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2.7 METEOROLOGY AND AIR QUALITY

2.7.1 GENERAL CLIMATE

{Callaway Plant Unit 2 is located in Callaway County, Missouri, approximately 10 miles (16 km) southeast of Fulton, Missouri. The Callaway site is on a plateau between nearby shallow river valleys. The Missouri River flows in a 2-mile (3.2 km) wide, east-west valley approximately 5 miles (8 km) south of the site at an elevation of approximately 340 ft (104 m) below the Callaway site. The weather data used to create this narrative is from the period 1971-2000 (NOAA, 2007).

Missouri has a continental type of climate marked by strong seasonality. In winter, dry-cold air masses, unchallenged by any topographic barriers, periodically swing south from the northern plains and Canada. If cold air masses meet reasonably humid air, snowfall or rainfall can result. In summer, moist, warm air masses, equally unchallenged by topographic barriers, swing north from the Gulf of Mexico and can produce copious amounts of rain, either by fronts or by convectional processes. In some summers, high pressure stagnates over Missouri, creating extended drought periods. Spring and fall are transitional seasons when abrupt changes in temperature and precipitation may occur due to successive, fast-moving fronts separating contrasting air masses.

Frontal systems are frequently strong during all seasons except summer. A strong cold front is often preceded by a shower or thunderstorm and followed by a shift in wind direction from south to north and drops in temperature of as much as 20°F (11°C) in 2 hours. Warm fronts usually are preceded by general rainfall and followed by a shift from north to south winds and warmer temperatures. Frontal systems are usually weak and reach the region less frequently during the summer months (NOAA, 2007).}

2.7.1.1 Winds

{The prevailing winds at the surface are determined by the frequency and intensity of anticyclones and cyclones that move over the area. At Callaway the predominant 33 ft (10 m) wind direction is from the south-southeast. Airflow is primarily from southwest to southeast during most of the year; however, during winter and spring months, winds from the west to northwest occur frequently and may constitute the prevailing wind direction during some winter and spring months. Wind speeds are generally greatest during spring and lowest during summer.

During light wind situations, some air drainage from the Callaway site into the Missouri River Valley may occur; however, such drainage is expected to be minimal due to the distance separating the site from the edge of the valley.

Surface mean wind speeds range from 5 mph to 6 mph (2.2 m per sec to 2.7 m per sec) in summer to 7 mph to 8 mph (3.1 m per sec to 3.6 m per sec) in winter and early spring. The highest mean wind speeds are associated with thunderstorms and with cyclones and anticyclones associated with frontal passages particularly in the early spring.}

2.7.1.2 Storm Tracks

{High and low pressure systems pass over the region generally from west to east. They alternate every few days, except during late summer and autumn when high pressure systems occasionally stagnate over the region for a week or more. These stagnating high pressure conditions provide the worst macro-scale diffusion conditions. Locally, diffusion is worst during strong inversion situations and light winds. Such conditions, which commonly last only a few

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hours, occur most frequently during predawn hours of autumn and winter. The low pressure systems promote atmospheric mixing and provide favorable diffusion conditions. The path of low pressure systems is generally to the north of the region during summer and near or just to the south of the region during winter. Low pressure systems reach their maximum intensity during winter and spring but are weak during summer.**}**

2.7.1.3 Temperatures

{The mean annual temperature in central Missouri (Columbia) is 54.1°F (12.3°C). The winter climate has periods of cold weather usually interrupted by periods of at least a few mild days. The average frost penetration is about 30 in (78 mm) in central Missouri. Summer is characterized by considerable warm weather with at least several hot, humid periods. Nights during the summer are usually comfortable.

On average, temperatures of 90°F (32.2°C) or higher occur 30 to 40 days per year in central Missouri. The average number of days per year with minimum temperature of 32°F (0°C) or lower is about 105 in this area. Average relative humidity is lower in the early spring (March and April) and highest in the winter (December and January) although the monthly average values only vary from 66% in April to 75% in December.}

2.7.1.4 Precipitation

{Precipitation is moderate; heaviest amounts usually fall during late spring, and lightest amounts occur during midwinter. The most favorable situation for rain occurs during the spring and summer when the jet stream shifts to the north and high pressure in the Atlantic Ocean allows southerly winds to carry large quantities of moisture from the Gulf of Mexico into Missouri. Summer precipitation, and spring precipitation to some extent, is commonly convective and occasionally very intense. Autumn, winter, and some spring precipitation are lighter, but of greater duration which is characteristic of synoptic scale precipitation-producing systems.

Annual average precipitation is about 40 inches (1,016 mm). Distribution is generally uniform throughout the year except for the winter months that average about 2.25 inches (57.2 mm) per month. The heaviest precipitation occurs in the spring (a maximum of 12.31 inches (312.7 mm) in May 1995). Winter precipitation is less dependable and more variable than in spring. There have been lengthy periods of drought during the 1930s, in the early 1950s and again in the late 1980s.}

2.7.2 REGIONAL AIR QUALITY

2.7.2.1 Background

The Clean Air Act (EPA, 1990), which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (CFR, 2007d) for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards.

- Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.
- Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

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The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. Units of measure for the standards are parts per million (ppm), milligrams per cubic meter of air (mg per m^3), and micrograms per cubic meter of air (µg per m^3). Areas are either in attainment of the air quality standards or in non-attainment. Attainment means that the air quality is better than the standard.

2.7.2.2 {Callaway County

Based on EPA data, Callaway County, Missouri, is in attainment for all the National Ambient Air Quality Standards (NAAQS) as of December 5, 2006 (EPA, 2007a). Callaway County is part of the Northern Missouri Intrastate Air Quality Control Region (AQCR), as designated in 40 CFR 81.116, (CFR, 2007b). The attainment status of the Northern Missouri Intrastate AQCR with regard to national ambient air quality standards is listed as being better than national standards for total suspended particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide, PM-2.5 (particulate matter with diameter less than 2.5 microns), and for the 8 hour ozone standard.}

2.7.3 SEVERE WEATHER PHENOMENA

2.7.3.1 Tornados

{The plant site is located in a region of relatively numerous and severe tornados. The region of maximum worldwide tornado occurrence is located just west in Kansas and Oklahoma. A total of 608 tornados were reported throughout the state of Missouri over the 13-year period of 1955 through 1967 (Pautz, 1969). Tornados have been observed during every month of the year; however, approximately 60% of the annual total occurred during April, May and June. While tornados have occurred during all hours of the day, they are most frequent between 4 and 6 p.m. (OMSC, 2007). As can be seen in Figure 2.7-1 and Figure 2.7-2 (NOAA, 2000), the annual average number of tornados and strong-violent tornados (F2 to F5) during the period 1950 to 1995 are 26 and 8, respectively.

In the period from January 1, 1950, through December 31, 2004, 26 tornados were reported in Callaway County (NWS, 2005). This corresponds to an annual average of 0.5 tornados per year. The magnitude of the tornados ranged from F0 to F2, as designated by the National Weather Service. An F0 tornado has estimated wind speeds less than 73 mph (33 m per sec). An F1 tornado has estimated wind speeds between 73 and 112 mph (33 and 50 m per sec). An F2 tornado has estimated wind speeds between 113 and 157 mph (50 and 70 m per sec). The widths of the paths of the 26 tornados in Callaway County were estimated to range from 10 yards to 200 yards (9 m to 183 m). (NWS, 2005)

In a study reported in the Journal of Weather and Forecasting of the American Meteorological Society (AMS, 2003), an estimate was made of the probability of an occurrence of a tornado day near any location in the contiguous U.S. for any time during the year. The study applied Gaussian smoothers in space and time to the observed tornado days from 1980 to 1999 to produce daily maps and annual cycles at any point on a 50 mile by 50 mile (80 km by 80 km) grid. Figure 2.7-3 shows the date of maximum tornado threat for locations meeting the minimum data requirements of the study (the gray shaded areas). The date of maximum tornado threat for the part of Missouri that includes Callaway Plant Unit 2 is indicated on Figure 2.7-3 to be between early and late May.}

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2.7.3.2 Hurricanes and Tropical Storms

{Hurricanes typically develop over tropical ocean waters and dissipate rapidly when passing over land masses and regions of cooler temperatures. Therefore, the influence of hurricanes on the climatology of the Callaway site and the surrounding area is insignificant.}

2.7.3.3 Thunderstorms

{Thunderstorms are observed during every month of the year. During the summer they are most frequent, occurring on the average of one day out of four. From November through February, they seldom occur. The most damaging thunderstorms are usually those associated with the passage of a cold front or a squall line during the spring and summer. Table 2.7-1 presents the average monthly and annual number of days with thunderstorms for Columbia, Missouri, for the period of 1970-2006 (NOAA, 2006a). The annual average frequency of thunderstorms is 51 days per year with about 60% of them occurring between May and August.}

2.7.3.4 Lightning

A methodology was presented (Marshall, 1973) for estimating lightning strike frequencies which includes consideration of the attractive area of structures. The method consists of determining the number of lightning flashes to earth per year per square kilometer and then defining an area over which the structure can be expected to attract a lightning strike. {There are 6 flashes to earth per year per sq km (0.386 sq mile) in the vicinity of the Callaway Plant Unit 2}(conservatively estimated using Figure 2.7-4 (NOAA, 2007a). The total attractive area, A, of a structure with length L, width W, and height H, for lightning flashes with a current magnitude of 50% of all lightning flashes is defined (Marshall, 1973) as:

$$\{A = LW + 6H\,(L + W) + 12.57\,H^2 \qquad \text{Eq. 2.7-1}$$

The grouping of safety-related Callaway Plant Unit 2 structures that maximizes the attractive area is composed of the four safeguards buildings, the reactor building, the access building, the fuel building and the nuclear auxiliary building.

$$L = 215\text{ m},\ W = 140\text{m},\ H = 40\text{m} \qquad \text{Eq. 2.7-2}$$

The total attractive area is therefore equal to 0.14 sq km (0.054 sq mile).

The number of lightning strikes to earth per thunderstorm day per sq km (Ne) (0.386 sq mile) is given by:

$$Ne = (0.1 + 0.35 \sin x)\,(0.40 \pm 0.2) \text{ where= site latitude of } 38^0\ 47' \qquad \text{Eq. 2.7-3}$$

$$Ne = 0.128$$

0.128 x (51 thunderstorm days per year) = 6.53 flashes per sq km year (16.9 flashes per sq mile).

