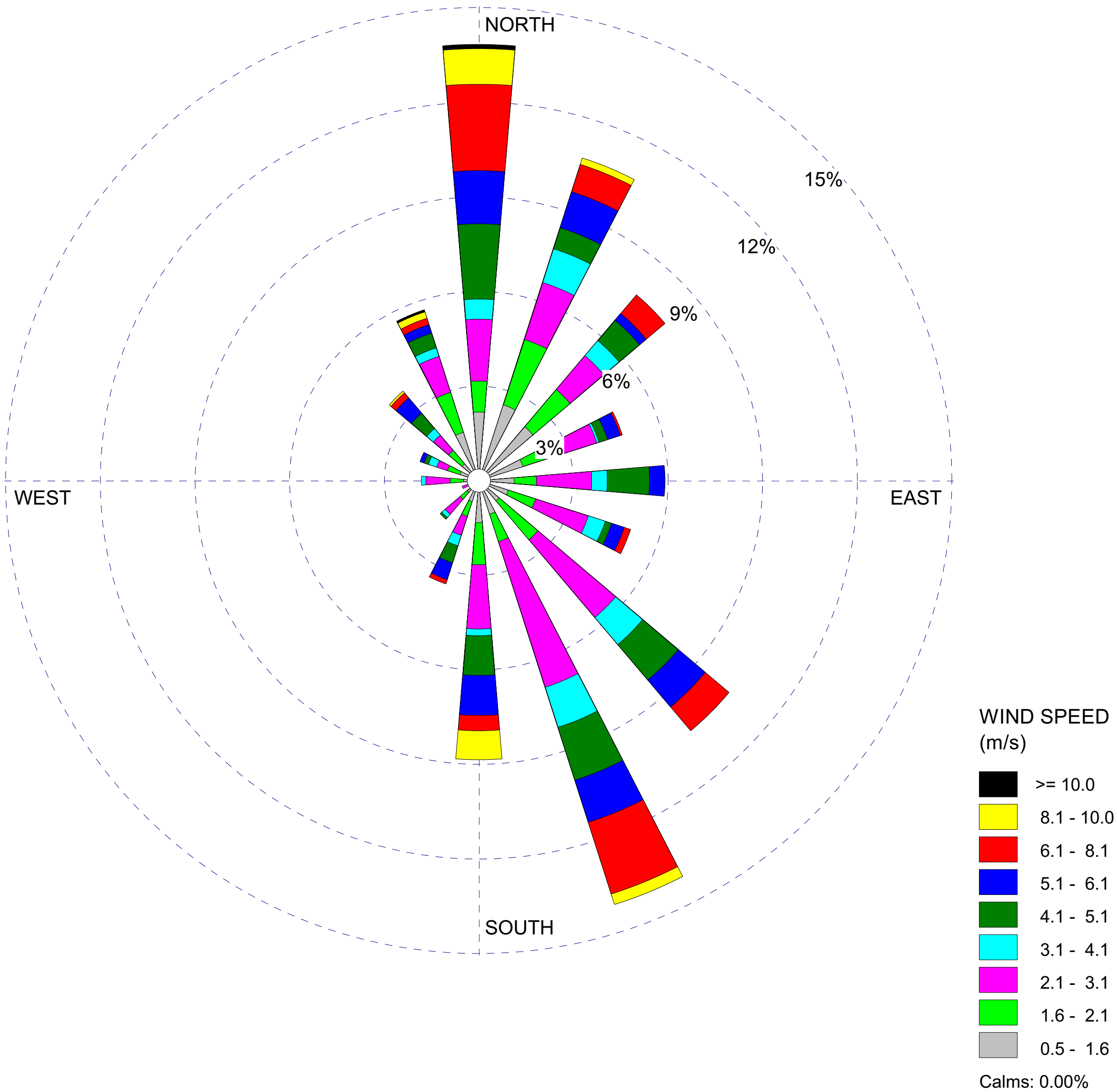


Figure 2.7-7 (Sheet 11 of 12) 10-Meter Level Wind Rose—November
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

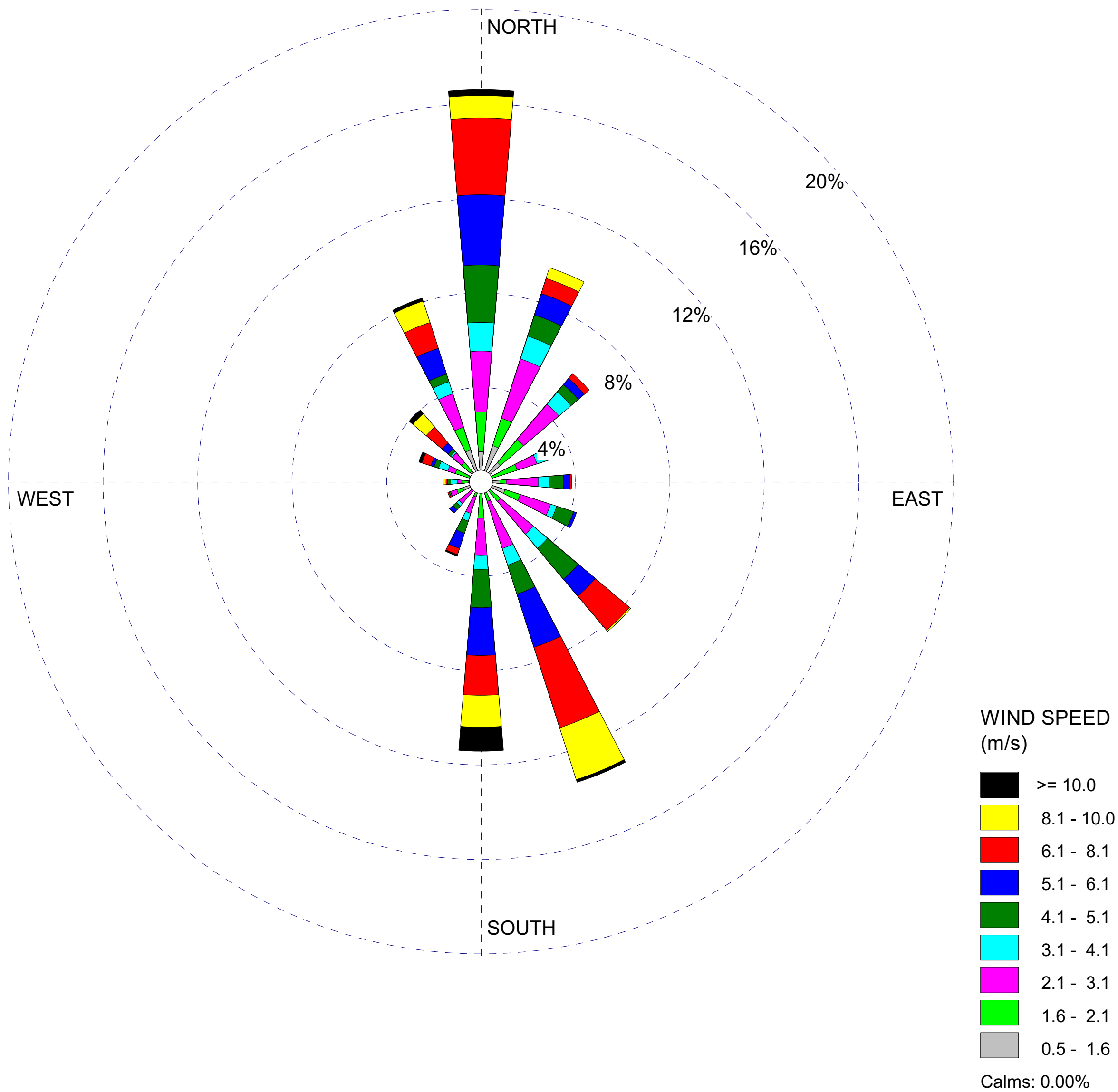


Figure 2.7-7 (Sheet 12 of 12) 10-Meter Level Wind Rose—December
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

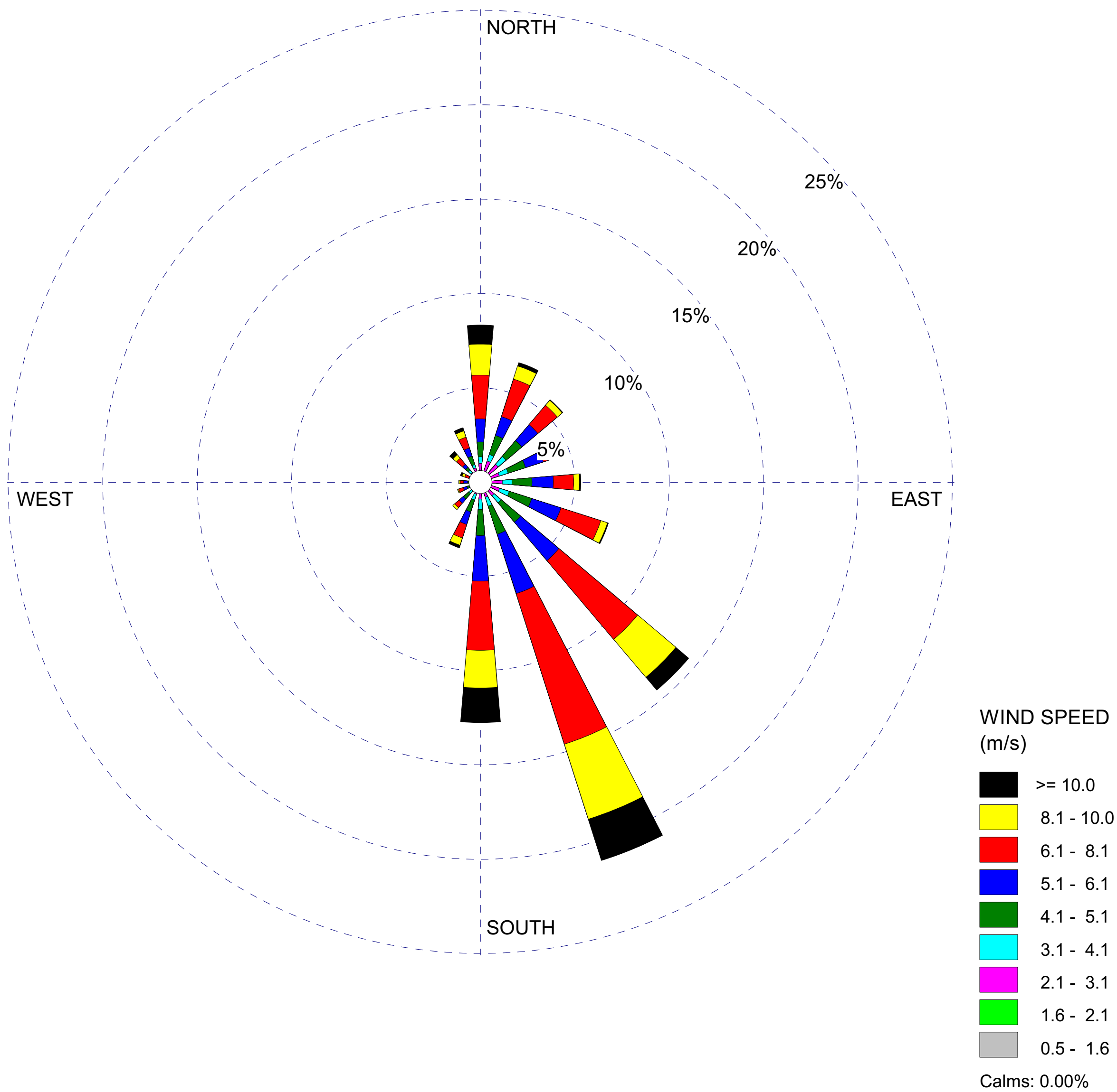


Figure 2.7-8 60-Meter Level Wind Rose—Annual
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

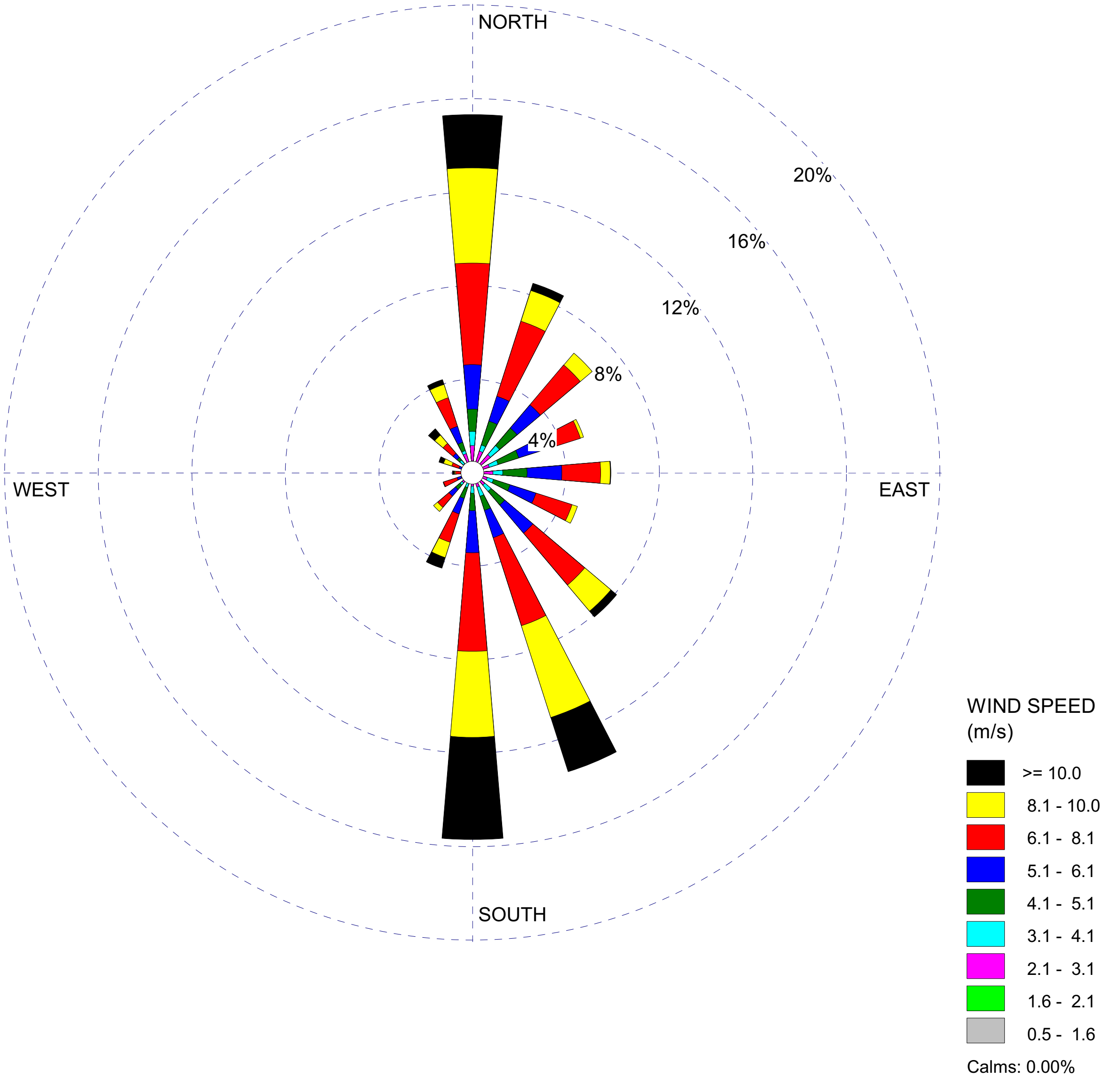


Figure 2.7-9 60-Meter Level Wind Rose—Winter
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