Using the attractive area of 0.14 sq km (0.054 sq mile), the probability is that there will be 6.53 flashes per sq km (16.9 flashes per sq mile) per year x 0.14 sq km (0.054 sq mile) = 0.91 flashes per year or one lightning flash every 1.1 years (401 days).}

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2.7.3.5 Droughts

{Drought may be conceptualized in different ways. Meteorological drought, based on precipitation records, is different from agricultural or soil-moisture drought and the physiological drought of plants. Drought is commonly thought of as a growing season phenomenon, but precipitation deficiency during colder months does affect moisture abundance during the following warmer months. If drought is defined as a month during which less than 40% of normal precipitation for that month is received, then the average probability of such a dry month, based on records at Columbia, is about 15%, or one in seven years. For the months of April and May, the probability reduces to 8%, but for August and September, it rises to 18% and 21%, respectively, or one in five years. Thus, monthly precipitation is more variable in August and September than in April and May. The probability of three consecutive months receiving less than 60% of mean precipitation, again at Columbia, for the months of April through October, is 13%, or about one year in eight. There is no convincing evidence that severe droughts occur in Missouri with any cyclic regularity. (OMSC, 2007).}

2.7.3.6 High Winds

{Table 2.7-2 presents the maximum monthly 2-minute wind speed and 5-second gust for Columbia, MO. These data were retrieved from the National Climatic Data Center (NOAA, 1959, 1969, 1979, 1989, 1999 and 2006). The highest 2-minute wind speed was 63 mph (28 m per sec) in 1952 and the highest 5-second value of 95 mph (42 m per sec) occurred in June, 1985.}

2.7.3.7 Hail

{Hail occurs throughout the Callaway region and may occur throughout the year, but it is much less likely in winter. May has the greatest number of days with hail. The Callaway site area is subject to frequent hail. Hailstones up to 3 inches in diameter (7.6 cm) are not infrequent; however the most commonly reported hailstone is 0.75 inch (1.9 cm) (Pautz, 1967).}

2.7.3.8 Ice Storms

{Freezing rain may occur in the region of the Callaway site from November through March. On the average about five (Changnon, 2004) of these events occur each year. Ice accumulation can range from a light glazing to over two inches (51 mm) on trees and power lines (Changnon, 2004). The average ice accumulation is one-half of an inch (13 mm) per storm. The most recent severe ice storm occurred on November 30, 2006 when more than one inch (25 mm) of ice accumulated in the site area.}

2.7.3.9 Snow Storms

{Snowfall may occur in the site region from October through May, but is most common in December, January and February. The extreme 24-hour and single-storm snowfall of 27.6 inches (70.1 cm) for the state of Missouri occurred March 16 to 17, 1970 at Neosho. In Columbia, Missouri, near the site, the greatest 24 hour total during the period of 1950-2006 was 19.7 inches (50 cm) in January 1995 (NOAA, 2006a).}

2.7.4 LOCAL METEOROLOGY

{The Callaway site meteorological data was used in this analysis. These data are from the onsite meteorological monitoring program which was designed, and has been operated, according to Safety Guide 23 (NRC, 1972). The data recovery goal of 90% was met for each of the three years of data (2004 through 2006).

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An analysis of the differences between Safety Guide 23 and Regulatory Guide (RG) 1.23 Revision 1, (NRC. 2007) was made and it was concluded that the guidance provided in the two versions of the document are so similar that there is no adverse impact from using the onsite meteorological data monitored for Callaway Plant Unit 1 in analyses for Callaway Plant Unit 2.}

2.7.4.1 Temperature and Relative Humidity

{Monthly and annual temperature summaries from the Callaway Site onsite meteorological monitoring program are presented in Table 2.7-3 through Table 2.7-10 for the period from January 2004 through December 2006.

The monthly mean temperature at the Callaway site ranges from 33.1°F (0.6°C) in January to 76.5°F (24.7°C) in July. The monthly mean maximum temperature was 85.8°F (29.9°C) in July and the monthly mean minimum temperature was 25.8°F (-3.4°C) in January. The maximum hourly temperature at the Callaway site was 102.2°F (39.0°C) in July and the minimum hourly temperature was –1.5°F (-18.6°C) in January (see Table 2.7-8 and Table 2.7-9). The diurnal temperature range throughout the year is close to 17°F (9.5°C) (see Table 2.7-4). The frequency of occurrence of hourly temperature values falling below the freezing point (32°F or 0°C) is approximately 11.4% (see Table 2.7-10).

Temperature and humidity statistics from sites around the Callaway site are presented in Table 2.7-11 through Table 2.7-20. Dry bulb temperature values are from the 30 year period from 1971 through 2000 for Columbia, St. Louis and Kansas City, MO and for 2004-2006 for Jefferson City and Vichy-Rolla, MO. Wet bulb temperature values are from the 23 year period from 1978 to 2000. The monthly mean temperatures measured at the Callaway site show good correspondence with the values presented in these tables. For example, almost all of the mean monthly temperatures measured at the Callaway site fall within the range of values reported by the surrounding stations.

Table 2.7-21 through Table 2.7-23 present the monthly design wet bulb temperature and the mean coincident dry bulb temperature for locations in the vicinity of the Callaway site. These wet bulb temperature values correspond to 0.4%, 1.0%, and 2.0% cumulative frequency of occurrence for the indicated month. The data were determined from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers Weather Data Viewer (ASHRAE, 2005). Data for Columbia, St. Louis and Kansas City, Missouri, are from the period 1972 to 2001.}

2.7.4.2 Precipitation and Fog

{The monthly precipitation summary from the Callaway Site onsite meteorological monitoring program is presented in Table 2.7-24 through Table 2.7-27 for the period from 2004 to 2006. The annual precipitation summary is discussed in FSAR section 2.3, and FSAR Figure 2.3-42 through Figure 2.3-47.

Monthly and annual summaries of heavy fog (visibility less than one-quarter mile) are presented in Table 2.7-31 for sites around the Callaway site. The fog observations were made at the National Weather Service (NWS) stations at Columbia, St. Louis and Kansas City, MO. The average number of days per year with heavy fog in Columbia, St. Louis and Kansas City, MO are 23.5, 11.0, and 19.1, respectively.

Precipitation statistics from NWS sites around the Callaway site are presented in Table 2.7-28 through Table 2.7-30. Monthly average precipitation at the Callaway site ranges from 0.95 in (24.07 mm) in February to 4.53 in (115.06 mm) in August. Monthly percent frequency of occurrence of precipitation at the Callaway site ranges from 2.96% in September to 8.33% in

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November. The rainfall rate distribution presented in Table 2.7-26 indicates that heavy rainfalls occur infrequently at the Callaway site. The maximum monthly precipitation measured at the Callaway site does not correspond well with the values from the NWS sites around the plant. This may be due to the difference in the period of records (3 years for the Callaway site versus 30 for the NWS sites. The minimum monthly precipitation measured at the Callaway Site, however, does correspond well with the values from the NWS sites around the plant.

Monthly precipitation wind roses at the Callaway site for the 33 ft (10 m) and 197 ft (60 m) elevations are presented in Figure 2.7-5 through Figure 2.7-28. These precipitation wind roses portray joint frequency distributions of wind speed and direction for only the hours in which precipitation was recorded. Each of these monthly precipitation wind roses show that the most frequent wind direction has either a northerly or southeast to east-southeast component.

Figure 2.7-5 through Figure 2.7-28 include monthly precipitation wind roses of wind speed and direction as a function of precipitation rate class for the 2004 to 2006 meteorological data measured at the Callaway Site at the 33 ft (10 m) and 197 ft (60 m) elevations. These precipitation wind roses portray joint frequency distributions of wind speed and direction as a function of precipitation rate class for only the hours in which precipitation was recorded. These figures show that for the larger precipitation rate classes (0.5 in per hr [12.7 mm per hr] and greater) in the summer where there is more than a single observation, the most frequent wind direction may have a southerly or westerly component. This could indicate high rainfall rates due to thunderstorms rather than typical frontal passage rain showers and their associated northerly or southeasterly winds.}

2.7.4.3 Monthly Mixing Height Data and Inversion Summary

{Monthly average mixing height values for the period from 1997 through 2006 were calculated from the daily average values for each month of each year (as data were available) based on twice daily mixing height data from the National Climatic Data Center (NOAA, 2007b). These data were taken from the upper air and surface National Weather Service station (Springfield, MO) closest to the Callaway site. Overall monthly average mixing height values were calculated from the individual monthly average values; for example, the January overall monthly average mixing height value of 1,633 ft (498 m) is the average of all of the individual January mixing height values from 1997 through 2006. On average, the number of valid days of data per month ranged from 26 to 31 (that is, days that had both a morning and afternoon mixing height value). Data were unavailable about 2.4% of the time over the ten year period.

Figure 2.7-29 presents the monthly average mixing height values. Table 2.7-32 shows the monthly average mixing height values in tabular form. As shown, the monthly average mixing heights ranged from 1,444 ft (498 m) in December to 4,959 ft (1,512 m) in July. The annual average mixing height was 3,562 ft (1,086 m).

Frequency and persistence of temperature inversion conditions at the Callaway site are shown in Table 2.7-33 through Table 2.7-35. These tables were developed using 3 years of onsite meteorological data (2004 through 2006). The maximum temperature inversion duration was 16 hours. Approximately two-thirds of the inversions lasted less than 9 hours.}

2.7.4.4 Wind Speed and Direction

{Table 2.7-36 and tables in FSAR Section 2.3.2 include annual and monthly joint frequency distributions (JFD) of wind speed and direction as a function of atmospheric stability derived from the Callaway Site onsite meteorological monitoring program 33 ft (10 m) level. Table 2.7-37 and the tables in FSAR Section 2.3.2 present annual and monthly joint frequency

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distributions (JFD) of wind speed and direction as a function of atmospheric stability derived from the Callaway Site 197 ft (60 m) onsite meteorological data. These tables were developed using 3 years of onsite meteorological data (2004 to 2006) following the guidance in RG 1.23 (NRC, 2007). Note that additional wind speed classes were added to provide greater coverage of the lower wind speeds that are most important for atmospheric dispersion.

The annual prevailing wind direction (the direction from which the wind blows most often) at the Callaway site at the 33 ft (10 m) level is from the south-southeast, approximately 12% of the time. Winds from the southeast through southwest sectors occur approximately 45% of the time. Conversely, winds from the northwest through northeast sectors occur approximately 32% of the time. The annual prevailing wind direction at the Callaway site at the 197 ft (60 m) level is from the south, approximately 10% of the time. Winds from the southeast through southwest sectors occur approximately 44% of the time. Conversely, winds from the northwest through northeast sectors occur approximately 30% of the time. As is normally the case, there are more observations of calm winds at the lower level than at the upper level (0.12% versus 0.01%). At both the 33 ft (10 m) and 197 ft (60 m) levels, winds occur most infrequently from the east (4%).

During the winter months (December through February), the prevailing wind direction at both levels at Callaway is from the northwest, approximately 9% at 33 ft (10m) and 10% at 197 ft (60m). During the spring months (March through May), the prevailing wind direction is from the south-southeast, approximately 11% of the time at the lower level and from the south approximately 11% of the time at the upper level. During the summer months (June through August), the prevailing wind direction is from the south-southeast approximately 13% of the time at the lower level and from the south-southwest about 11% of the time at the upper level. During the autumn months (September through November), the prevailing wind direction at both levels is from the south-southeast, approximately 14% of the time at the 33 ft (10 m) and approximately 13% of the time at the 197 ft (60 m) level.

The most prevalent wind speed class at the Callaway site on an annual basis for the 33 ft (10 m) level is the 6.9 mph to 11 mph (3.1 m per sec to 5.0 m per sec) class, which occurs approximately 32% of the time. The most prevalent wind speed class on an annual basis for the 197 ft (60 m) level is the 11.4 mph to 15.7 mph (5.1 m per sec to 7.0 m per sec) class, which occurs approximately 35% of the time.

On a seasonal basis, the most prevalent wind speed class for the 33 ft (10 m) level is the 6.9 mph to 11.1 mph (3.1 m per sec to 5.0 m per sec) class, which occurs approximately 42% of the time during the winter months (December through February), 36% of the time during the spring months (March through May) and 30% during the autumn months (September through November). During the summer months (June through August), the most prevalent wind speed class is the 4.7 mph to 6.7 mph (2.1 m per sec to 3.0 m per sec) class which occurs approximately 32% of the time. At the 197 ft (60 m) level, the most prevalent wind speed class is the 11.4 mph to 15.6 mph (5.1 m per sec to 7.0 m per sec) class, which occurs approximately 36% during the winter months (December through February), 38% during the spring months (March through May), and 36% during the autumn months (September through November). During the summer months (June through August), the most prevalent wind speed class is the 6.9 mph to 11.2 mph (3.1 m per sec to 5.0 m per sec) class which occurs approximately 45% of the time.

Table 2.7-38 through Table 2.7-40 present monthly and annual summaries of wind speed and direction for three stations around the Callaway site, i.e., Columbia, (NOAA, 2006a) St. Louis (NOAA, 2006b) and Kansas City, Missouri (NOAA, 2006c). Note that the most prevalent wind

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speed class on an annual basis for the 33 ft (10 m) level at Callaway Site is lower than the average annual wind speeds at the same measurement height presented for these three stations (9.7 mph [4.3 m per sec], 9.3 mph [4.2 m per sec], and 10.5 mph [4.7 m per sec], respectively); this would lead to more conservative atmospheric dispersion estimates using the Callaway Site onsite meteorological data.

Figure 2.7-30 and Figure 2.7-31 present wind rose plots of Callaway Plant Unit 1 2004 to 2006 meteorological data for the 33 ft (10 m) and 197 ft (60 m) elevations. FSAR Figure 2.3-13 through Figure 2.3-24 in FSAR Section 2.3.2 present monthly wind rose plots of Callaway Plant Unit 1 2004 to 2006 meteorological data for the 33 ft (10 m) elevation. FSAR Figure 2.3-25 through Figure 2.3-36 in FSAR Section 2.3.2 present monthly wind rose plots of Callaway Plant Unit 1 2004 to 2006 meteorological data for the for the 197 ft (60 m) elevation.

Figure 2.7-32 through Figure 2.7-36 present multi-year average annual wind rose plots for five National Weather Service (NWS) stations in Missouri that are around the Callaway site (Columbia, St. Louis, Kansas City, Jefferson City and Vichy-Rolla). Meteorological data used to create the plots were downloaded from the National Oceanic and Atmospheric Administration (NOAA) web site and were measured at approximately 20 ft (7 m) above ground level. The meteorological data for all sites were from 2004 through 2006.}

2.7.4.5 Wind Direction Persistence Summary

{Table 2.7-41 and Table 2.7-42 include wind direction persistence summaries for the 33 ft (10 m) and 197 ft (60 m) measurement levels at the Callaway site. Table 2.3-38 through Table 2.3-40 and Table 2.3-42 through Table 2.3-44 in FSAR Section 2.3.2 present annual wind direction persistence summaries for the 33 ft (10 m) and 197 ft (60 m) measurement levels at the Callaway Plant site respectively for the years 2004 through 2006. Most of the time, approximately 97%, wind direction persistence events last for 4 hours or less at both measurement levels. Low speed (5 mph (2m per sec) or less) wind direction persistence events lasting 12 hours or more occur hundreds of times per year for both measurement levels. Higher wind speed persistence events occur more than 50 times per year for the lower and upper measurement levels. Wind direction persistence events lasting greater than 24 hours occurred four times at the lower measurement level and 13 times at the upper measurement level for the three years of onsite data.}

2.7.4.6 Atmospheric Stability Persistence Summary

Depending on the amount of incoming solar radiation and other factors, the atmosphere may be more or less turbulent at any given time. Meteorologists have defined atmospheric stability classes, each representing a different degree of turbulence in the atmosphere. When moderate to strong incoming solar radiation heats air near the ground, causing it to rise and generate large eddies, the atmosphere is considered unstable, or relatively turbulent. Unstable conditions are associated with atmospheric stability classes A and B. When solar radiation is relatively weak or absent, air near the surface has a reduced tendency to rise, and less turbulence develops. In this case, the atmosphere is considered stable, or less turbulent, and the stability class would be E or F. Stability classes D and C represent conditions of more neutral stability, or moderate turbulence. Neutral conditions are associated with relatively strong wind speeds and moderate solar radiation.

Atmospheric stability is determined by the delta temperature method as defined in Regulatory Guide 1.23 Rev. 1 (NRC, 1972) and Revision 1 (NRC, 2007). This methodology classifies atmospheric stability based on the temperature change with height (°C per 100 m). {At the

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Callaway Site, atmospheric stability is classified according to the difference between the temperature measurements at the 197 ft (60 m) and 33 ft (10 m) levels.

Table 2.3-74 through Table 2.3-76 and Table 2.3-78 through Table 2.3-80 in FSAR Section 2.3.2 include annual atmospheric stability persistence summaries at the Callaway Plant site for the 33 ft (10 m) and 197 ft (60 m) elevations respectively for the years 2004 through 2006. Table 2.7-43 and Table 2.7-44 include annual atmospheric persistence summaries for the three year period 2004 through 2006 for the 33 ft (10 m) and 197 ft (60 m) elevations, The tables were generated using three years of onsite meteorological data (2004-2006).

Most of the time, approximately 75%, stability persistence events last for less than four hours. Stability persistence events lasting 12 hours occur 19 times per year on the average and events lasting for greater than 24 hours occur one time per year on the average.}

2.7.5 MAXIMUM TERRAIN HEIGHTS AND TOPOGRAPHIC MAPS

{Figure 2.7-37 presents a map which shows the topography within a 1 mi (1.6 km) radius of the Callaway site, the location of the meteorological tower, and Callaway Plant Unit 1. Figure 2.7-38 presents a map which shows the topography within a 5 mile (8 km) radius of the Callaway site. Figure 2.7-39 presents a map which shows the topography within a 50 mi (80 km) radius of the Callaway site. Figure 2.7-40 presents a plot of maximum elevation versus distance from the center of the plant in each of the sixteen 22.5 degree compass point sectors (centered on true north, north-northeast, northeast, etc.) radiating from the plant to a distance of 50 miles (80 km).

The Callaway site consists of flat plateau farmland. Elevations across the site range from 843 ft (257 m) above mean sea level (msl) to 514 ft (157 m) msl. The highest terrain in the vicinity of the site is in the west through north-northwest sectors. The Ozark Mountains lie in the southeast through southwest sectors.

Callaway Plant Unit 2 is northwest of the existing Callaway Plant Unit 1. Some portions of the Callaway site were cleared of existing vegetation and graded to accommodate Callaway Plant Unit 2 and its ancillary structures. These terrain modifications are limited to the Callaway Plant Unit 2 area and the immediately surrounding area and, therefore, do not represent a significant alteration to the topographic character of the region around the Callaway site.}

2.7.6 ATMOSPHERIC DISPERSION FACTORS

2.7.6.1 Long-Term Routine Effluent Atmospheric Dispersion and Deposition Values

{Table 2.7-45 through Table 2.7-50 present atmospheric dispersion factors (χ/Q's) and deposition factors (D/Q's) determined using methodologies from RG 1.111 (NRC, 1977) as implemented in the ABS computer code XDCALC Version1.5.12 (XDCALC). The values are normal effluent annual average atmospheric dispersion and deposition factors determined using the following input data and assumptions:

- Three years of onsite meteorological data were used (2004 through 2006),
- A mixed mode release from the stack
- Lower level (10 m or 33 ft) and mid level (60 m or 197 ft) wind speed and direction data were used,

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- Vertical temperature difference (60 m [197 ft] temperature minus 10 m [33 ft] temperature) data were used,
- Building wake credit was taken using a Reactor Building height of 60 m (197 ft) and cross-sectional area of 2,940 sq m (31,630 sq ft),
- Stack height was assumed to be 62 m (203 ft),
- Stack inner diameter was assumed to be 3.8 m (12.5 ft) (a conservative assumption),
- Stack flow rate was assumed to be 6,865,646 lpm (242,458 cu ft per min) (a conservative assumption),
- Values were computed for each hour of meteorological data using the measured speed, direction and stability.
- Plume rise was considered for the elevated portion of the mixed mode release,
- The sector average dispersion model was used in accordance with (Regulatory Guide 1.111) (NRC, 1977),
- Dispersion coefficients were modeled as provided in Regulatory Guide 1.111 (NRC, 1977a),
- Regulatory Guide 1.111, (NRC, 1977) depletion and deposition curves were used,
- Special receptors based on the Callaway Plant 2007 Land Use Census Report (Ameren, 2007) were included at the site boundary, nearest residents, gardens, meat animals, and milk cows).
- Terrain heights of receptors out to 45 miles were considered.

XDCALC computes plume standard deviations in the horizontal and vertical dimensions (σ_y and σ_z, respectively) using the analytical expressions from the Nuclear Regulatory Commission-sponsored computer program XOQDOQ (NRC, 1972). The onsite meteorological data used in the dispersion analysis has been shown to be representative of the region as discussed in Section 2.7.4. Thus, the atmospheric dispersion and deposition factors determined by XDCALC from the site boundary to a radius of 45 miles (72 km) from the plant are appropriate for use in estimating the consequences of routine releases for Callaway Plant Unit 2. The 45-mile (72 km) calculation is made at the center of the last radial segment (40-50 miles (64 to 80 km)) for use with the population in the same segment.

A comparison was made of the original FSAR data from the Callaway on-site meteorological tower (1973-75 and 1978-79) and the data used to support the Callaway Plant Unit 2 application (2004-2006). In general the data were found to agree well with the average wind speed, directions and temperatures all very similar. While the data for the most recent three years (2004-2006) were consistent, there was a distinct shift towards more unstable hours (about 15% and correspondingly less neutral and stable hours) when compared with the earlier data. This may result in somewhat lower X/Q values. However the values at the highest 0.5 or 5% would probably be unaffected.

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Meteorological data summaries used as input to XDCALC are provided in Section 2.7.4. The regulatory guidance described in RG 1.23 Revision 1 (NRC, 2007), was followed in the determination of appropriate onsite meteorological data. The regulatory guidance described in RG 1.112 (NRC, 1977a) was followed in the determination of points of routine release of radioactive materials to the atmosphere and their characteristics. The regulatory guidance described in RG 1.109, Revision 1 (NRC, 1977b), was followed in the determination of potential receptors of interest listed in Table 2.7-51.

XDCALC produces the following dispersion parameters at offsite locations of interest:

- the concentration (χ) of gaseous releases for a given a release rate (Q) expressed as χ/Q,
- the concentration of depleted halogen and particulate releases that deposit while traveling downwind (expressed as depleted χ/Q), and
- the deposition factor D/Q, which is used as a measure of the relative deposition of released halogen and particulate radioactive materials.

The largest undepleted, undecayed χ/Q value determined at the site boundary is 2.79E-07 sec per cu m in the NNW sector. The largest undepleted, undecayed χ/Q value determined at the location of nearest residents is 1.19E-07 sec per cu m in the SSE sector 13,248 ft (4,039 m) downwind. The largest undepleted, undecayed χ/Q value determined at the location of nearest vegetable garden is 1.17E-07 sec per cu m in the SSE sector 13,356 ft (4,072 m) downwind. The largest undepleted, undecayed χ/Q value determined at the location of nearest meat animal is 1.10E-07 sec per cu m in the SE sector 11,719 ft (3,573 m) downwind. The largest undepleted, undecayed χ/Q value determined at the location of nearest milk animal is 9.06E-08 sec per cu m in the SSE sector 16,735 ft (5,102 m) downwind.}

2.7.6.2 50th Percentile Atmospheric Dispersion Factors

Table 2.7-52 presents fiftieth percentile atmospheric dispersion factors for use in evaluating the environmental impact of design basis accidents using realistic values per Section 7.1. These factors were determined using the methodology of Regulatory Guide 1.145 Revision 1 (NRC, 1982) {as implemented in the AEOLUS3 computer code.