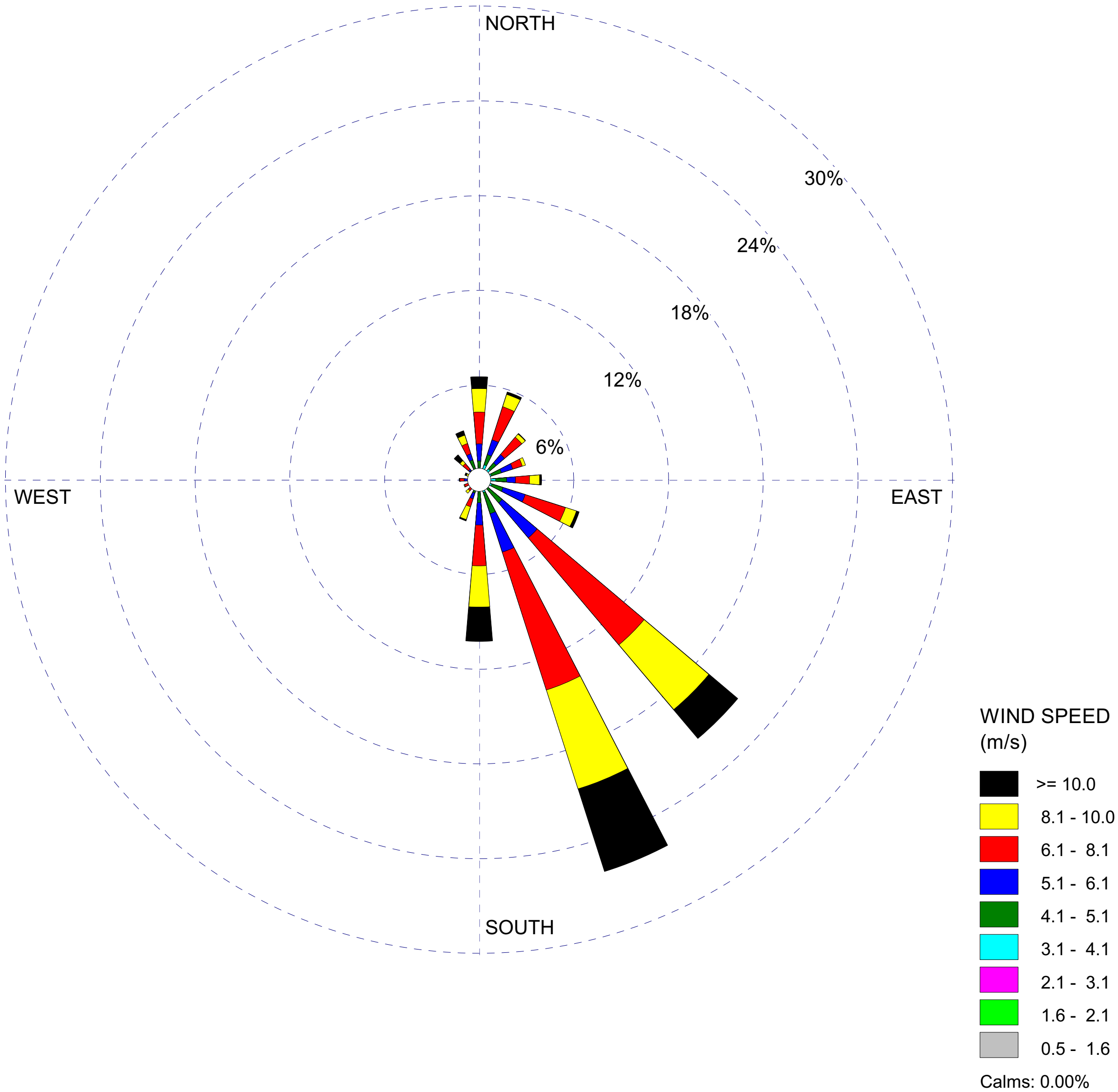


Figure 2.7-10 60-Meter Level Wind Rose—Spring
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

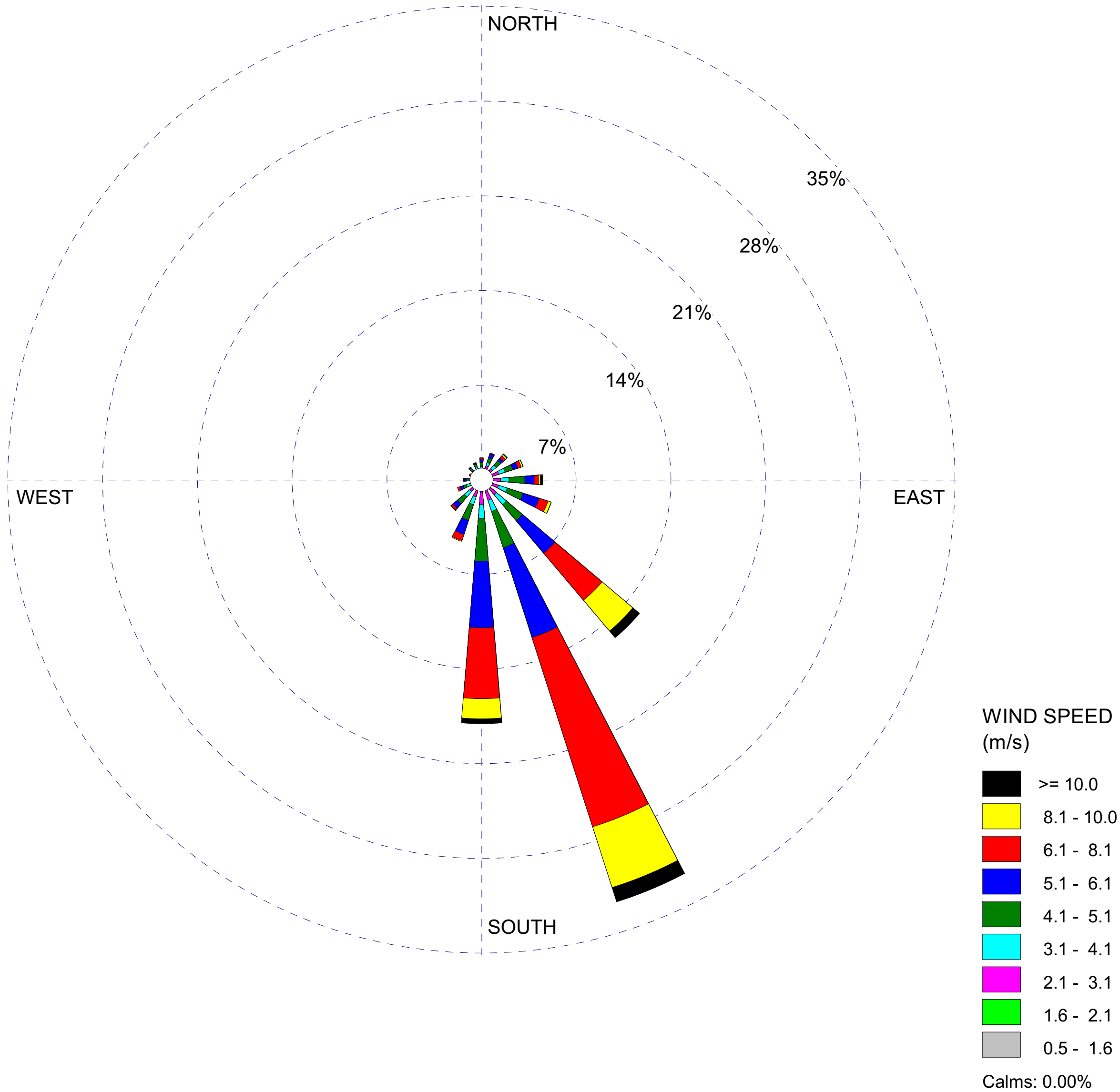


Figure 2.7-11 60-Meter Level Wind Rose—Summer
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

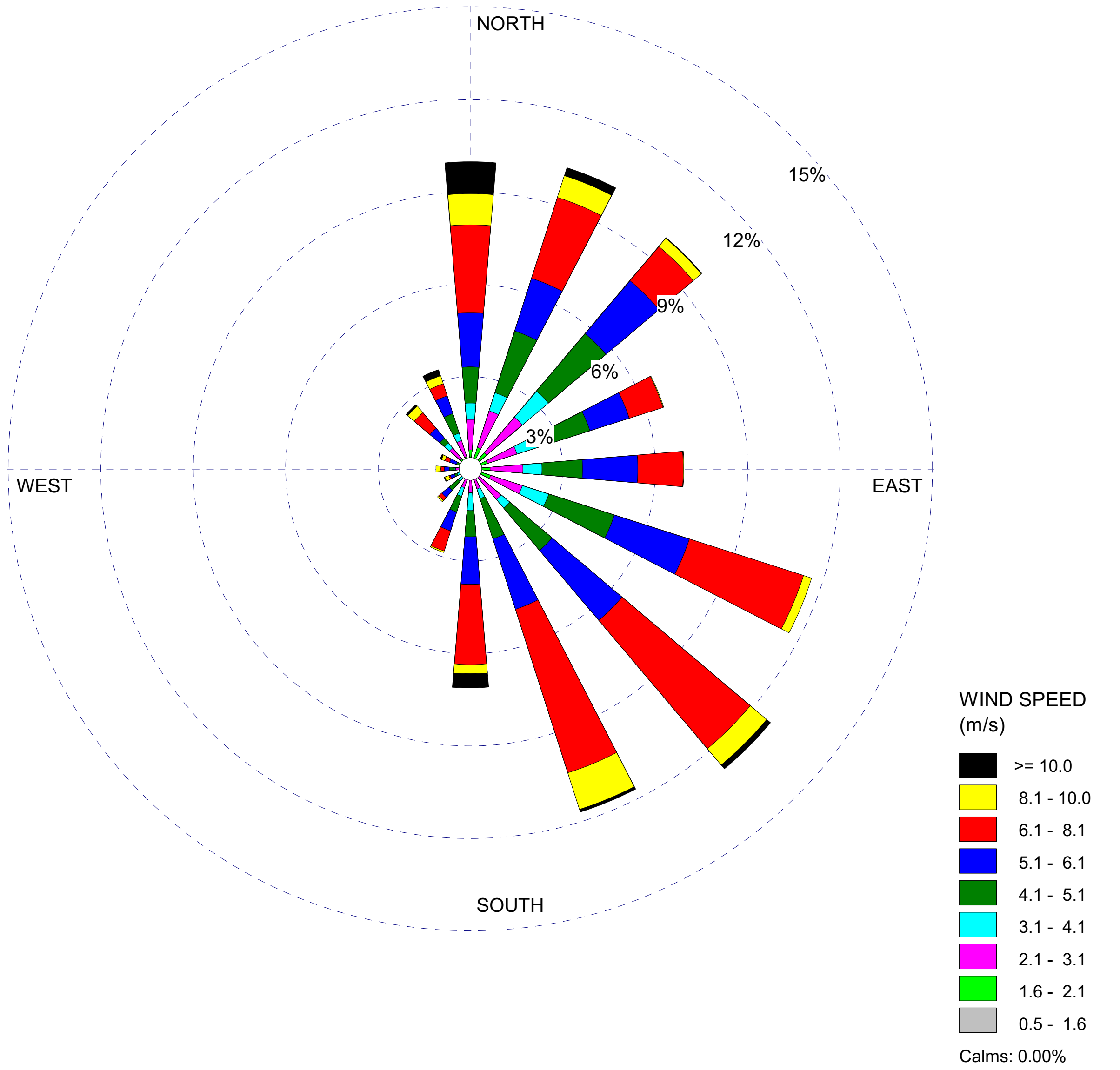


Figure 2.7-12 60-Meter Level Wind Rose—Autumn
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