The 50th percentile atmospheric dispersion factor for the 0-2 hour time period at the Low Population Zone (LPZ) is 8.90E-06 sec per cu m.}

2.7.7 NOISE

{The Callaway site is located on AmerenUE property totaling approximately 7,350 acres (2,974 hectares) surrounded by forest, grassland, and farmland on all sides (see Figure 2.2-2). The only sources of man-made noise at the Callaway site are those associated with Callaway Plant Unit 1 operations. AmerenUE does not have noise measurements for the Callaway site. However, the effect of noises generated by Callaway Plant Unit 1 operations is mitigated by the undeveloped land surrounding the plant. The center of Callaway site lies approximately 1 mile (1.6 km) east of the nearest property boundary (see Figure 2.1-1). The nearest full-time residence is approximately 1.2 miles (1.9 km) west of the Callaway site center point (Ameren, 2007).

In like fashion, the principal noise sources associated with normal operation of Callaway Plant Unit 2 are the switchyard, transformers, and the natural draft cooling tower. In addition, 2 of the 4 Essential Service Water System cooling towers will normally be in operation.

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Callaway Plant Unit 2 will use the new transmission lines installed within a widened corridor as discussed in Section 3.7. In NUREG-1437 (NRC, 1996), the NRC defined the environmental issue of noise associated with the transmission lines as SMALL for all plants.

2.7.7.1 Environmental Noise Survey

EPA formerly coordinated all federal noise control activities through its Office of Noise Abatement and Control. In 1981, the Administration concluded that noise issues were best handled at the state or local government level. As a result, the EPA phased out the office's funding in 1982 as part of a shift in federal noise control policy to transfer the primary responsibility of regulating noise to state and local governments (EPA, 2008). The State of Missouri does not regulate allowable noise levels at residential receptors. AmerenUE has not received any noise related complaints at the Callaway site and, therefore, no noise surveys have been conducted in the area surrounding the Callaway site.

2.7.7.2 Metrics for Noise Assessment

In the absence of onsite noise data, AmerenUE reviewed the noise determinations made by NRC with regard to similar nuclear power plants. In the Generic Environmental Impact Statement (GEIS) for License Renewal (NUREG-1437) (NRC 1996) the NRC evaluated the impacts of noise at all operating nuclear reactors and concluded: "Because noise impacts have been found to be small and generally not noticed by the public, noise impacts are expected to be of small significance at all sites. Because noise reduction methods would be costly, and given that there have been few complaints, no additional mitigation measures are warranted for license renewal."

The noise from Callaway Plant Unit 1, along with the addition of Callaway Plant Unit 2, is not greater than the normal operational noise occurring at other nuclear power plants. AmerenUE believes that background or ambient sound levels at the Callaway site, with its rural setting, would likely compare to the ambient sound level of a farm, 44 decibels or to that of a small town or quiet suburban area, 46 to 52 decibels (EPA, 1974).}

2.7.8 REFERENCES

{**Ameren, 2007**, Callaway Plant 2007 Land Use Census Report, October 2007.

AMS, 2003. Climatological Estimates of Local Daily Tornado Probability for the United States, American Meteorological Society, Journal of Weather and Forecasting, Volume 18, H. Brooks, C. Doswell III, and M. Kay, August 2003.

ASHRAE, 2005. Weather Data Viewer, version 3.0, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Inc., 2005.

CFR, 2007a. Title 40, Code of Federal Regulations, Part 50, National Primary and Secondary Ambient Air Quality Standards, 2007.

CFR, 2007b. Title 40, Code of Federal Regulations, Part 81.116, Northern Missouri Intrastate Air Quality Control Region, 2007.

CFR, 2007c. Title 24 Code of Federal Regulations, Part 51.101, “General Policy,” 2007.

CFR, 2007d. Title 40 Code of Federal Regulation, Part 50, “National Primary and Secondary Ambient Air Quality Standards,” 2007.

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Changnon, 2004, Climate Atlas: Freezing Rain and Ice Storms, Changnon Climatologist, 2004.

EPA, 1974. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," U.S. EPA,. March, 1974

EPA, 1990. Clean Air Act of 1990, Website: http://www.epa.gov/air/caa/

EPA, 2007a. National Ambient Air Quality Standards (NAAQS), U.S. Environmental Protection Agency, Website: http://epa.gov/air/criteria.html, Date accessed: May 2007.

EPA, 2008. EPA Identifies Noise Levels Affecting Health and Welfare, www.epa.gov/history/topics/noise/01.htm. Accessed February 11, 2008

Marshall, 1973. Lightning Protection, J. Marshall, 1973.

NOAA, 2000. 1998-1999 Tornadoes and a Long-Term U.S. Tornado Climatology, Technical Report 99-02, National Oceanic and Atmospheric Administration/National Environmental Satellite, Data, and Information Service, National Climatic Data Center, August 2000.

NOAA, 2006a. Local Climatological Data, 2006 Annual Summary with Comparative Data, Columbia, Missouri, National Oceanic and Atmospheric Administration/National Environmental Satellite, Data, and Information Service, National Climatic Data Center, 2007.

NOAA, 2006b. Local Climatological Data, 2006 Annual Summary with Comparative Data, St. Louis, Missouri, National Oceanic and Atmospheric Administration/National Environmental Satellite, Data, and Information Service, National Climatic Data Center, 2007.

NOAA, 2006c. Local Climatological Data, 2006 Annual Summary with Comparative Data, Kansas City, Missouri, National Oceanic and Atmospheric Administration/National Environmental Satellite, Data, and Information Service, National Climatic Data Center, 2007.

NOAA, 2007 U.S. Department of Commerce, NOAA Earth System Research Laboratory

NOAA, 2007a. Lightning Flash Density Map of the United States, National Oceanic and Atmospheric Administration, Website: http://www.crh.noaa.gov/Image/pub/ltg2/usa_ltg_fdm.gif, Date accessed: March 13, 2007.

NOAA, 2007b. Upper Air Meteorological Data from Springfield, MO for the Period of 1997-2007.

NRC, 1972. Onsite Meteorological Programs, Regulatory Guide 1.23 (Safety Guide 23), Nuclear Regulatory Commission, Revision 0, February 1972 and Revision 1, March 2007.

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

NRC, 1977a. Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors, Regulatory Guide 1.112, Revision 0-R, Nuclear Regulatory Commission, May 1977.

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NRC, 1977b. Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Regulatory Guide 1.109, Revision 1, Nuclear Regulatory Commission, October 1977.

NRC, 1982. Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants, Regulatory Guide 1.145, Revision 1, Nuclear Regulatory Commission, November 1982.

NRC 1982a. XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations, NUREG/CR 2919, PNL 4380 September 1982.

NRC, 1996. Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, Vol. 1, Nuclear Regulatory Commission, 1996.

NRC, 2007. Meteorological Monitoring Programs for Nuclear Power Plants, Regulatory Guide 1.23, Revision 1, Nuclear Regulatory Commission, October 2007.

NWS, 2005. NOAA's National Weather Service Weather Forecast Office, St. Louis, MO, Callaway County Tornados, November 2, 2005.

OMSC, 2007. Narrative Description of Missouri Climate, Office of Missouri State Climatologist, Website: http://cdo.ncdc.noaa.gov/climatenormals/clim60/states/Clim_MO_01.pdf, Date accessed: May 30, 2007.

Pautz, 1967, Severe Local Storm Occurrences, 1955-1967, Technical Memorandum WBTM, FCST, 12 ,NOAA, U.S. Department of Commerce, 1969.

EPA, 1990. Clean Air Act of 1990, Section 109, 42 USC 7409}

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Table 2.7-1—{Monthly Mean Number of Days with Thunderstorms}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO Regional Airport	0.7	1.0	2.8	5.2	8.0	7.6	7.6	7.0	4.8	3.2	1.9	0.7	50.5
St. Louis, MO	0.7	0.9	2.9	5.5	6.7	7.7	6.9	6.2	3.6	2.5	1.7	0.7	46.0
Kansas City, MO	0.4	0.8	2.7	5.0	8.0	8.9	7.9	7.3	5.4	3.1	1.4	0.4	51.3

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Table 2.7-2—{Maximum Monthly Wind Speed (mph) at Columbia, Missouri 1950-2006}

Month	Fastest MPH*	Year	Peak Gust+	Year
January	56	1951	53	1984
February	51	1984	63	1984
March	59	1964	64	1984
April	57	1953	69	1984
May	58	1950	58	1988
June	59	1985	95	1985
July	61	1958	64	1986
August	56	1954	81	2003
September	63	1952	54	1985
October	49	1959	59	1996
November	49	1955	53	1998
December	58	1971	55	1984

*1950-2006 Maximum 2-minute wind speed

+1984-2006 Maximum 5-second

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Table 2.7-3—{Callaway Site Monthly Mean Temperatures (degrees F) (2004-2006)}

	WET BULB			DRY BULB			DEW POINT			RELATIVE HUMIDITY		
	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.	Min.	Max.	Ave.
January	23.5	35.7	29.6	25.8	41.1	33.1	19.5	30.3	24.7	57.3	86.8	72.0
February	24.3	36.4	30.9	27.0	43.9	35.3	18.9	28.9	24.2	47.6	82.4	64.1
March	32.8	44.4	38.9	36.3	53.9	45.0	26.5	37.3	31.4	44.6	80.7	60.9
April	44.9	55.2	50.4	48.8	67.4	58.3	38.0	49.0	43.4	42.6	80.9	60.1
May	52.0	61.9	57.3	55.5	73.3	64.5	48.8	57.1	52.9	50.8	87.1	68.3
June	59.8	68.7	64.6	63.3	81.2	72.2	57.4	64.7	61.1	51.8	88.3	69.9
July	63.7	71.6	67.9	67.6	85.8	76.5	60.7	67.7	64.4	49.1	87.7	68.5
August	62.7	70.6	66.9	65.7	83.2	74.2	60.2	66.8	63.6	52.6	88.2	70.5
September	55.3	64.8	60.5	58.5	76.7	67.5	52.9	60.8	57.0	52.7	88.5	71.3
October	43.7	54.1	49.1	47.3	64.1	55.5	39.1	48.8	44.2	50.2	86.0	68.6
November	35.1	46.7	41.1	38.8	54.8	46.6	29.8	40.5	35.2	51.0	81.6	66.3
December	25.4	36.4	31.1	28.0	42.3	35.0	20.7	30.2	25.5	53.0	82.2	67.8
TOTAL	43.1	53.5	48.6	47.0	64.0	55.4	38.9	48.1	43.5	50.3	84.9	67.3

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Table 2.7-4—{Callaway Site Monthly Mean Diurnal Temperature Range (2004 – 2006)}

	Deg C	Deg F
January	8.6	15.1
February	9.4	17.1
March	9.7	18.0
April	10.2	18.9
May	9.9	18.2
June	9.9	18.2
July	10.1	19.2
August	9.6	17.5
September	10.0	17.8
October	9.4	17.4
November	8.8	16.9
December	7.9	13.9
ANNUAL	9.5	17.3

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Table 2.7-5—{Callaway Site Monthly Mean Extreme Minimum Temperatures (2004-2006)}

	Minimum	
	deg C	**deg F**
January	-18.6	-1.5
February	-17.0	1.4
March	-5.6	21.9
April	0.5	32.9
May	2.0	35.6
June	11.3	52.3
July	13.0	55.4
August	10.0	50.0
September	5.1	41.2
October	-3.2	26.2
November	-8.4	16.9
December	-16.4	2.5
ANNUAL	-18.6	-1.5