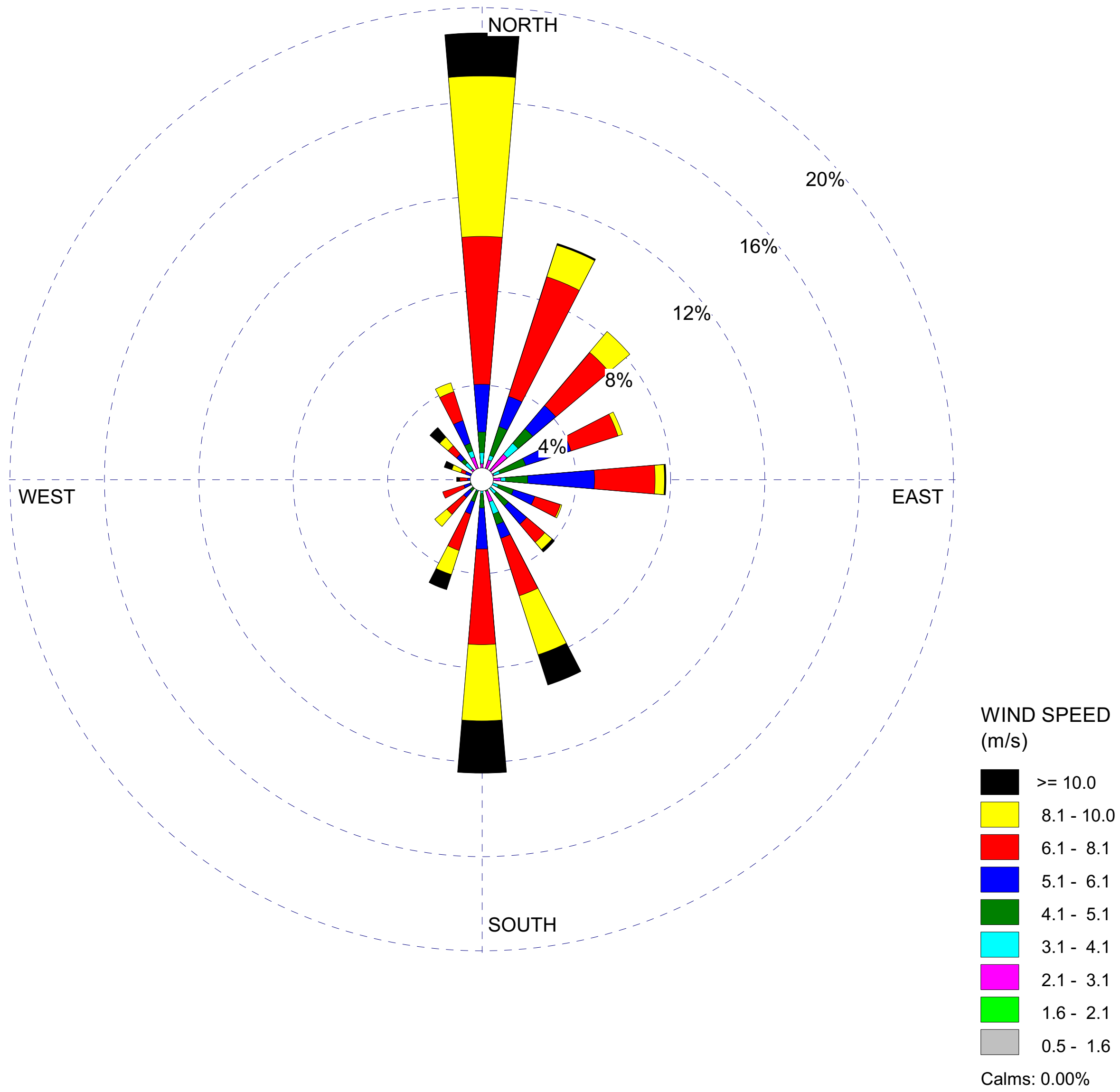


Figure 2.7-13 (Sheet 1 of 12) 60-Meter Level Wind Rose—January
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

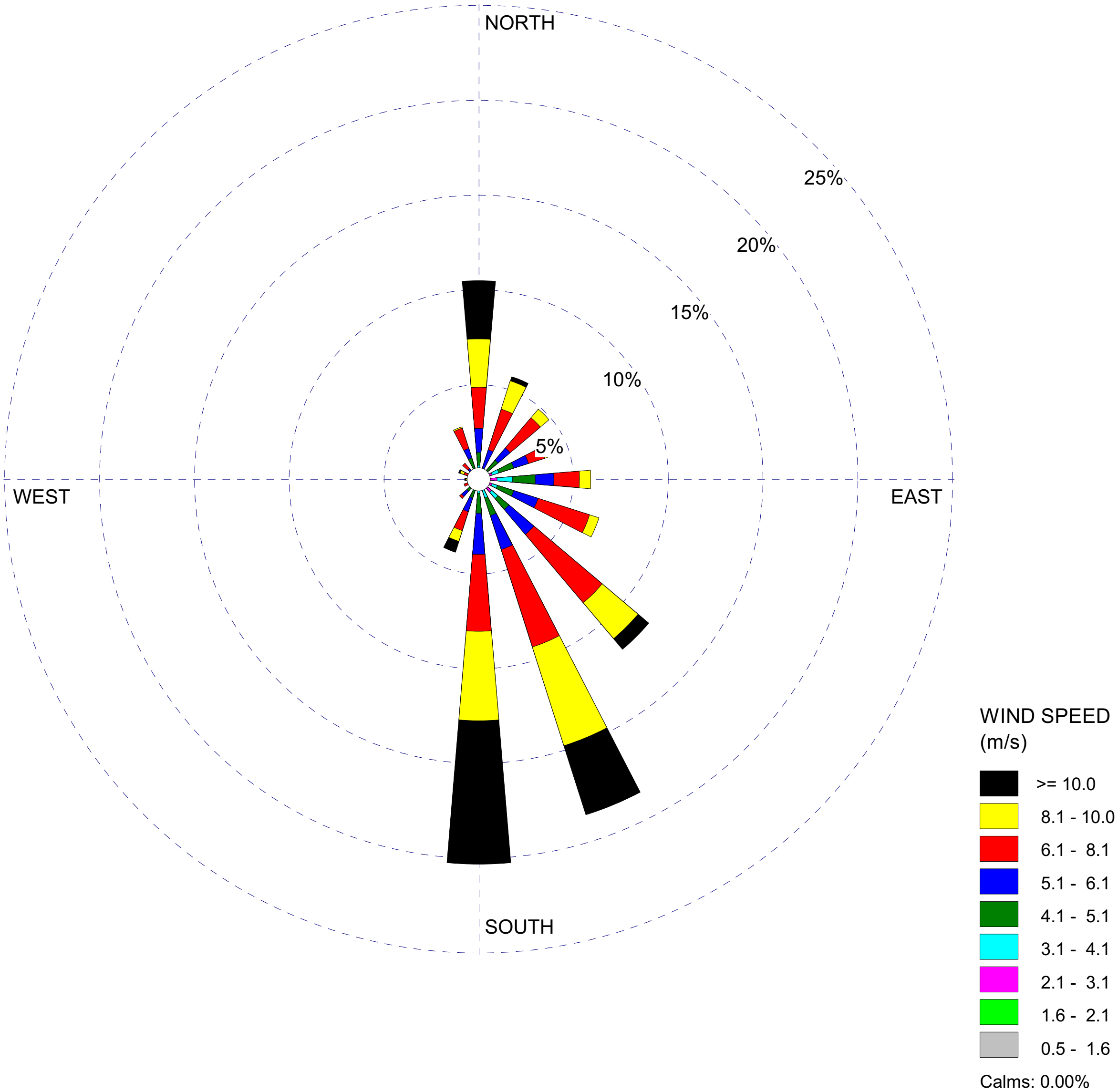


Figure 2.7-13 (Sheet 2 of 12) 60-Meter Level Wind Rose—February VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

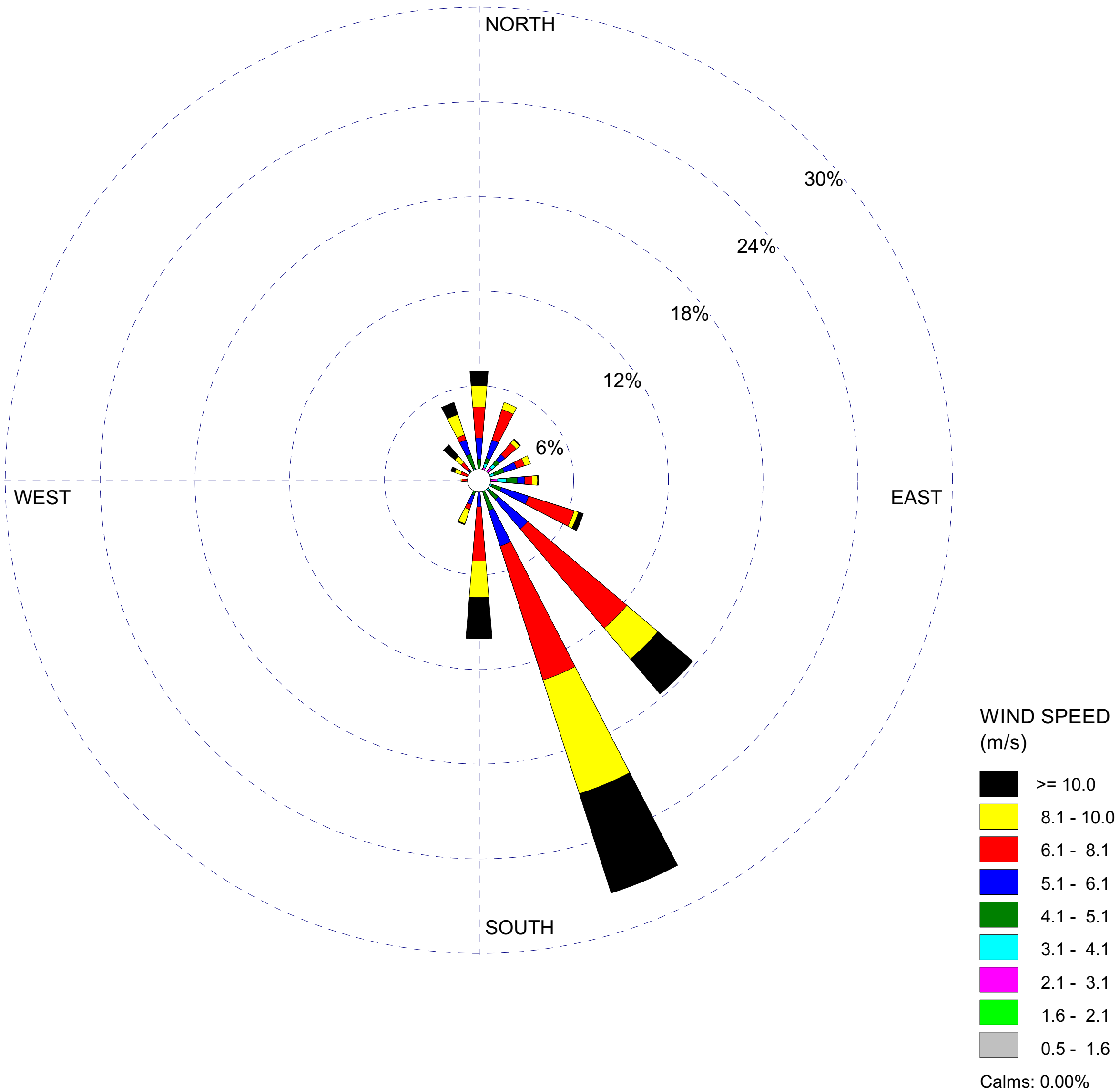


Figure 2.7-13 (Sheet 3 of 12) 60-Meter Level Wind Rose—March
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

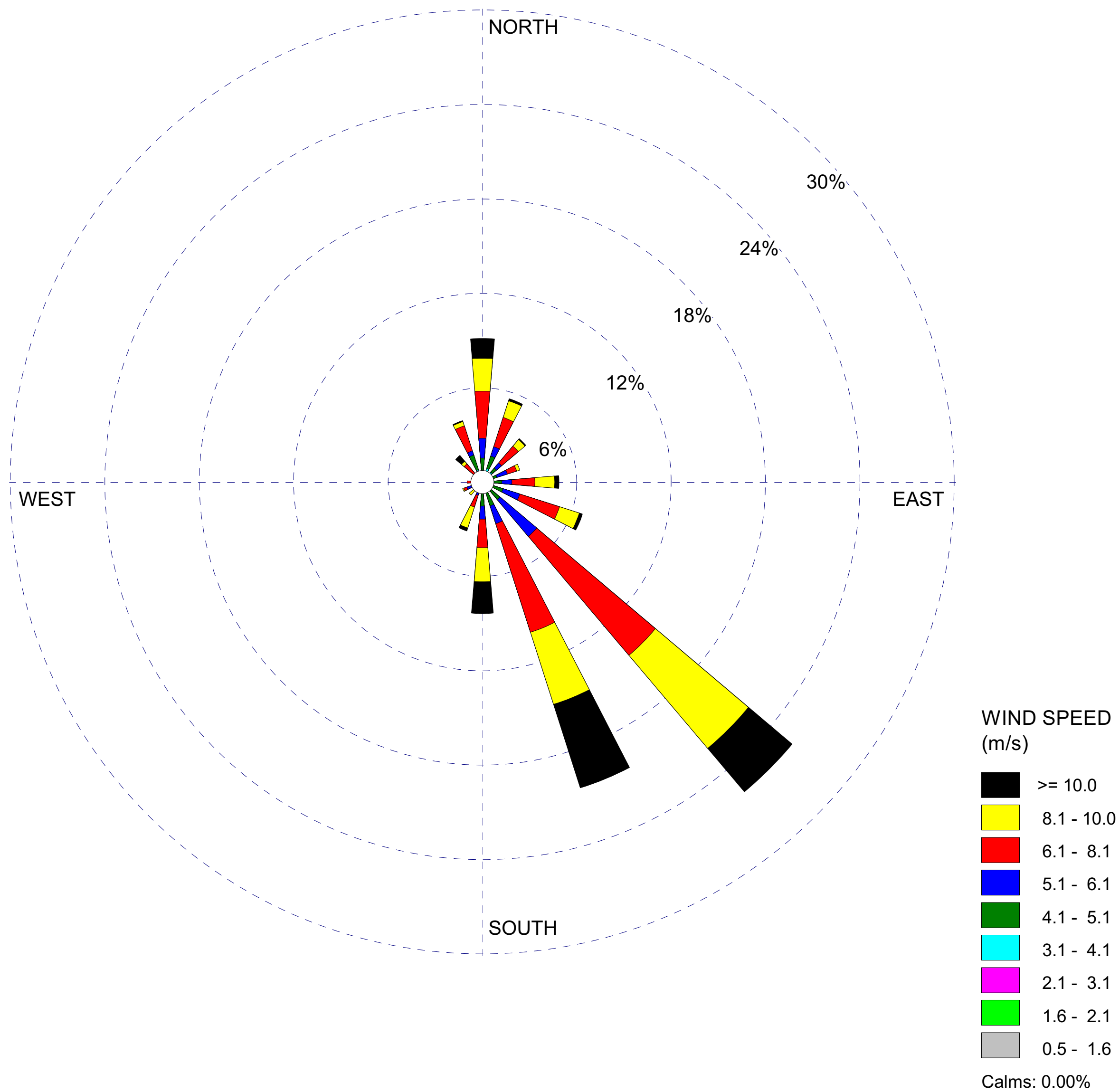


Figure 2.7-13 (Sheet 4 of 12) 60-Meter Level Wind Rose—April
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

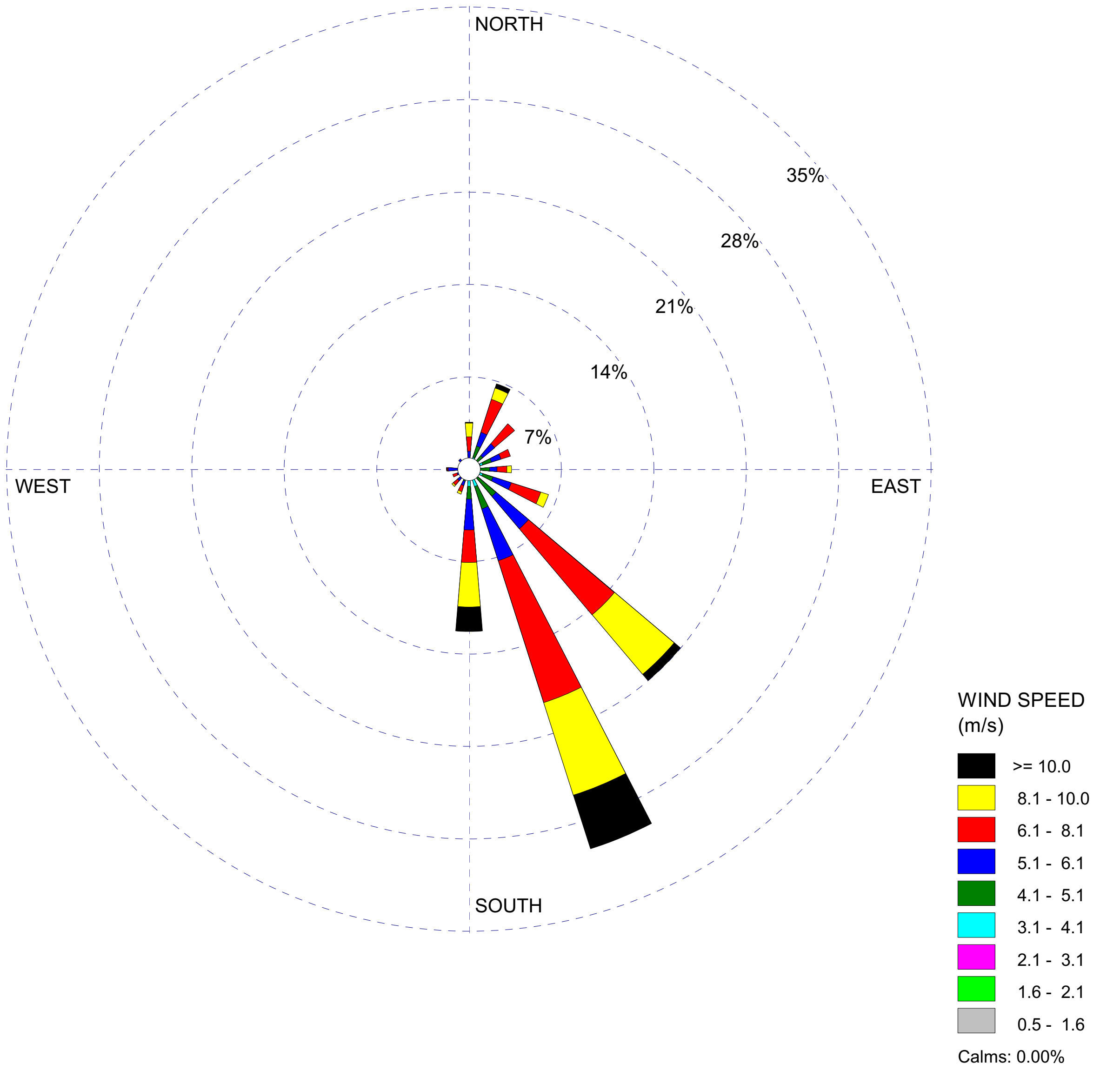


Figure 2.7-13 (Sheet 5 of 12) 60-Meter Level Wind Rose—May
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

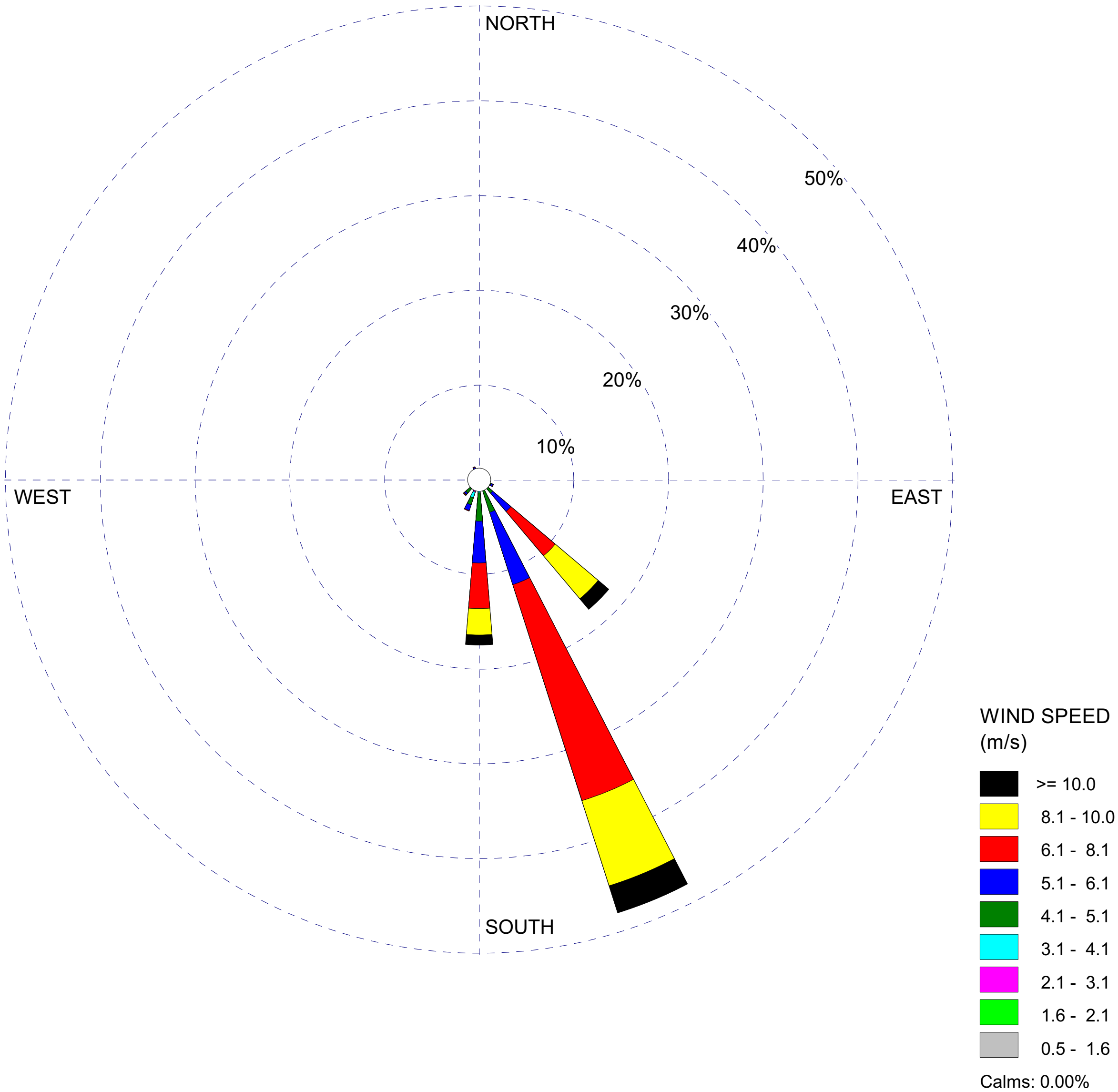


Figure 2.7-13 (Sheet 6 of 12) 60-Meter Level Wind Rose—June
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

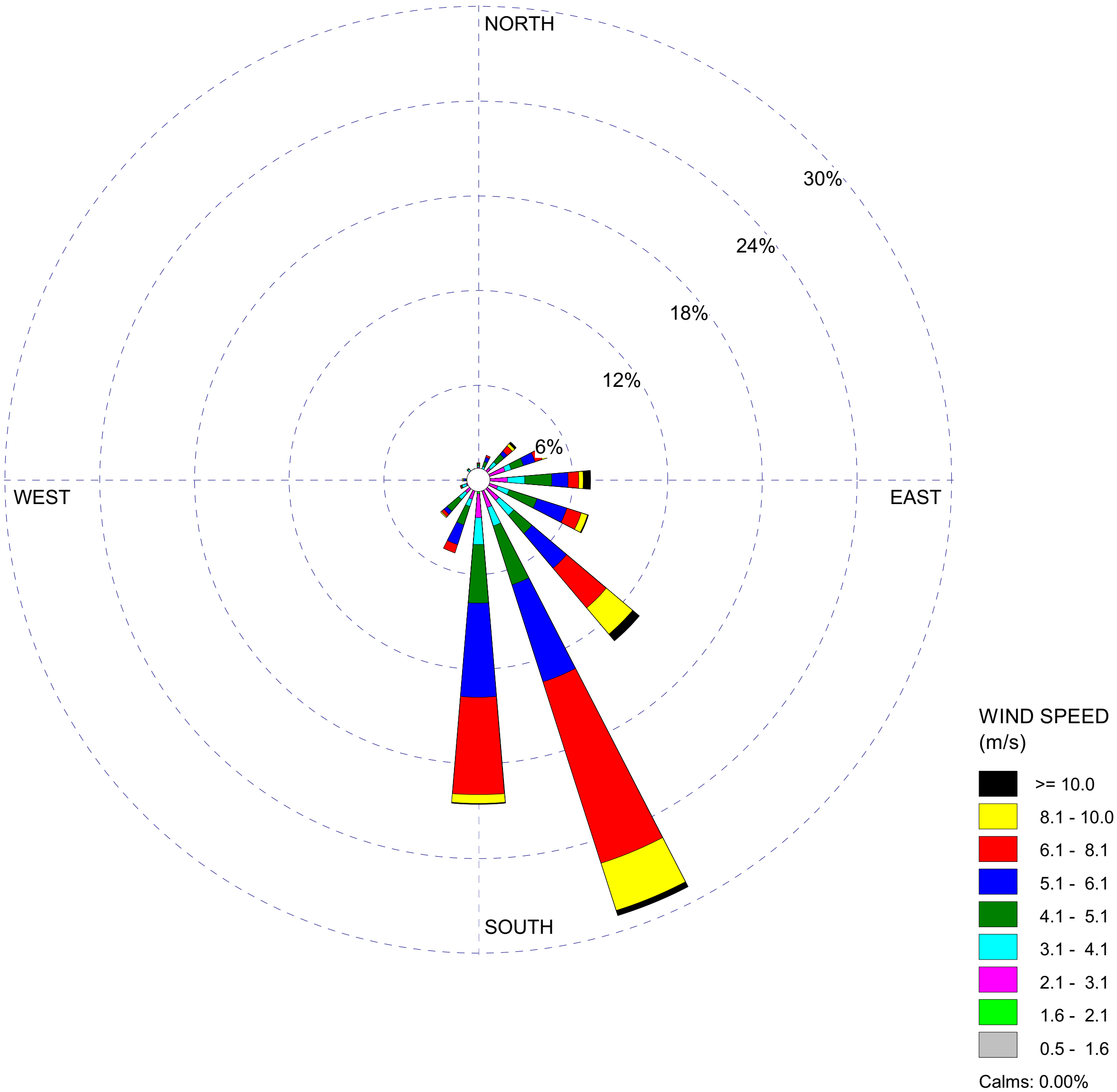


Figure 2.7-13 (Sheet 7 of 12) 60-Meter Level Wind Rose—July
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

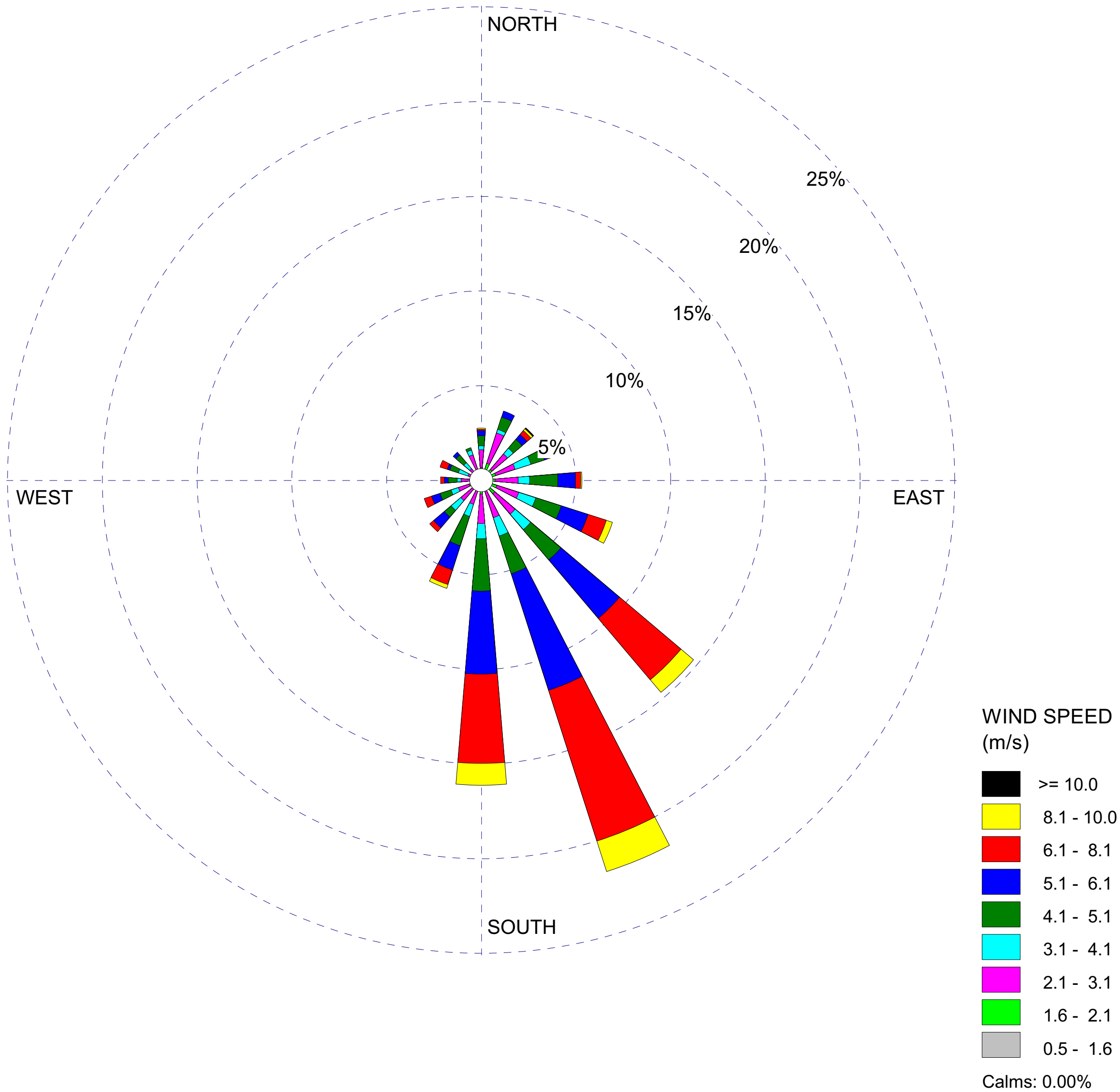


Figure 2.7-13 (Sheet 8 of 12) 60-Meter Level Wind Rose—August
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