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Table 2.7-6—{Callaway Site Monthly Mean Daily Maximum Temperatures (2004-2006)}

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F	41.1	43.9	53.9	67.4	73.3	81.2	85.8	83.2	76.7	64.1	54.8	42.3	64.0
°C	5.1	6.6	12.7	19.7	22.9	27.3	29.9	28.4	24.8	17.8	12.7	5.7	17.8

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Table 2.7-7—{Callaway Site Monthly Mean Daily Minimum Temperatures (2004-2006)}

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
°F	25.8	27.0	36.3	48.8	55.5	63.3	67.6	65.7	58.5	47.3	38.8	28.0	47.0
°C	-3.4	-2.8	2.4	9.3	13.1	17.4	19.8	18.7	14.7	8.5	3.8	-2.2	8.3

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Table 2.7-8—Callaway Site Maximum Hourly Temperatures (2004-2006)}

	Maximum	
	deg C	deg F
January	20.8	69.4
February	21.4	70.5
March	25.5	77.9
April	31.0	87.8
May	31.7	89.1
June	34.8	94.6
July	39.0	102.2
August	37.0	98.6
September	31.6	88.9
October	32.9	91.2
November	27.0	80.6
December	19.6	67.3
ANNUAL	39.0	102.2

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Table 2.7-9—{Callaway Site Minimum Hourly Temperatures (2004-2006)}

	Minimum	
	deg C	deg F
January	-18.6	-1.5
February	-17.0	1.4
March	-5.6	21.9
April	0.5	32.9
May	2.0	35.6
June	11.3	52.3
July	13.0	55.4
August	10.0	50.0
September	5.1	41.2
October	-3.2	26.2
November	-8.4	16.9
December	-16.4	2.5
ANNUAL	-18.6	-1.5

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Table 2.7-10—{Callaway Site Number of Hourly Temperature Values Greater Than or Less Than Indicated Value (2004-2006)}

Value	Number of Hours of Occurrence	Percent Frequency of Occurrence
≥ 95.0°F	97	0.37%
≥ 90.0°F	340	1.30%
≤ 32.0°F	2999	11.43%
≤ 00.0°F	5	0.02%

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Table 2.7-11—{Monthly Mean Temperatures (1971-2000) at Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	°F	27.8	33.7	44	54.4	63.7	72.7	77.4	75.7	67.3	56	43.2	32	54
	°C	-2.3	0.9	6.7	12.4	17.6	22.6	25.2	24.3	19.6	13.3	6.2	0.0	12.2
St. Louis, MO	°F	29.6	35.4	45.8	56.6	66.5	75.6	80.2	78.2	70.2	58.3	45.3	33.9	56.3
	°C	-1.3	1.9	7.7	13.7	19.2	24.2	26.8	25.7	21.2	14.6	7.4	1.1	13.5
Kansas City, MO	°F	26.9	33	43.8	54.4	64.3	73.6	78.5	76.6	68.1	56.8	42.7	31.3	54.2
	°C	-2.8	0.6	6.6	12.4	17.9	23.1	25.8	24.8	20.1	13.8	5.9	-0.4	12.3
Jefferson City, MO*	°F	34.8	36.1	46.6	58.6	66.4	73.8	78.3	75.8	68.4	56.9	48.3	36.1	56.8
	°C	1.6	2.3	8.1	14.8	19.1	23.2	25.7	24.3	20.2	13.8	9.1	2.3	13.8
Vichy Rolla, MO*	°F	35	35.9	45.6	58	65.5	73	77	75.3	67.7	56.1	47.2	32.6	55.9
	°C	1.7	2.2	7.6	14.4	18.6	22.8	25.0	24.1	19.8	13.4	8.4	0.3	13.3

* Data Period 2004-2006

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Table 2.7-12—{Monthly Mean Maximum Temperatures (1971-2000) at Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	°F	37.4	43.9	55.1	65.9	74.6	83.6	88.6	87.3	79.1	68.0	53.4	41.5	64.9
	°C	3.0	6.6	12.8	18.8	23.7	28.7	31.4	30.7	26.2	20.0	11.9	5.3	18.3
St. Louis, MO	°F	37.9	44.3	55.4	66.7	76.5	85.3	89.8	87.9	80.1	68.3	53.8	42.0	65.7
	°C	3.3	6.8	13.0	19.3	24.7	29.6	32.1	31.1	26.7	20.2	12.1	5.6	18.7
Kansas City, MO	°F	36.0	42.6	54.4	65.2	74.6	83.9	88.8	87.1	79.0	67.6	52.0	40.0	64.3
	°C	2.2	5.9	12.4	18.4	23.7	28.8	31.6	30.6	26.1	19.8	11.1	4.4	17.9
Jefferson City, MO*	°F	45.5	47.7	58.0	71.0	77.5	85.1	89.2	86.4	80.0	68.1	58.4	45.8	67.8
	°C	7.5	8.7	14.4	21.7	25.3	29.5	31.8	30.2	26.7	20.1	14.7	7.7	19.9
Vichy Rolla, MO*	°F	45.8	46.9	56.6	69.4	75.8	84.5	88.6	86.2	78.5	66.2	56.8	42.5	66.6
	°C	7.7	8.3	13.7	20.8	24.3	29.2	31.4	30.1	25.8	19.0	13.8	5.8	19.2

* Data Period 2004-2006

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Table 2.7-13—{Monthly Mean Minimum Temperatures (1971-2000) at Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	°F	18.2	23.4	33	42.9	52.8	61.8	66.3	64	55.4	44.1	33	22.5	43.1
	°C	-7.7	-4.8	0.6	6.1	11.6	16.6	19.1	17.8	13.0	6.7	0.6	-5.3	6.2
St. Louis, MO	°F	21.2	26.5	36.2	46.5	56.6	65.6	70.6	68.6	60.3	48.2	36.7	25.8	46.9
	°C	-6.0	-3.1	2.3	8.1	13.7	18.7	21.4	20.3	15.7	9.0	2.6	-3.4	8.3
Kansas City, MO	°F	17.8	23.3	33.2	44.5	53.9	63.2	68.2	66.1	57.2	45.8	33.9	23.1	44.3
	°C	-7.9	-4.8	0.7	6.9	12.2	17.3	20.1	18.9	14.0	7.7	1.1	-4.9	6.8
Jefferson City, MO*	°F	26.3	26.4	37.2	45.6	56.2	61	68.9	66.6	57.9	48	39.9	28.6	47
	°C	-3.2	-3.1	2.9	7.6	13.4	16.1	20.5	19.2	14.4	8.9	4.4	-1.9	8.3
Vichy Rolla, MO*	°F	26.8	27.5	37.3	47.1	55.4	63.1	66.1	65.8	58.1	46.6	39.6	26.2	46.7
	°C	-2.9	-2.5	2.9	8.4	13.0	17.3	18.9	18.8	14.5	8.1	4.2	-3.2	8.2

* Data Period 2004-2004

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Table 2.7-14—{Monthly Mean Wet Bulb Temperatures (1984-2006) at Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	°F	27.1	30.9	38.6	48.6	58.3	66.4	70.2	68.7	60.7	50.3	39.5	30.1	49.1
	°C	-2.7	-0.6	3.7	9.2	14.6	19.1	21.2	20.4	15.9	10.2	4.2	-1.1	9.5
St. Louis, MO	°F	29.1	32.7	40.1	50.2	59.4	67.3	71.2	70.1	62.4	52.0	41.5	32.0	50.7
	°C	-1.6	0.4	4.5	10.1	15.2	19.6	21.8	21.2	16.9	11.1	5.3	0.0	10.4
Kansas City, MO	°F	26.3	30.0	38.2	48.2	58.1	66.4	70.6	69.1	61.1	50.2	38.6	29.3	48.8
	°C	-3.2	-1.1	3.4	9.0	14.5	19.1	21.4	20.6	16.2	10.1	3.7	-1.5	9.3

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Table 2.7-15—{Monthly Mean Dew Point Temperatures (1984-2006) at Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	°F	22.5	25.9	32.5	42.8	54.4	63.3	67.2	65.7	57.0	45.7	34.7	25.6	44.8
	°C	-4.7	-3.8	-1.1	4.6	10.8	16.4	18.8	18.2	14.7	8.4	1.3	-3.7	6.7
St. Louis, MO	°F	23.8	27.1	33.4	43.7	54.1	63.0	67.3	66.3	57.7	46.4	35.7	26.8	45.4
	°C	-0.6	0.3	2.9	7.6	12.8	18.1	18.8	20.4	15.4	11.4	6.1	1.4	9.6
Kansas City, MO	°F	21.3	24.9	31.7	42.0	53.6	62.9	67.4	65.8	57.2	45.3	33.5	24.6	44.2
	°C	-2.6	-1.7	1.1	6.3	12.4	17.3	20.0	17.3	15.6	9.4	3.7	-1.2	8.2

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Table 2.7-16—{Number of Days with Maximum Hourly Temperature Value Greater Than or Equal to 90°F at Sites Around Callaway Site}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	0.0	0.0	0.0	0.1	0.3	4.8	14.1	12.0	4.2	0.1	0.0	0.0	35.6
St. Louis, MO	0.0	0.0	0.0	0.3	1.3	8.6	15.8	12.2	4.5	0.1	0.0	0.0	42.8
Kansas City, MO	0.0	0.0	0.0	0.3	0.4	5.6	14.5	11.7	3.7	0.1	0.0	0.0	36.3

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Table 2.7-17—{Number of Days with Maximum Hourly Temperature Value Less Than or Equal to 32°F at Sites Around Callaway Site}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	12.0	6.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	7.4	29.0
St. Louis, MO	11.0	6.6	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	6.3	25.7
Kansas City, MO	12.1	7.3	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.9	8.0	31.2

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Table 2.7-18—{Number of Days with Minimum Hourly Temperature Value Less Than or Equal to 32°F at Sites Around Callaway Site}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	27.1	21.0	14.6	3.3	*	0.0	0.0	0.0	*	2.5	13.7	24.9	107.1
St. Louis, MO	25.6	19.2	12.2	2.5	*	0.0	0.0	0.0	0.0	1.3	10.2	22.1	93.1
Kansas City, MO	27.9	21.2	14.9	3.7	*	0.0	0.0	0.0	*	2.3	13.8	26.0	109.8

Note:

* Denotes value is between 0.00 and 0.05

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Table 2.7-19—{Number of Days with Minimum Hourly Temperature Value Less Than or Equal to 0°F at Sites Around Callaway Site}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	2.7	1.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	1.4	5.6
St. Louis, MO	1.8	0.6	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.2
Kansas City, MO	3.6	1.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	7.6

Note:

* Denotes value is between 0.00 and 0.05

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Table 2.7-20—{Monthly Mean Relative Humidity at Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	%	74	72	67	66	72	73	72	73	72	70	72	75	72
St. Louis, MO	%	75	73	68	64	67	67	68	70	70	69	72	76	70
Kansas City, MO	%	71	70	66	64	69	71	70	72	71	68	71	73	70

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Table 2.7-21—{Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperature Values for Columbia, Missouri (1972-2001)}