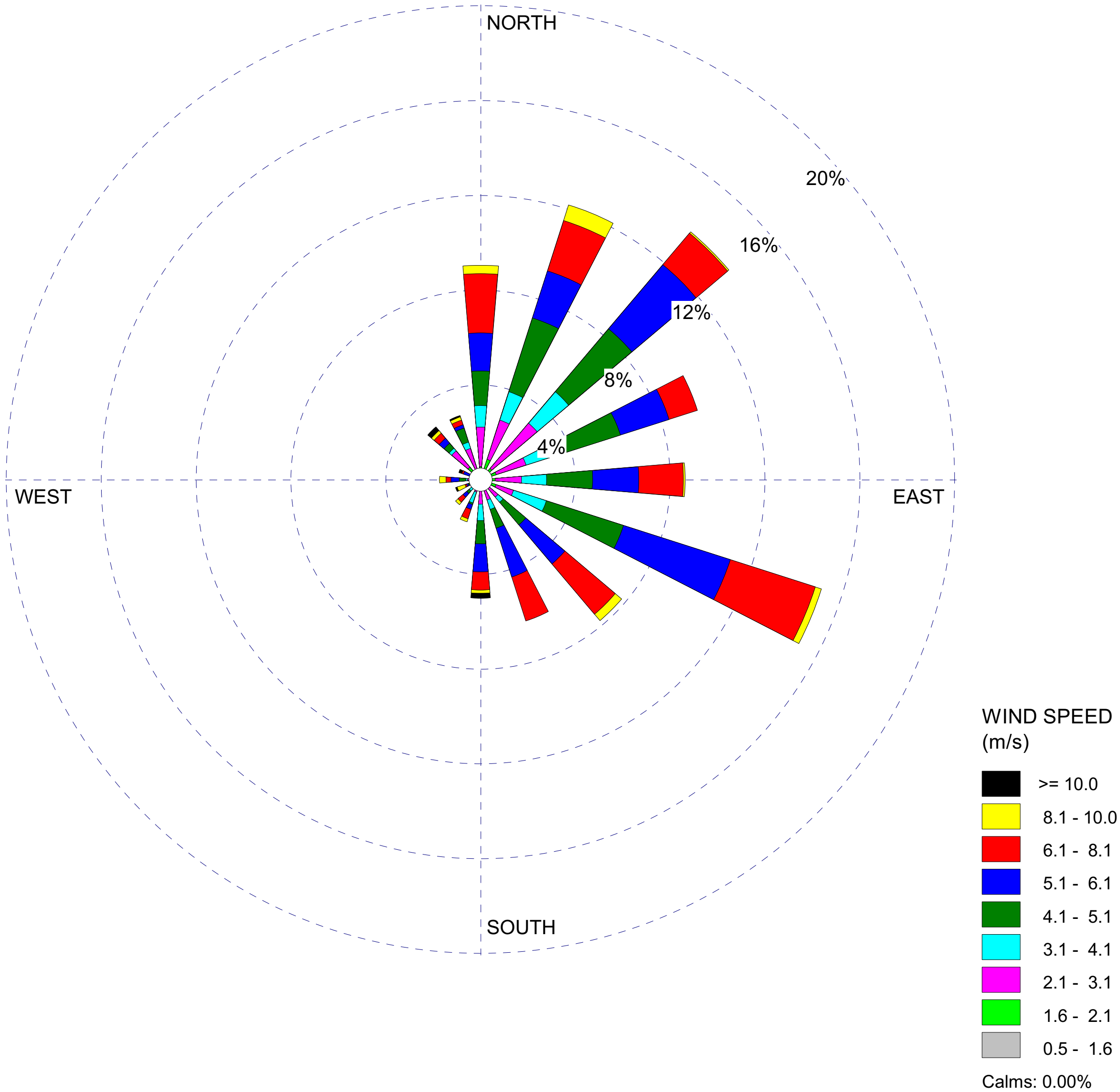


**Figure 2.7-13 (Sheet 9 of 12) 60-Meter Level Wind Rose—September
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)**

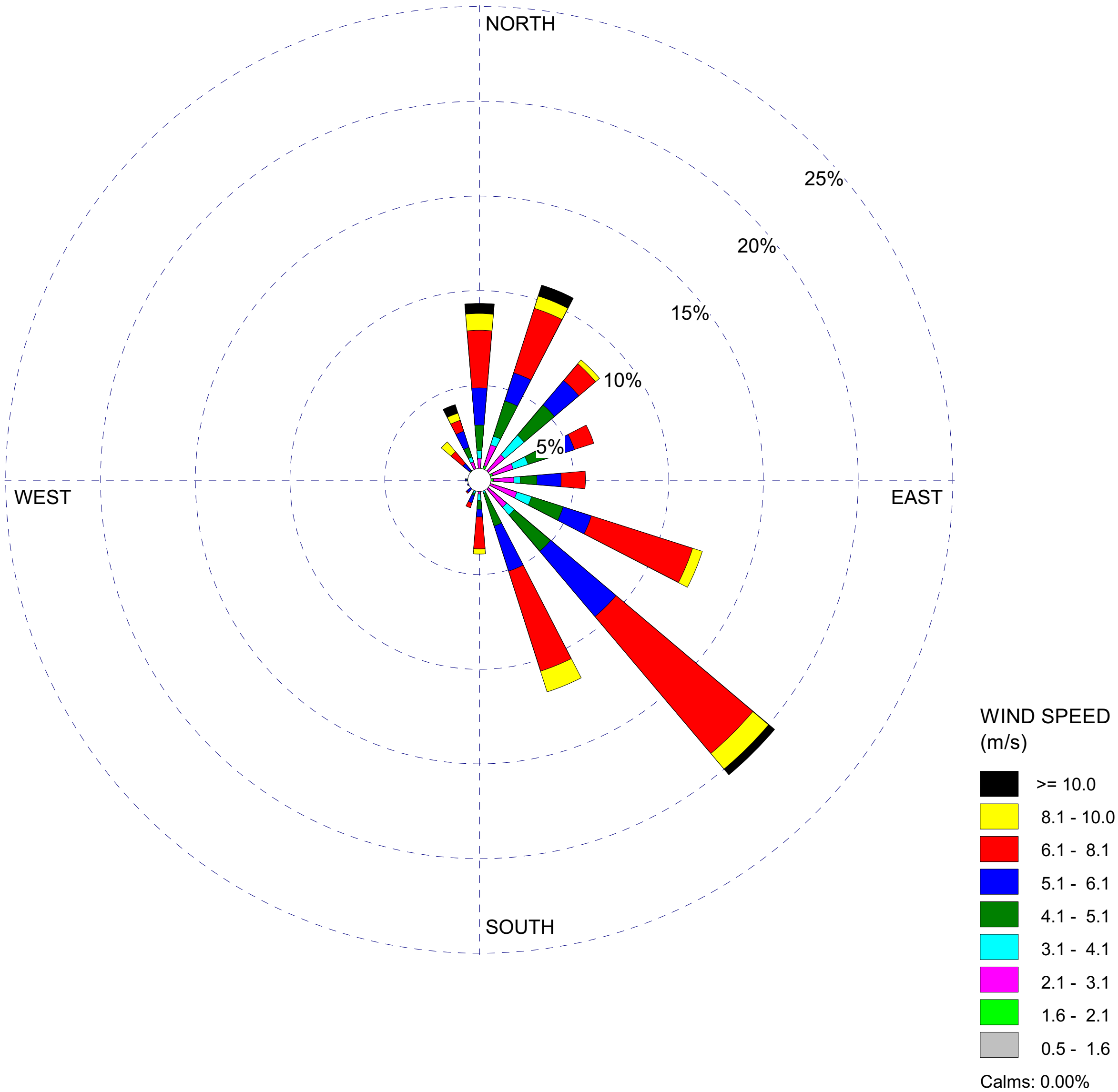


Figure 2.7-13 (Sheet 10 of 12) 60-Meter Level Wind Rose—October
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

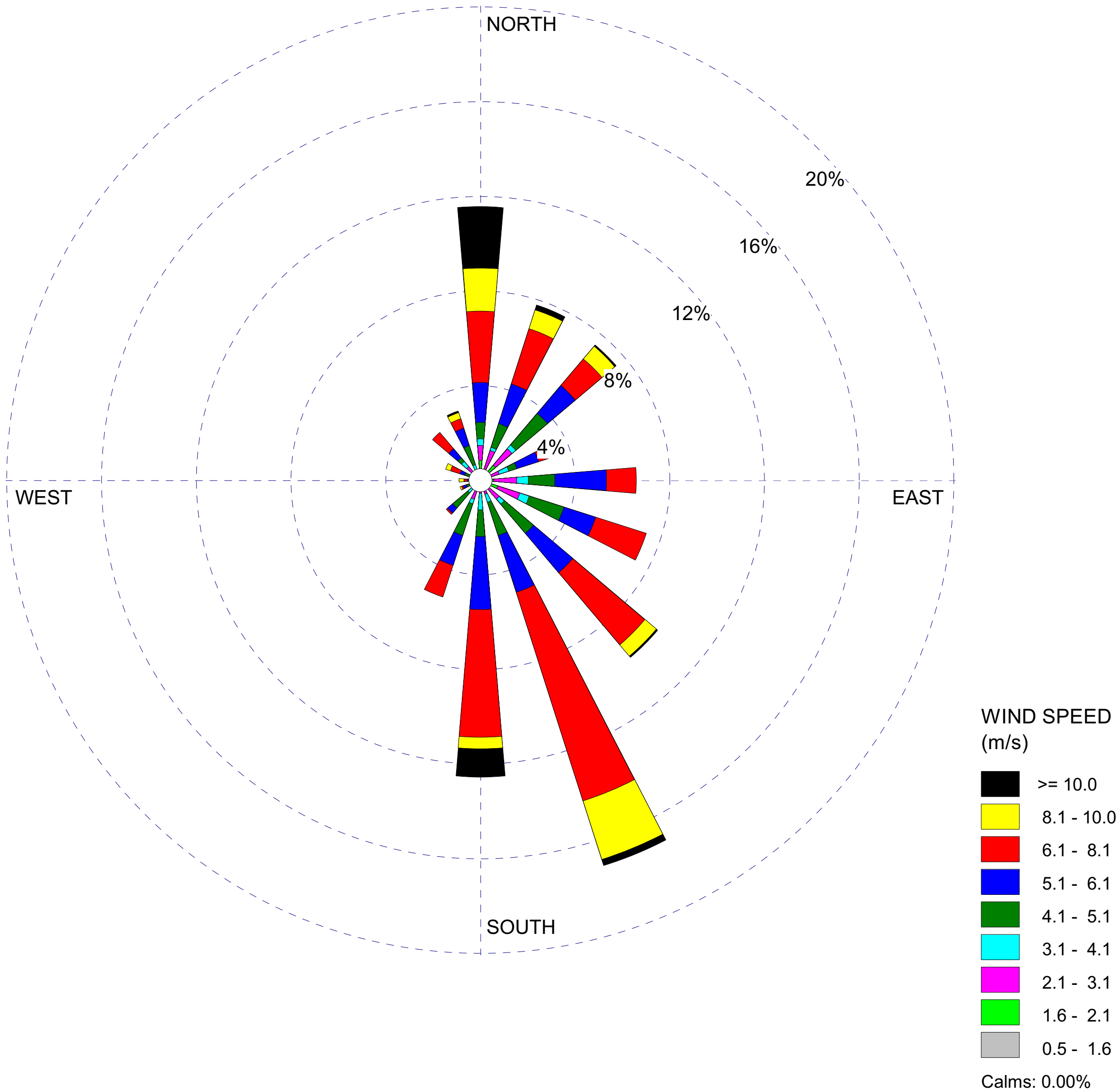


Figure 2.7-13 (Sheet 11 of 12) 60-Meter Level Wind Rose—November
VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)

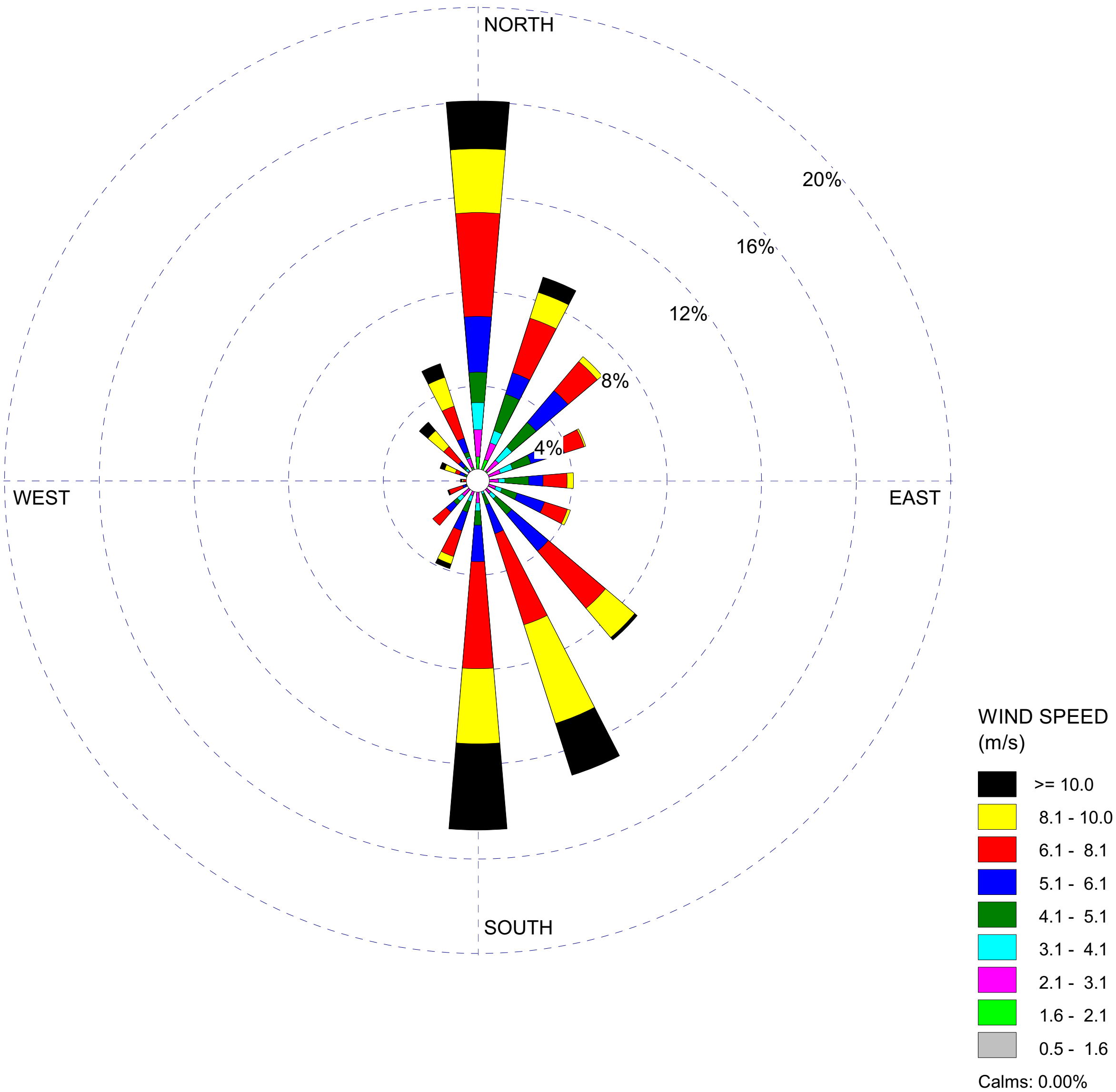
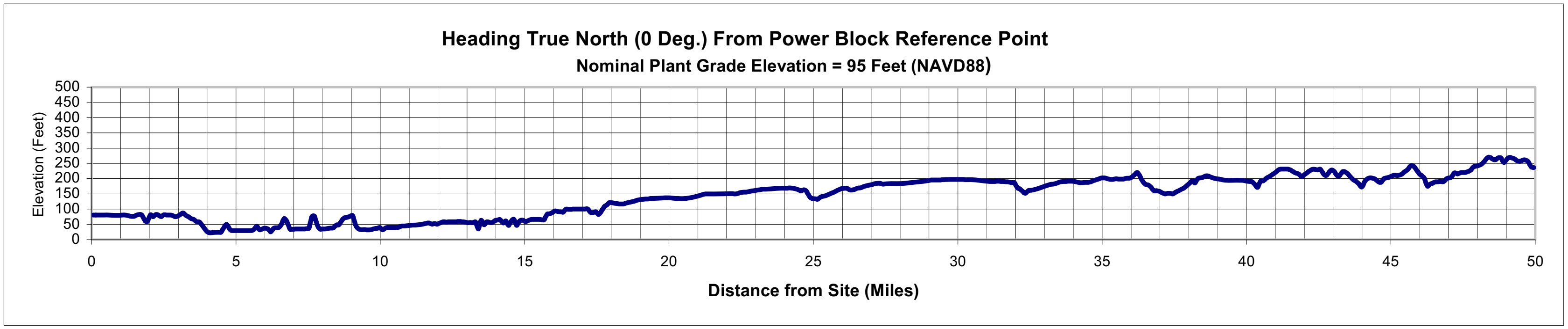
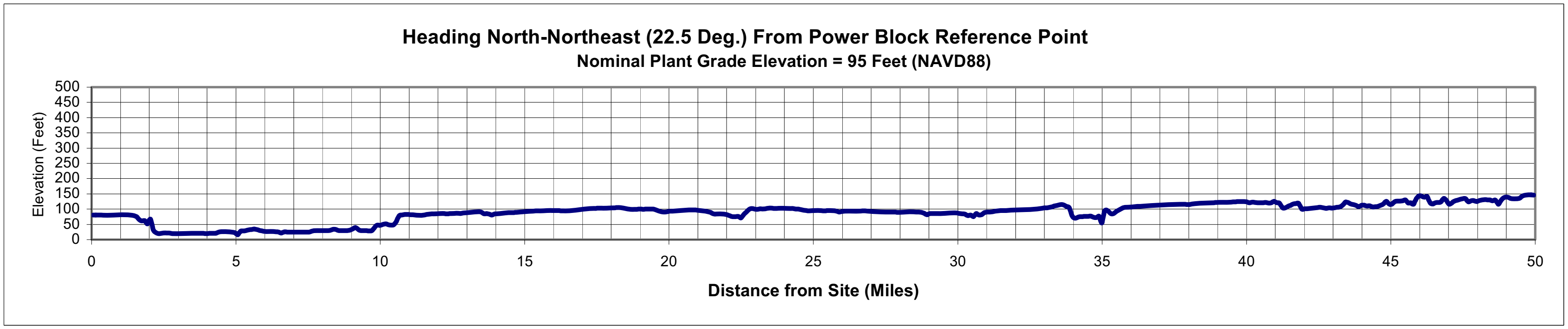


Figure 2.7-13 (Sheet 12 of 12) 60-Meter Level Wind Rose—December VCS Pre-Application Monitoring Program (July 1, 2007 through June 30, 2009)





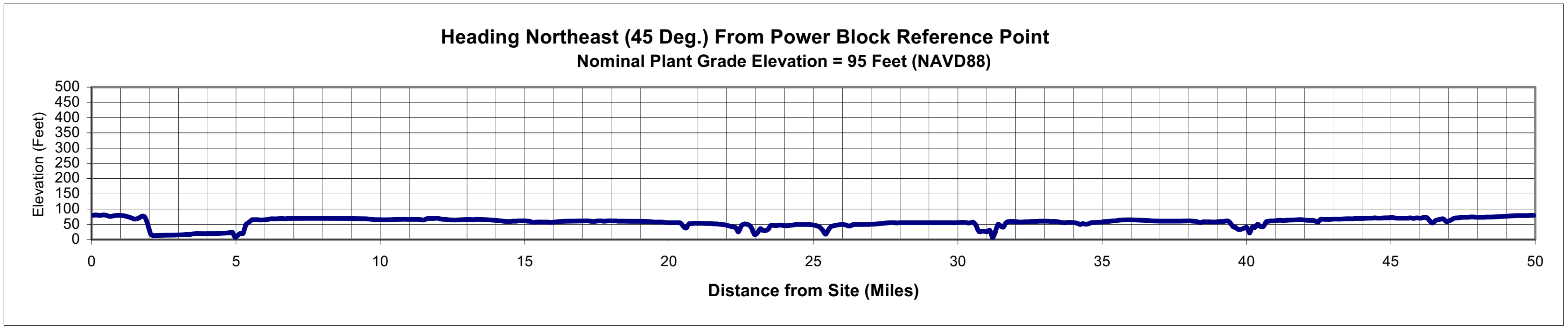


Figure 2.7-14 Terrain Elevation Profiles within 50 Miles of the VCS Site (Sheet 1 of 6)

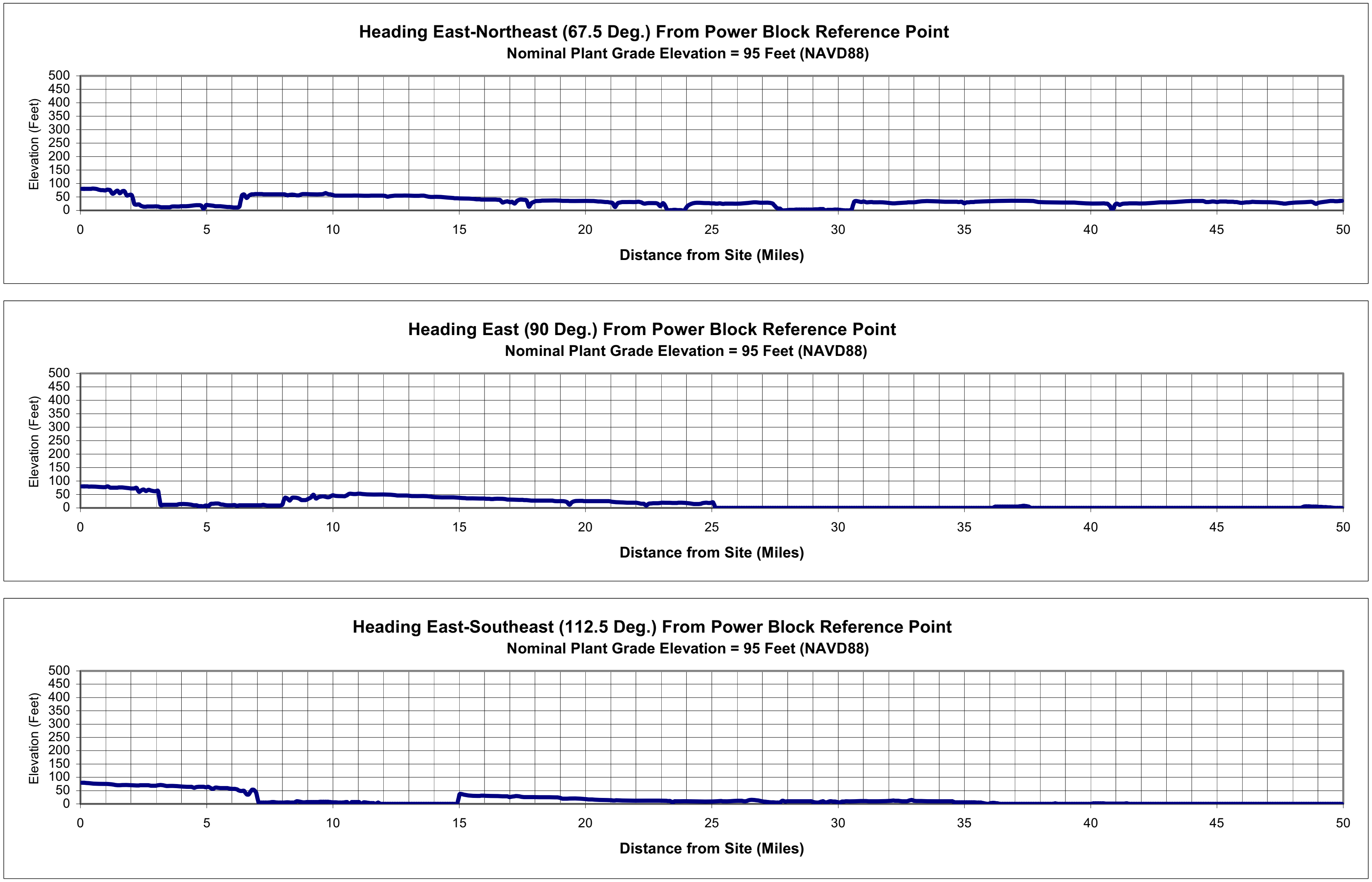
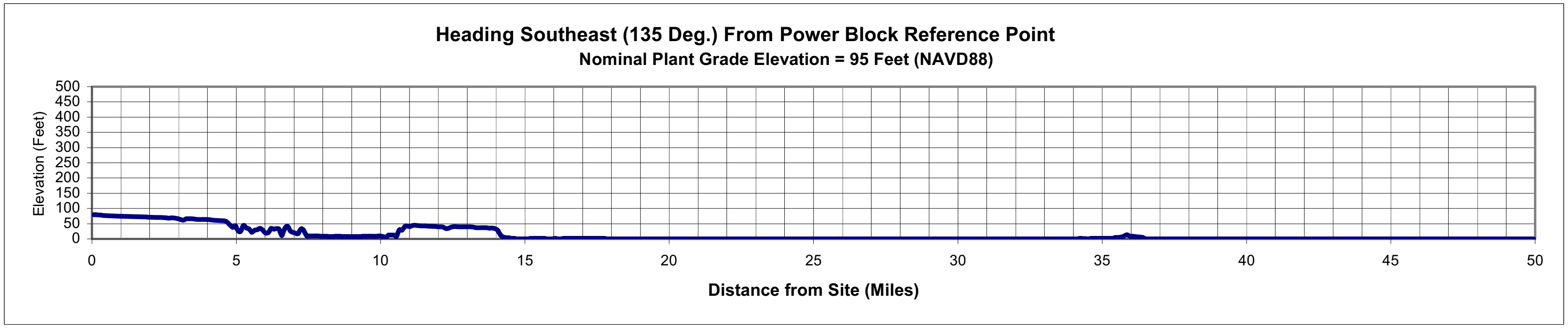
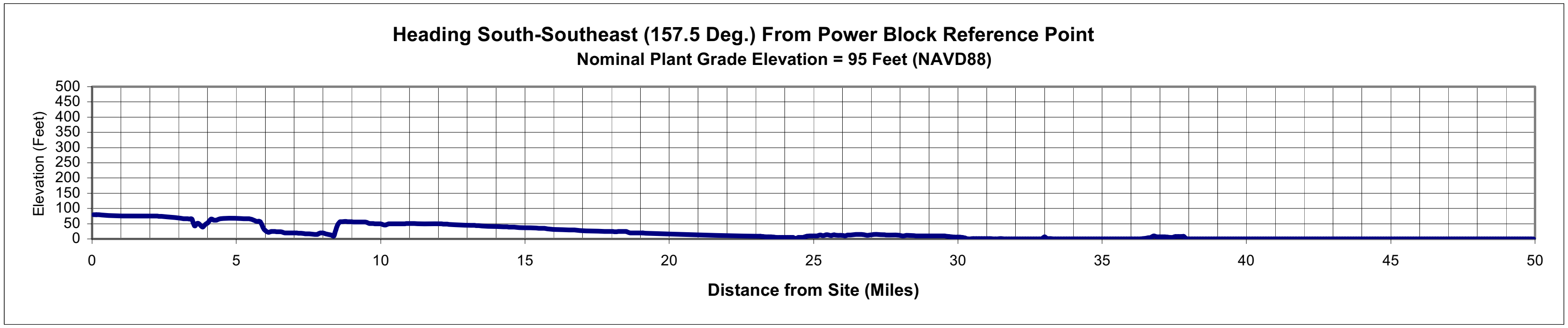


Figure 2.7-14 Terrain Elevation Profiles within 50 Miles of the VCS Site (Sheet 2 of 6)