%	Jan		Feb		Mar		Apr		May		Jun	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19a	*19b*	*19c*	*19d*	*19e*	*19f*	*19g*	*19h*	*19i*	*19j*	*19k*	*19l*
0.4%	55.4°F	59.5°F	59.0°F	65.0°F	64.1°F	74.3°F	68.5°F	79.3°F	75.5°F	83.9°F	79.1°F	88.8°F
	13.0°C	15.3°C	15.0°C	18.3°C	17.8°C	23.5°C	20.3°C	26.3°C	24.2°C	28.8°C	26.2°C	31.6°C
1%	52.8°F	56.2°F	56.5°F	62.6°F	62.5°F	72.0°F	67.4°F	77.7°F	74.3°F	82.5°F	78.1°F	87.9°F
	11.6°C	13.4°C	13.6°C	17.0°C	16.9°C	22.2°C	19.7°C	25.4°C	23.5°C	28.1°C	25.6°C	31.1°C
2%	49.8°F	53.8°F	54.1°F	60.5°F	60.7°F	69.7°F	66.1°F	76.5°F	72.9°F	80.9°F	77.2°F	86.9°F
	9.9°C	12.1°C	12.3°C	15.8°C	15.9°C	20.9°C	18.9°C	24.7°C	22.7°C	27.2°C	25.1°C	30.5°C
%	Jul		Aug		Sep		Oct		Nov		Dec	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19m	*19n*	*19o*	*19p*	*19q*	*19r*	*19s*	*19t*	*19u*	*19v*	*19w*	*19x*
0.4%	81.2°F	90.3°F	80.7°F	90.7°F	77.3°F	88.3°F	69.8°F	78.1°F	64.4°F	70.8°F	60.6°F	65.0°F
	27.3°C	32.4°C	27.1°C	32.6°C	25.2°C	31.3°C	21.0°C	25.6°C	18.0°C	21.6°C	15.9°C	18.3°C
1%	80.2°F	90.0°F	79.7°F	90.1°F	76.0°F	86.8°F	68.4°F	76.2°F	62.7°F	68.3°F	57.8°F	62.2°F
	26.8°C	32.2°C	26.5°C	32.3°C	24.4°C	30.4°C	20.2°C	24.6°C	17.1°C	20.2°C	14.3°C	16.8°C
2%	79.3°F	89.7°F	78.5°F	88.9°F	75.0°F	85.2°F	67.2°F	74.4°F	61.3°F	66.4°F	55.1°F	58.8°F
	26.3°C	32.1°C	25.8°C	31.6°C	23.9°C	29.6°C	19.6°C	23.6°C	16.3°C	19.1°C	12.8°C	14.9°C

Note:

WB = wet bulb

MCDB = mean coincident dry bulb

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Table 2.7-22—{Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperature Values for St. Louis, Missouri (1972-2001)}

%	Jan		Feb		Mar		Apr		May		Jun	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19a	*19b*	*19c*	*19d*	*19e*	*19f*	*19g*	*19h*	*19i*	*19j*	*19k*	*19l*
0.4%	58.2°F	61.8°F	61.1°F	67.7°F	65.8°F	76.2°F	69.8°F	81.0°F	75.5°F	85.5°F	79.3°F	89.9°F
	14.6°C	16.6°C	16.2°C	19.8°C	18.8°C	24.6°C	21.0°C	27.2°C	24.2°C	29.7°C	26.3°C	32.2°C
1%	55.8°F	58.4°F	58.7°F	64.6°F	64.3°F	73.1°F	68.5°F	78.7°F	74.4°F	84.1°F	78.3°F	88.7°F
	13.2°C	14.7°C	14.8°C	18.1°C	17.9°C	22.8°C	20.3°C	25.9°C	23.6°C	28.9°C	25.7°C	31.5°C
2%	52.9°F	56.4°F	56.4°F	62.6°F	62.7°F	70.7°F	67.4°F	76.8°F	73.2°F	82.5°F	77.4°F	87.8°F
	11.6°C	13.6°C	13.6°C	17.0°C	17.1°C	21.5°C	19.7°C	24.9°C	22.9°C	28.1°C	25.2°C	31.0°C
%	Jul		Aug		Sep		Oct		Nov		Dec	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19m	19n	19o	19p	19q	19r	19s	19t	19u	19v	19w	19x
0.4%	81.4°F	93.0°F	80.6°F	91.9°F	78.8°F	89.0°F	71.4°F	78.2°F	65.7°F	71.7°F	62.7°F	67.4°F
	27.4°C	33.9°C	27.0°C	33.3°C	26.0°C	31.7°C	21.9°C	25.7°C	18.7°C	22.1°C	17.1°C	19.7°C
1%	80.4°F	92.0°F	79.9°F	91.1°F	77.4°F	87.6°F	70.2°F	76.7°F	64.4°F	69.6°F	60.5°F	64.0°F
	26.9°C	33.3°C	26.6°C	32.8°C	25.2°C	30.9°C	21.2°C	24.8°C	18.0°C	20.9°C	15.8°C	17.8°C
2%	79.8	91.4°F	79.0°F	90.0°F	76.2°F	85.7°F	69.0°F	75.2°F	63.1°F	67.5°F	57.5°F	60.7°F
	26.6°C	33.0°C	26.1°C	32.2°C	24.6°C	29.8°C	20.6°C	24.0°C	17.3°C	19.7°C	14.2°C	15.9°C

Note:

WB = wet bulb

MCDB = mean coincident dry bulb

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Table 2.7-23—{Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperature Values for Kansas City, Missouri (1972-2001)}

%	Jan		Feb		Mar		Apr		May		Jun	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19a	*19b*	*19c*	*19d*	*19e*	*19f*	*19g*	*19h*	*19i*	*19j*	*19k*	*19l*
0.4%	54.9°F	59.3°F	58.2°F	66.2°F	63.9°F	72.1°F	69.4°F	81.2°F	75.6°F	84.7°F	79.0°F	89.4°F
	12.7°C	15.2°C	14.6°C	19.0°C	17.7°C	22.3°C	20.8°C	27.3°C	24.2°C	29.3°C	26.1°C	31.9°C
1%	51.0	55.5°F	54.8°F	61.9°F	62.2°F	70.7°F	68.2°F	78.5°F	73.9°F	82.4°F	78.0°F	88.4°F
	10.6°C	13.1°C	12.7°C	16.6°C	16.8°C	21.5°C	20.1°C	25.8°C	23.3°C	28.0°C	25.6°C	31.3°C
2%	47.3	52.8°F	51.9°F	59.1°F	60.4°F	68.8°F	66.6°F	75.9°F	72.3°F	80.8°F	77.2°F	87.5°F
	8.5°C	11.6°C	11.1°C	15.1°C	15.8°C	20.4°C	19.2°C	24.4°C	22.4°C	27.1°C	25.1°C	30.8°C
%	Jul		Aug		Sep		Oct		Nov		Dec	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19m	*19n*	*19o*	*19p*	*19q*	*19r*	*19s*	*19t*	*19u*	*19v*	*19w*	*19x*
0.4%	81.5°F	91.4°F	80.8°F	90.2°F	77.4°F	89.2°F	69.7°F	79.2°F	63.7°F	69.6°F	59.2°F	62.7°F
	27.5°C	33.0°C	27.1°C	32.3°C	25.2°C	31.8°C	20. 9°C	26.2°C	17.6°C	20.9°C	15.1°C	17.1°C
1%	80.4	90.6°F	79.9°F	89.8°F	76.5°F	87.7°F	68.4°F	77.0°F	62.3°F	68.0°F	56.5°F	60.5°F
	26.9°C	32.6°C	26.6°C	32.1°C	24.7°C	30.9°C	20.2°C	25.0°C	16.8°C	20.0°C	13.6°C	15.8°C
2%	79.5	90.0°F	78.8°F	89.1°F	75.4°F	85.9°F	67.4°F	75.1°F	60.5°F	65.9°F	53.1°F	57.0°F
	26.4°C	32.2°C	26.0°C	31.7°C	24.1°C	29.9°C	19.7°C	23.9°C	15.8°C	18.8°C	11.7°C	13.9°C

Note:

WB = wet bulb

MCDB = mean coincident dry bulb

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Table 2.7-24—{Callaway Nuclear Plant Monthly and Annual Precipitation Summaries (2004 - 2006)}

	Average Precipitation	
	mm	in
JAN	87.17	3.43
FEB	24.07	0.95
MAR	87.63	3.45
APR	52.73	2.08
MAY	68.03	2.68
JUN	35.93	1.41
JUL	68.77	2.71
AUG	115.1	4.53
SEP	67.47	2.66
OCT	80.33	3.16
NOV	93.83	3.69
DEC	26.93	1.06
ANNUAL	808	31.81

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Table 2.7-25—{Callaway Nuclear Plant Monthly and Annual Percent Frequency of Precipitation Occurrence(2004 - 2006)}

	Average Percent Frequency of Precipitation Occurrence (Hourly)
JAN	7.80%
FEB	3.58%
MAR	6.18%
APR	5.97%
MAY	4.84%
JUN	3.29%
JUL	4.30%
AUG	6.05%
SEP	2.96%
OCT	6.54%
NOV	8.33%
DEC	3.67%
ANNUAL	5.29%

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Table 2.7-26—{Callaway Nuclear Plant Rainfall Rate Distribution (2004-2006)}

Rainfall Rate in/hr (mm/hr)	Number of hours
0.0 (0.0)	24340
0.0-0.1 (0.0-2.5)	1119
0.1-0.2 (2.5-5.1)	164
0.2-0.3 (5.1-7.6)	36
0.3-0.4 (7.6-10.2)	17
0.4-0.5 (10.2-12.7)	9
0.5-0.6 (12.7-15.2)	5
0.6-0.7 (15.2-17.8)	7
0.7-0.8 (17.8-20.3)	1
0.8-0.9 (20.3-22.9)	3
0.9-1.0 (22.9-25.4)	1
1.0-2.0 (25.4-50.8)	3
2.0-3.0 (50.8-76.2)	0
Missing Data	598

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Table 2.7-27—{Callaway Nuclear Plant Measured Extreme Precipitation Hourly Values (2004-2006) }

Rainfall Amount (in (mm))	**1.47 (37.3)**	**1.24 (31.5)**	**1.01 (25.7)**
Date Occurred	8/27/2004	9/15/2005	9/15/2004

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Table 2.7-28—{Mean Monthly and Annual Precipitation (1971-2000) At Sites Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	in	1.73	2.20	3.21	4.16	4.87	4.02	3.80	3.75	3.42	3.18	3.47	2.47	40.28
	mm	88.14	76.71	99.82	76.20	98.81	87.12	97.79	95.00	101.09	80.26	79.25	85.09	1065.28
St. Louis, MO	in	2.14	2.28	3.60	3.69	4.11	3.76	3.90	2.98	2.96	2.76	3.71	2.86	38.75
	mm	88.65	74.93	105.92	84.84	112.27	90.42	101.09	102.62	107.95	90.42	84.58	93.73	1137.41
Kansas City, MO	in	1.15	1.31	2.44	3.38	5.39	4.44	4.42	3.54	4.64	3.33	2.30	1.64	37.98
	mm	104.39	79.50	112.78	81.79	105.66	82.04	109.73	116.59	98.30	77.98	87.12	92.71	1148.59
Jefferson City, MO+	in	2.80	0.76	2.44	2.68	2.53	1.73	2.61	5.82	2.51	2.09	2.73	1.17	29.87
	mm	71.12	19.30	61.89	68.16	64.26	43.94	66.21	147.74	63.84	53.09	69.43	29.80	758.78
Vichy Rolla, MO+	in	3.46	0.82	2.89	3.03	5.67	3.46	2.50	3.92	3.25	2.34	3.30	0.71	35.34
	mm	87.80	20.83	73.41	77.05	143.93	87.80	63.42	99.65	82.47	59.35	83.90	17.95	897.55

+Note: Jefferson City and Vichy Rolla use data from 2004-2006 only.