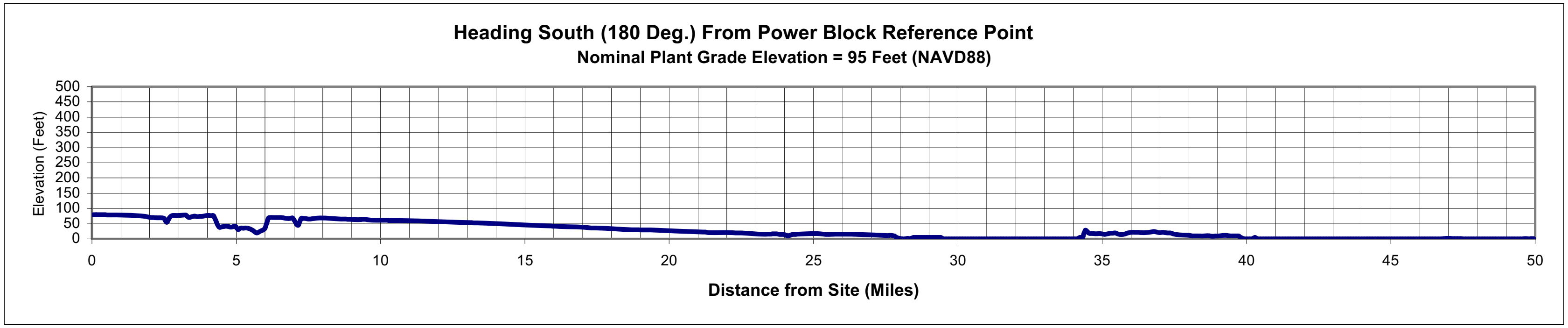
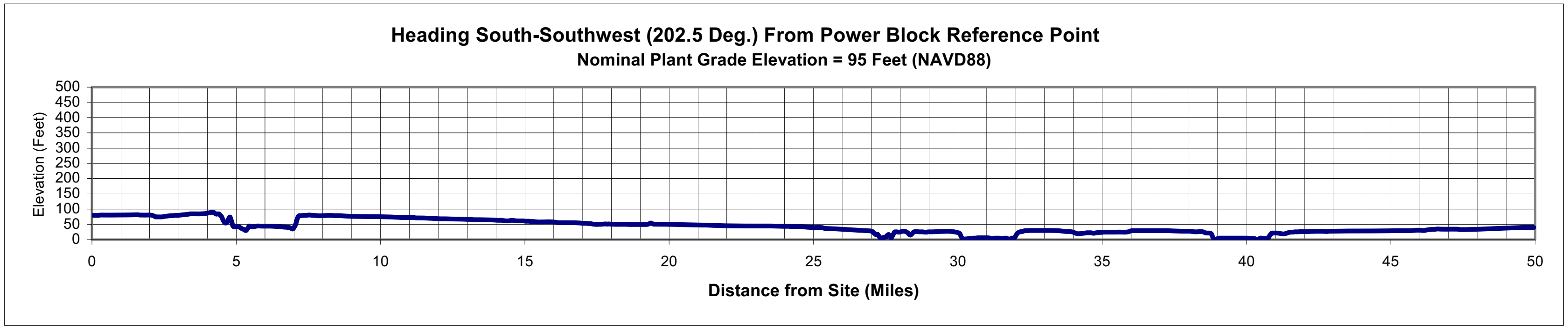
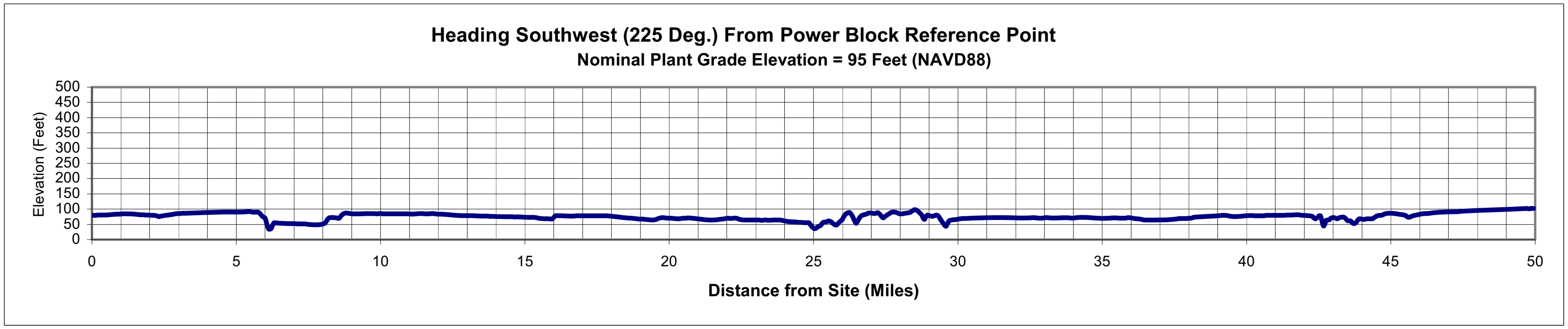


Figure 2.7-14 Terrain Elevation Profiles within 50 Miles of the VCS Site (Sheet 3 of 6)





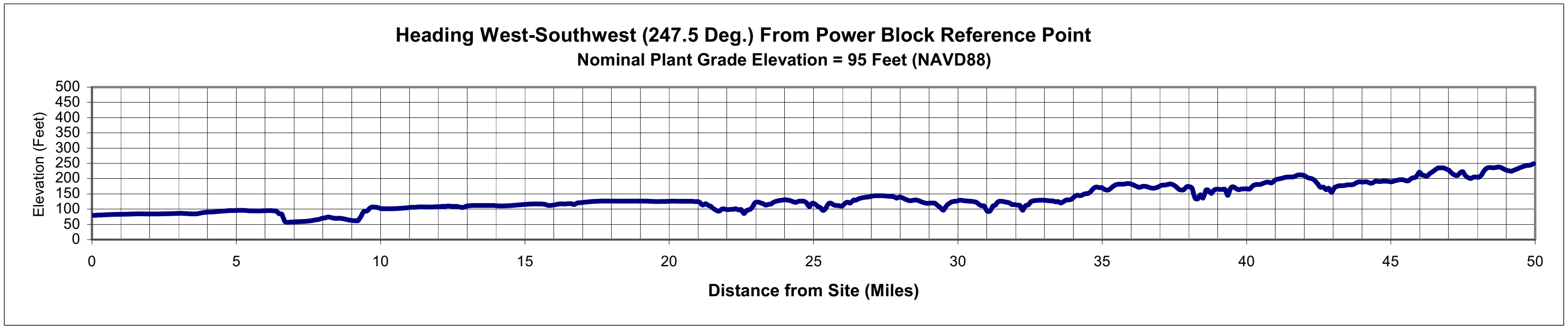
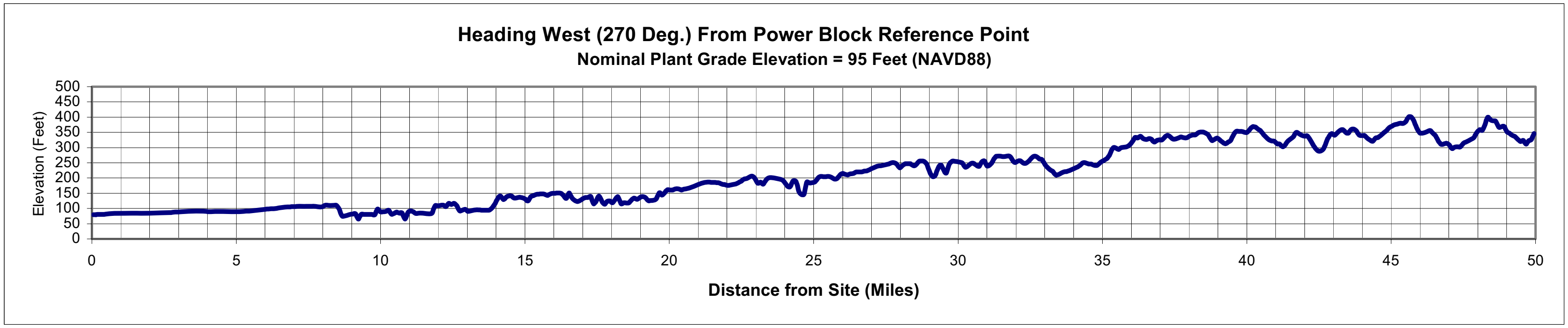
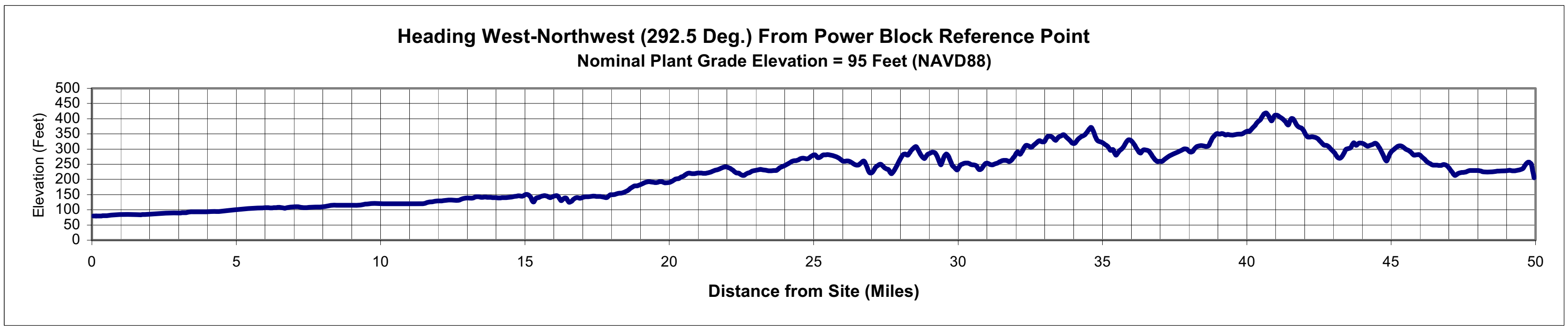


Figure 2.7-14 Terrain Elevation Profiles within 50 Miles of the VCS Site (Sheet 4 of 6)





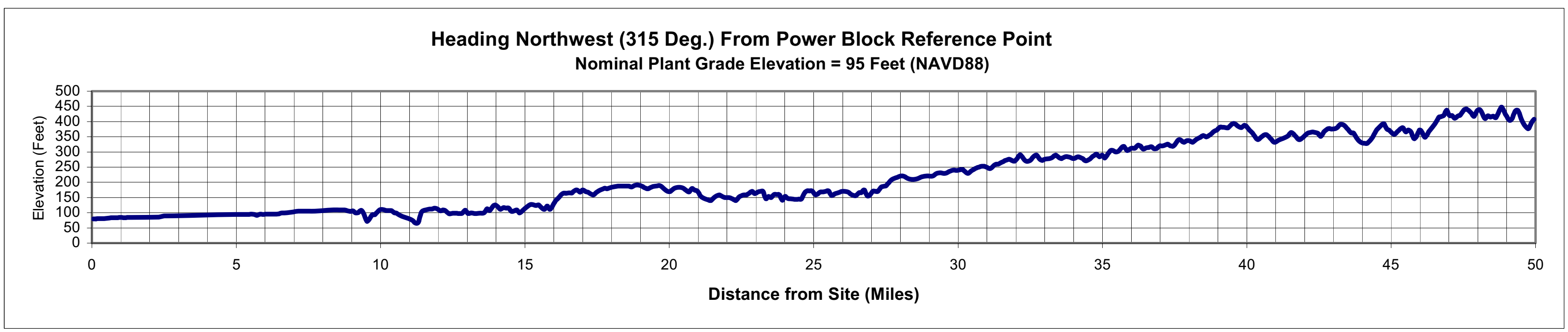


Figure 2.7-14 Terrain Elevation Profiles within 50 Miles of the VCS Site (Sheet 5 of 6)

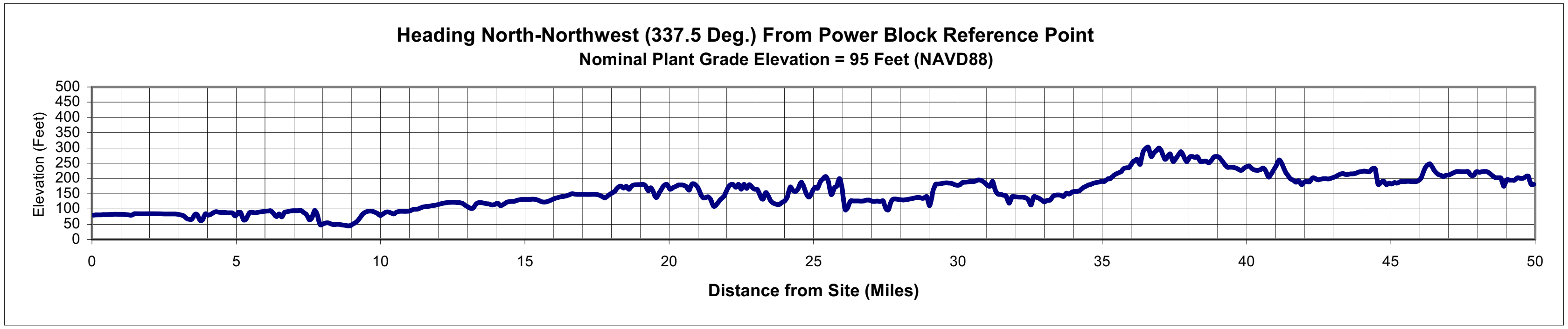
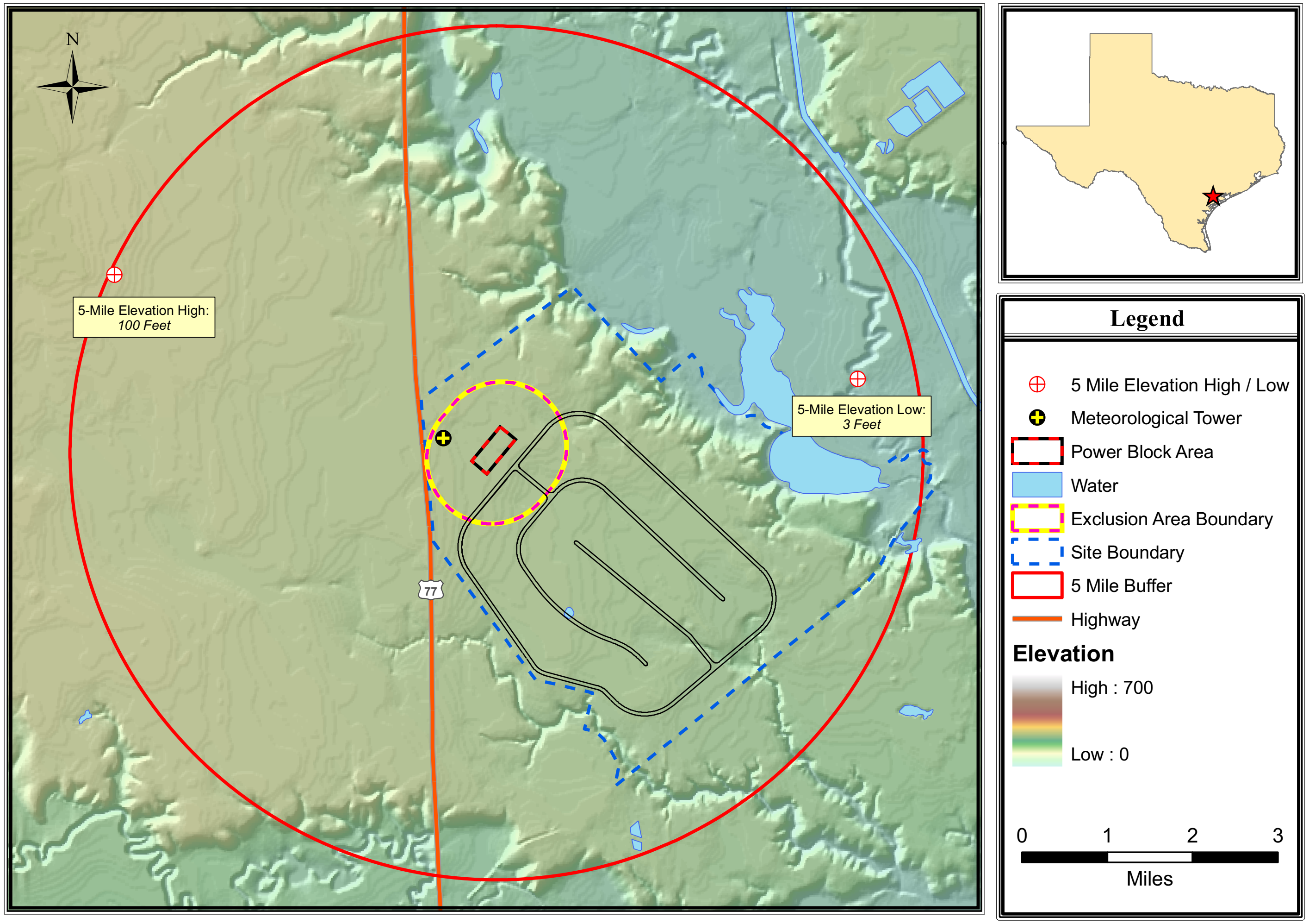