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Table 2.7-29—Mean Monthly and Annual Snowfall (1971-2000) Around Callaway Site}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	in	7.3	7.3	3.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0	2.4	4.6	25.7
	mm	177.80	162.56	60.96	2.54	0.00	0.00	0.00	0.00	0.00	0.00	15.24	43.18	462.28
St. Louis, MO	in	7.4	4.8	3.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	1.5	4.9	22.5
	mm	66.04	96.52	33.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.16	205.74
Kansas City, MO	in	5.8	5.0	2.6	0.8	0.0	0.0	0.0	0.0	0.0	0.3	1.3	4.3	20.1
	mm	109.22	121.92	35.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.62	40.64	314.96

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Table 2.7-30—{Monthly Mean Number of Days with Precipitation (1971-2000) Around Callaway Site}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	7.9	8.5	10.8	11.1	12.1	9.1	8.5	8.1	8.4	8.9	9.6	8.9	111.9
St. Louis, MO	9.4	8.2	11.1	11.4	11.3	9.6	8.3	8.1	7.5	8.5	10.1	9.4	112.9
Kansas City, MO	7.3	7.1	10.0	11.0	11.5	10.5	8.6	8.5	8.4	7.4	7.9	7.5	105.7

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Table 2.7-31—{Monthly Mean Number of Days with Heavy Fog (1971-2000) Around Callaway Site}

SITE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO (1)	3.0	2.5	2.0	1.3	1.7	1.0	1.5	1.9	2.0	1.8	1.6	3.2	23.5
St. Louis, MO (2)	2.2	1.6	1.2	0.6	0.6	0.3	0.2	0.4	0.5	0.7	0.9	1.8	11.0
Kansas City, MO (3)	2.7	2.5	1.8	1.0	1.1	0.8	0.5	1.2	1.0	1.7	1.9	2.9	19.1

Note:

(1) Columbia period 1965-2000,
(2) St. Louis period 1959-2000,
(3) Kansas City period 1968-2002

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Table 2.7-32—{Monthly and Annual Average Mixing Height Values (m)}

MONTH	YEAR										Monthly Average	Annual Average
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
JAN	388	661	432	492	504	450	447	372	645	587	498	1086
FEB	676	1118	1381	810	519	840	589	810	1099	1162	901	
MAR	996	1163	827	944	1232	687	1074	986	1376	994	1028	
APR	1366	1512	1354	1789	1386	960	1689	1344	1451	1568	1442	
MAY	1661	1165	1141	1013	2083	946	1176	1320	1570	2015	1409	
JUN	1471	1328	1423	1242	1332	2004	1196	1475	1375	1555	1440	
JUL	1848	1627	1687	1344	937	1792	1302	1559	1286	1734	1512	
AUG	933	1351	1329	1078	1707	1699	1551	1351	1950	1596	1454	
SEP	1132	1748	1205	1451	1190	1693	1498	1162	1228	1202	1351	
OCT	1475	740	723	1062	795	1104	598	1252	527	1225	950	
NOV	899	522	407	507	508	712	349	856	754	536	605	
DEC	618	242	391	448	389	293	696	554	514	258	440	

Monthly and Annual Average Mixing Height Values (ft)

Table 2.7-32—{Monthly and Annual Average Mixing Height Values (ft)}

MONTH	YEAR										Monthly Average	Annual Average
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006		
JAN	1273	2167	1419	1615	1652	1477	1467	1219	2116	1925	1633	3562
FEB	2217	3669	4531	2659	1704	2756	1933	2658	3607	3812	2955	
MAR	3267	3816	2715	3098	4042	2254	3525	3233	4516	3261	3373	
APR	4481	4961	4443	5868	4546	3149	5542	4409	4762	5146	4731	
MAY	5451	3823	3745	3322	6833	3104	3858	4331	5152	6611	4623	
JUN	4826	4357	4670	4075	4371	6575	3924	4840	4510	5103	4725	
JUL	6062	5337	5534	4409	3075	5878	4271	5116	4219	5688	4959	
AUG	3060	4434	4359	3537	5599	5575	5087	4433	6396	5235	4771	
SEP	3715	5736	3953	4762	3903	5556	4915	3811	4030	3942	4432	
OCT	4838	2428	2372	3485	2609	3623	1962	4108	1729	4020	3117	
NOV	2948	1712	1337	1665	1666	2335	1143	2809	2473	1757	1985	
DEC	2026	794	1284	1471	1275	960	2285	1818	1685	846	1444	

Note: Empty cells denote no valid data.

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Table 2.7-33—{Temperature Inversion Frequency and Persistence, Year 2004}

DURATION (HOURS)	NUMBER OF OBSERVATIONS	PERCENT PROBABILITY
1	94	29.19
2	41	41.93
3	17	47.20
4	22	54.04
5	17	59.32
6	9	62.11
7	10	65.22
8	13	69.25
9	11	72.67
10	17	77.95
11	21	84.47
12	21	90.99
13	19	96.89
14	7	99.07
15	2	99.69
16	1	100.00

Notes:

The longest inversion lasted 16 hours.

Of the longest inversions, number 1 started 11 hours into day 339.

Third column defines the percent probability that if an inversion occurs, it's duration will be less than the number of hours specified.

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Table 2.7-34—{Temperature Inversion Frequency and Persistence, Year 2005}

DURATION (HOURS)	NUMBER OF OBSERVATIONS	PERCENT PROBABILITY
1	55	18.71
2	41	32.65
3	26	41.50
4	16	46.94
5	14	51.70
6	11	55.44
7	12	59.52
8	6	61.56
9	11	65.31
10	19	71.77
11	25	80.27
12	17	86.05
13	20	92.86
14	13	97.28
15	7	99.66
16	1	100.00

Notes:

The longest inversion lasted 16 hours.

Of the longest inversions, number 1 started 12 hours into day 288.

Third column defines the percent probability that if an inversion occurs, it's duration will be less than the number of hours specified.

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Table 2.7-35—{Temperature Inversion Frequency and Persistence, Year 2006}

DURATION (HOURS)	NUMBER OF OBSERVATIONS	PERCENT PROBABILITY
1	65	20.12
2	43	33.44
3	40	45.82
4	24	53.25
5	17	58.51
6	18	64.09
7	14	68.42
8	9	71.21
9	8	73.68
10	17	78.95
11	24	86.38
12	17	91.64
13	19	97.52
14	7	99.69
15	1	100.00

Notes:

The longest inversion lasted 15 hours.

Of the longest inversions, number 1 started 11 hours into day 25.

Third column defines the percent probability that if an inversion occurs, it's duration will be less than the number of hours specified.

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Table 2.7-36—{Callaway Site Joint Frequency Distribution -2004-2006, 10m, A Stability}

(Page 1 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	to	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Stability Class A	Delta Temperature	Extremely Unstable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	1	0	0	1	18	32	71	14	1	0	0	0	138
NNE	0	0	3	6	15	43	46	14	0	0	0	0	127
NE	0	0	2	6	25	48	37	2	0	0	0	0	120
ENE	0	0	2	13	25	46	26	1	0	0	0	0	113
E	0	0	4	13	15	35	37	3	1	0	0	0	108
ESE	0	0	1	12	19	37	53	7	0	0	0	0	129
SE	0	0	1	17	40	125	155	23	0	0	0	0	361
SSE	0	1	1	16	38	137	174	53	12	0	0	0	432
S	0	1	1	18	52	114	199	76	17	0	0	0	478
SSW	0	1	2	20	43	125	198	54	13	0	0	0	456
SW	0	0	5	20	30	107	170	43	4	3	0	0	382
WSW	0	0	2	15	20	31	61	22	0	0	0	0	151
W	0	0	1	14	18	60	128	39	7	0	0	0	267
WNW	1	0	1	7	10	56	146	43	11	0	0	0	275
NW	0	0	2	7	9	44	104	55	5	0	0	0	226
NNW	0	0	1	6	8	43	61	31	7	0	0	0	157
Totals	2	3	29	191	385	1083	1666	480	78	3	0	0	3920

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	3920
Total Hours for the Period	26304

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Table 2.7-36—{Callaway Site Joint Frequency Distribution -2004-2006, 10m, B Stability}

(Page 2 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Stability Class B	Delta Temperature	Moderately Unstable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	5	6	18	51	4	1	0	0	0	85
NNE	0	0	0	3	7	18	29	10	0	0	0	0	67
NE	0	0	1	1	6	17	21	3	0	0	0	0	49
ENE	0	0	1	5	7	19	22	3	0	0	0	0	57
E	0	0	1	1	8	8	18	2	0	0	0	0	38
ESE	0	0	1	2	4	16	13	4	0	0	0	0	40
SE	0	0	1	4	13	36	35	2	0	0	0	0	91
SSE	0	0	2	6	14	22	54	5	6	0	0	0	109
S	0	0	1	5	17	21	47	22	4	0	0	0	117
SSW	0	0	1	4	11	31	35	19	3	0	0	0	104
SW	0	0	1	2	13	23	33	7	4	0	0	0	83
WSW	0	0	0	3	8	21	24	7	0	1	0	0	64
W	0	0	0	4	7	21	32	7	0	0	0	0	71
WNW	0	0	1	3	5	27	44	9	1	0	0	0	90
NW	0	0	1	3	7	25	58	20	3	0	0	0	117
NNW	0	0	0	1	7	24	37	7	1	0	0	0	77
Totals	0	0	12	52	140	347	553	131	23	1	0	0	1259

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	1259
Total Hours for the Period	26304

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Table 2.7-36—{Callaway Site Joint Frequency Distribution -2004-2006, 10m, C Stability}

(Page 3 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Stability Class C	Delta Temperature	Slightly Unstable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	1	4	7	29	41	7	1	0	0	0	90
NNE	0	1	1	5	4	31	43	4	0	0	0	0	89
NE	0	0	5	5	7	34	21	0	0	0	0	0	72
ENE	0	1	1	4	4	18	22	1	0	0	0	0	51
E	0	0	0	2	1	15	27	1	2	0	0	0	48
ESE	0	0	1	5	2	20	22	0	0	0	0	0	50
SE	0	0	1	7	11	24	47	6	0	0	0	0	96
SSE	0	0	1	2	13	19	50	7	1	0	0	0	93
S	0	0	0	4	15	37	51	19	6	0	0	0	132
SSW	0	0	0	4	8	22	36	12	2	0	0	0	84
SW	0	0	0	6	7	17	44	11	0	1	0	0	86
WSW	0	1	1	7	9	14	24	9	6	0	0	0	71
W	0	0	1	9	4	20	32	12	0	0	0	0	78
WNW	0	0	1	1	7	20	42	16	2	0	0	0	89
NW	0	1	2	1	7	21	67	17	3	0	0	0	119
NNW	0	0	1	3	8	25	74	12	2	0	0	0	125
Totals	0	4	17	69	114	366	643	134	25	1	0	0	1373

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	1373
Total Hours for the Period	26304

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Table 2.7-36—{Callaway Site Joint Frequency Distribution -2004-2006, 10m, D Stability}