Figure 2.7-14 Terrain Elevation Profiles within 50 Miles of the VCS Site (Sheet 6 of 6)



Source Data: ESRI, Data & Maps and StreetMap USA, 2006.
USGS, seamless data distribution, NED shaded relief.

Projection: Texas South Central State Plane
Datum: North American Datum 1983

Drawing No.: EXELON_FIG_T_005MI_0000
Revision: 000 *Date:* 02/17/2010

Figure 2.7-15 Site and Vicinity Map (5-Mile Radius)

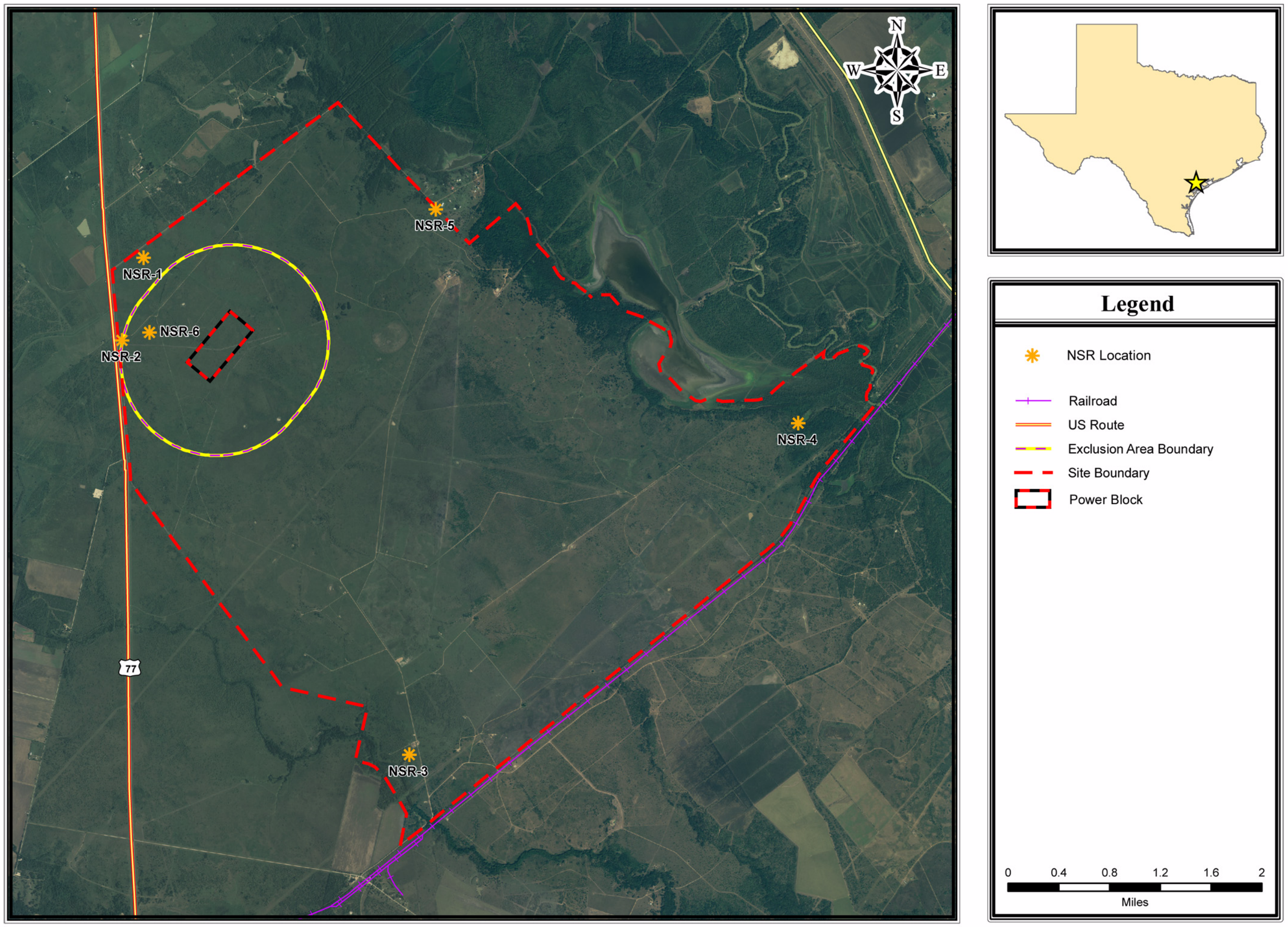


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Figure 2.7-16 Noise Monitoring Locations

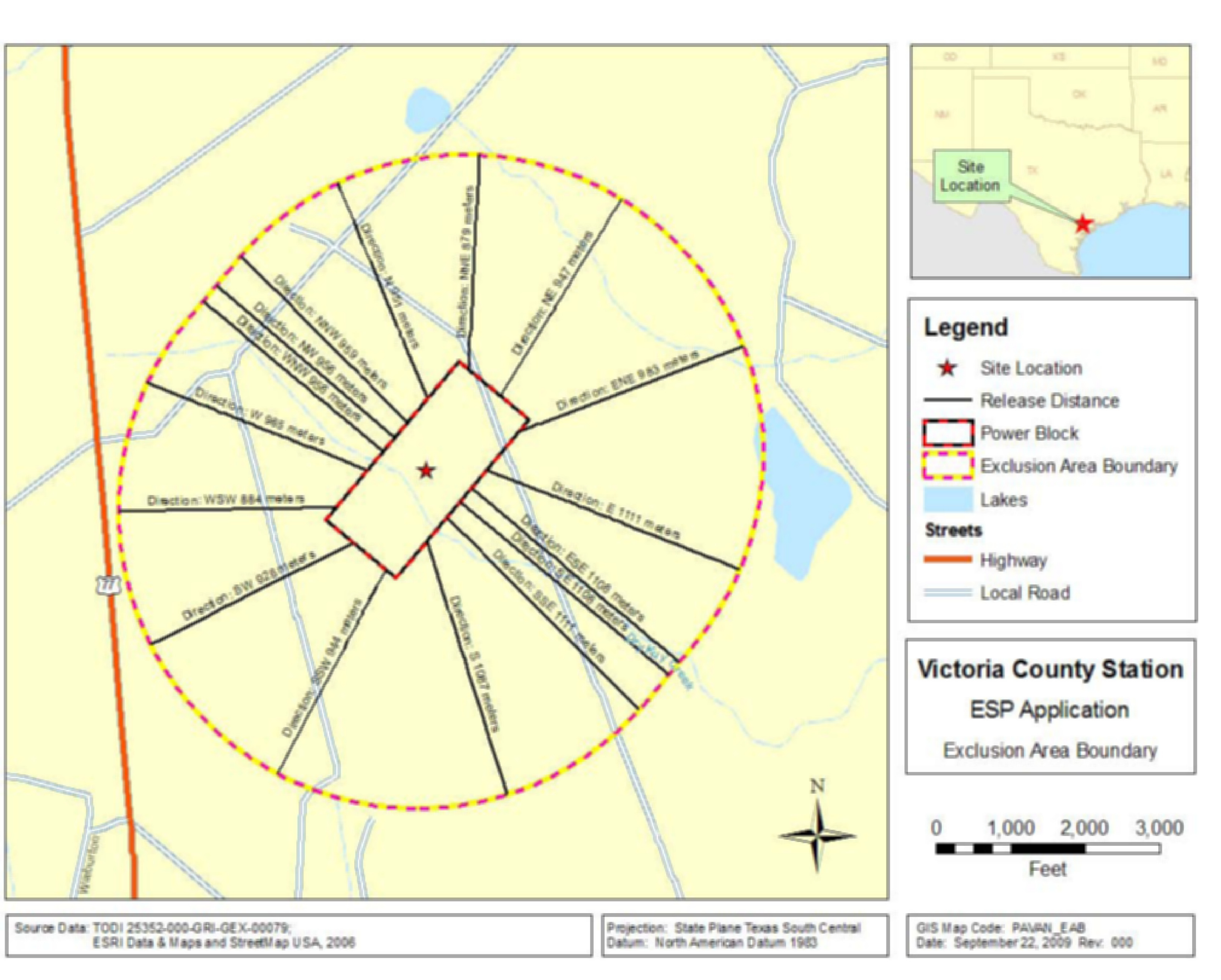

Figure 2.7-17 Distance to EAB from the Source Boundary for PAVAN Modeling

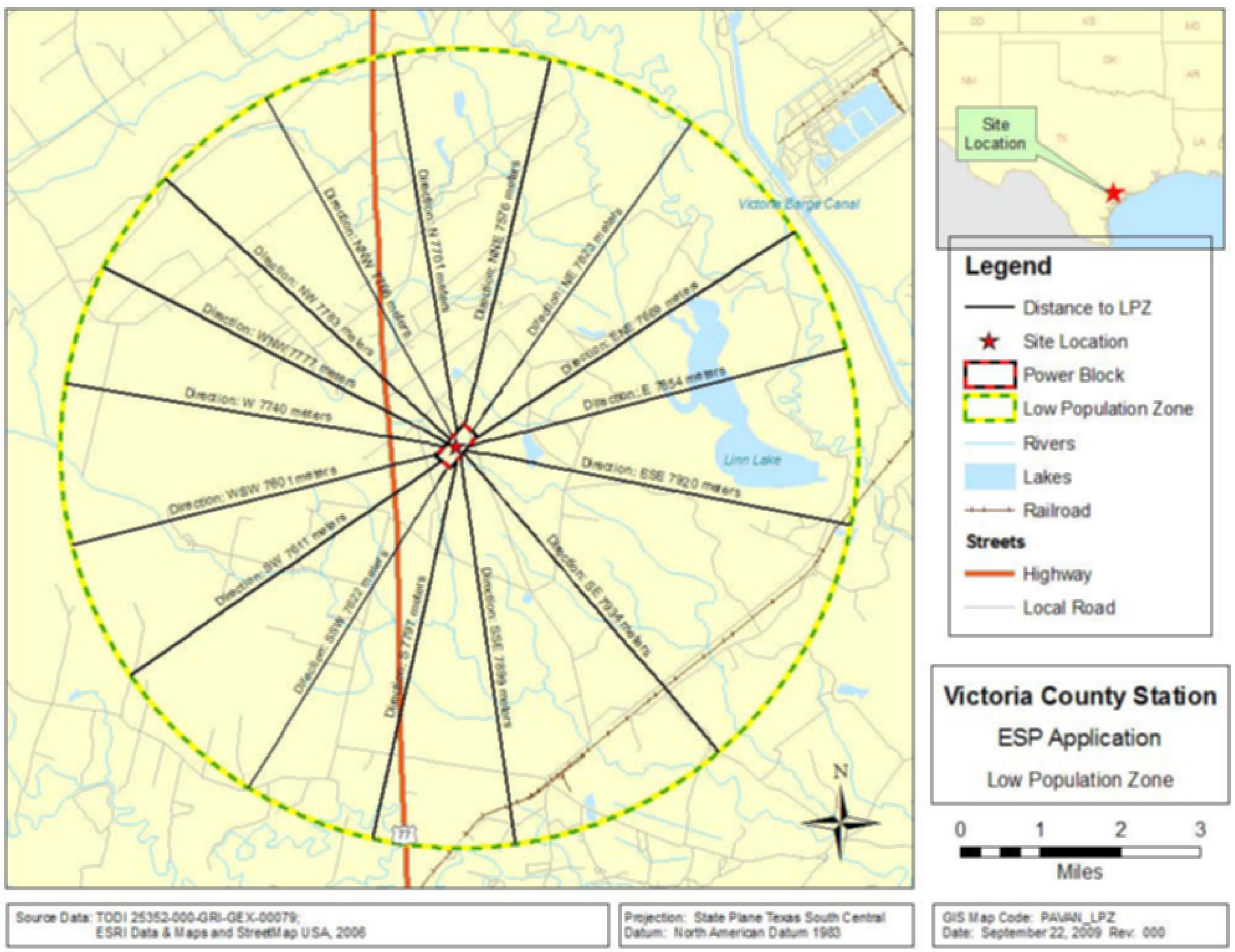

Figure 2.7-18 Distance to LPZ from the Source Boundary for PAVAN Modeling