(Page 4 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
Period of Record =		01/01/04 0:00	-	12/31/06 23:00	Total Period		
Elevation:		**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
Stability Class D		Delta Temperature	Neutral				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	2	3	9	26	57	227	328	99	24	0	0	0	775
NNE	0	5	7	39	80	209	232	41	4	0	0	0	617
NE	7	7	11	51	98	167	139	5	0	0	0	0	485
ENE	2	7	15	35	55	121	136	11	0	0	0	0	382
E	1	2	13	25	42	111	123	27	8	0	0	0	352
ESE	2	1	7	23	38	91	181	18	0	0	0	0	361
SE	0	3	9	20	52	130	253	47	1	0	0	0	515
SSE	1	0	7	21	39	115	232	63	8	0	0	0	486
S	2	2	6	21	35	91	178	78	11	0	0	0	424
SSW	1	5	10	22	36	63	124	52	7	0	0	0	320
SW	1	1	12	22	35	83	103	28	11	0	0	0	296
WSW	1	0	3	23	21	54	54	35	8	0	0	0	199
W	0	4	9	28	23	73	176	71	9	0	0	0	393
WNW	1	1	7	31	43	107	218	74	9	0	0	0	491
NW	0	3	10	38	58	164	281	125	12	0	0	0	691
NNW	1	2	12	33	53	201	380	159	28	0	0	0	869
Totals	22	46	147	458	765	2007	3138	933	140	0	0	0	7656

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	7656
Total Hours for the Period	26304

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Table 2.7-36—{Callaway Site Joint Frequency Distribution -2004-2006, 10m, E Stability}

(Page 5 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Stability Class E	Delta Temperature	Slightly Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	5	5	9	36	57	144	75	4	0	0	0	0	335
NNE	5	8	16	48	55	91	27	2	0	0	0	0	252
NE	11	4	20	65	63	81	8	0	0	0	0	0	252
ENE	6	10	17	49	37	61	11	1	0	0	0	0	192
E	3	7	11	46	48	76	29	1	0	0	0	0	221
ESE	7	5	13	52	61	103	47	5	1	0	0	0	294
SE	3	4	13	45	65	294	288	21	3	0	0	0	736
SSE	2	2	14	36	83	257	394	46	5	0	0	0	839
S	5	4	15	50	74	202	430	65	4	0	0	0	849
SSW	2	8	11	34	48	106	132	20	1	0	0	0	362
SW	2	7	18	40	61	93	105	5	3	0	0	0	334
WSW	2	5	16	57	34	89	76	10	0	0	0	0	289
W	7	18	26	56	59	145	103	4	0	0	0	0	418
WNW	3	10	27	47	72	107	80	4	0	0	0	0	350
NW	3	2	20	83	104	149	102	19	0	0	0	0	482
NNW	5	7	15	41	66	137	71	5	0	0	0	0	347
Totals	71	106	261	785	987	2135	1978	212	17	0	0	0	6552

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	6552
Total Hours for the Period	26304

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Table 2.7-36— {Callaway Site Joint Frequency Distribution -2004-2006, 10m, F Stability}

(Page 6 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Stability Class F	Delta Temperature	Moderately Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	7	6	18	26	42	45	4	0	0	0	0	0	148
NNE	4	11	29	33	26	26	0	0	0	0	0	0	129
NE	6	23	41	35	10	3	0	0	0	0	0	0	118
ENE	5	5	25	33	11	6	0	0	0	0	0	0	85
E	4	7	20	28	19	5	1	0	0	0	0	0	84
ESE	8	8	17	63	45	15	1	0	0	0	0	0	157
SE	8	6	24	74	121	187	95	1	0	0	0	0	516
SSE	12	8	36	47	115	336	142	1	0	0	0	0	697
S	7	9	26	36	61	180	100	0	0	0	0	0	419
SSW	3	15	20	45	52	98	28	0	0	0	0	0	261
SW	10	12	22	45	70	84	17	0	0	0	0	0	260
WSW	5	7	28	41	26	29	8	0	0	0	0	0	144
W	7	18	32	50	37	35	3	0	0	0	0	0	182
WNW	8	9	29	65	47	22	1	0	0	0	0	0	181
NW	4	7	16	62	71	38	0	0	0	0	0	0	198
NNW	5	5	11	30	45	44	2	0	0	0	0	0	142
Totals	103	156	394	713	798	1153	402	2	0	0	0	0	3721

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	3721
Total Hours for the Period	26304

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Table 2.7-36— {Callaway Site Joint Frequency Distribution -2004-2006, 10m, G Stability}

(Page 7 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Stability Class G	Delta Temperature	Extremely Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	8	11	18	61	24	1	0	0	0	0	0	0	123
NNE	8	13	27	38	10	0	0	0	0	0	0	0	96
NE	20	14	28	24	2	0	0	0	0	0	0	0	88
ENE	5	13	15	6	2	0	0	0	0	0	0	0	41
E	14	6	9	8	2	0	0	0	0	0	0	0	39
ESE	6	15	15	18	4	0	0	0	0	0	0	0	58
SE	11	18	28	47	33	47	8	0	0	0	0	0	192
SSE	7	23	34	96	100	103	30	0	0	0	0	0	393
S	12	17	21	27	32	19	2	0	0	0	0	0	130
SSW	15	11	29	27	17	13	0	0	0	0	0	0	112
SW	5	7	11	22	22	17	1	0	0	0	0	0	85
WSW	5	4	5	10	3	1	0	0	0	0	0	0	28
W	2	9	11	20	6	3	0	0	0	0	0	0	51
WNW	10	11	14	33	11	2	0	0	0	0	0	0	81
NW	6	9	11	30	13	4	0	0	0	0	0	0	73
NNW	5	6	15	44	21	10	0	0	0	0	0	0	101
Totals	139	187	291	511	302	220	41	0	0	0	0	0	1691

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	1691
Total Hours for the Period	26304

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Table 2.7-36—{Callaway Site Joint Frequency Distribution -2004-2006, 10m, All Stabilities}

(Page 8 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD10M	**Direction:**	DIR10M	**Lapse:**	DT60M-C
	Summary of All Stability Classes		Delta Temperature				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	23	25	55	159	211	496	570	128	27	0	0	0	1694
NNE	17	38	83	172	197	418	377	71	4	0	0	0	1377
NE	44	48	108	187	211	350	226	10	0	0	0	0	1184
ENE	18	36	76	145	141	271	217	17	0	0	0	0	921
E	22	22	58	123	135	250	235	34	11	0	0	0	890
ESE	23	29	55	175	173	282	317	34	1	0	0	0	1089
SE	22	31	77	214	335	843	881	100	4	0	0	0	2507
SSE	22	34	95	224	402	989	1076	175	32	0	0	0	3049
S	26	33	70	161	286	664	1007	260	42	0	0	0	2549
SSW	21	40	73	156	215	458	553	157	26	0	0	0	1699
SW	18	27	69	157	238	424	473	94	22	4	0	0	1526
WSW	13	17	55	156	121	239	247	83	14	1	0	0	946
W	16	49	80	181	154	357	474	133	16	0	0	0	1460
WNW	23	31	80	187	195	341	531	146	23	0	0	0	1557
NW	13	22	62	224	269	445	612	236	23	0	0	0	1906
NNW	16	20	55	158	208	484	625	214	38	0	0	0	1818
Totals	337	502	1151	2779	3491	7311	8421	1892	283	5	0	0	26172

Number of Calm Hours for this Table	31
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	101
Number of Valid Hours for this Table	26172
Total Hours for the Period	26304

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Table 2.7-37—{Callaway Site Joint Frequency Distribution -2004-2006, 60m, A Stability}

(Page 1 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class A	Delta Temperature	Extremely Unstable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	2	1	0	0	0	0	3
ESE	0	0	0	0	0	3	0	3	0	0	0	0	6
SE	0	0	0	0	0	6	9	2	0	0	0	0	17
SSE	0	0	0	0	0	12	22	6	0	0	0	0	40
S	0	0	0	0	0	6	27	17	6	0	0	0	56
SSW	0	0	0	0	1	6	27	14	1	0	0	0	49
SW	0	0	0	1	0	2	13	10	3	0	0	0	29
WSW	0	0	0	1	1	1	2	0	0	0	0	0	5
W	0	0	0	0	0	0	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0	0	1	0	0	0	1
NNW	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	0	0	2	2	36	102	53	11	0	0	0	206

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	206
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, B Stability}

(Page 2 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class B	Delta Temperature	Moderately Unstable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	0	1	1	1	2	0	0	0	0	5
NNE	0	0	0	0	1	3	2	0	0	0	0	0	6
NE	0	0	0	1	1	0	2	1	0	0	0	0	5
ENE	0	0	0	0	0	0	1	0	0	0	0	0	1
E	0	0	0	0	1	3	3	2	0	0	0	0	9
ESE	0	0	0	0	1	5	10	0	0	0	0	0	16
SE	0	0	0	1	5	15	35	6	1	0	0	0	63
SSE	0	0	0	1	4	16	41	14	9	0	0	0	85
S	0	0	0	0	3	18	41	36	17	1	0	0	116
SSW	0	0	0	0	2	12	44	28	10	0	0	0	96
SW	0	0	0	0	0	15	39	21	6	0	0	0	81
WSW	0	0	0	1	1	0	8	3	2	0	0	0	15
W	0	0	0	0	0	2	2	0	2	1	0	0	7
WNW	0	0	0	0	1	1	1	5	8	0	0	0	16
NW	0	0	0	0	1	1	3	1	10	0	0	0	16
NNW	0	0	0	0	0	1	3	1	0	0	0	0	5
Totals	0	0	0	4	22	93	236	120	65	2	0	0	542

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	542
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, C Stability}

(Page 3 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class C	Delta Temperature	Slightly Unstable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	0	0	5	15	7	0	0	0	0	27
NNE	0	0	0	0	0	2	12	0	1	0	0	0	15
NE	0	0	0	0	0	8	9	2	0	0	0	0	19
ENE	0	0	0	0	7	12	11	0	0	0	0	0	30
E	0	0	0	3	2	9	10	5	0	0	0	0	29
ESE	0	0	0	1	3	8	15	10	3	0	0	0	40
SE	0	0	0	0	8	22	66	22	7	0	0	0	125
SSE	0	0	0	0	2	22	51	22	15	1	0	0	113
S	0	0	0	4	4	16	31	36	16	3	0	0	110
SSW	0	0	0	4	4	19	41	29	26	1	0	0	124
SW	0	0	0	5	4	11	40	33	20	4	0	0	117
WSW	0	0	0	0	2	3	10	7	6	2	0	0	30
W	0	0	0	1	2	11	21	20	12	7	0	0	74
WNW	0	0	0	2	3	5	31	34	28	13	0	0	116
NW	0	0	0	1	1	5	12	17	22	0	0	0	58
NNW	0	0	0	0	1	3	6	13	15	0	0	0	38
Totals	0	0	0	21	43	161	381	257	171	31	0	0	1065

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	1065
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, D Stability}

(Page 4 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class D	Delta Temperature	Neutral				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	9	14	72	274	172	69	7	0	0	617
NNE	0	0	2	12	30	99	318	129	29	2	0	0	621
NE	0	0	3	18	30	116	215	67	4	0	0	0	453
ENE	0	1	3	13	25	65	160	58	8	0	0	0	333
E	0	0	5	12	16	42	124	53	18	9	0	0	279
ESE	0	0	2	10	12	46	111	67	13	0	0	0	261
SE	0	0	2	12	24	79	161	118	24	1	0	0	421
SSE	0	0	2	13	20	67	237	186	52	6	0	0	583
S	0	0	1	8	17	77	183	171	125	9	0	0	591
SSW	0	0	5	9	22	61	143	131	95	26	4	0	496
SW	0	0	0	7	25	60	166	159	88	19	8	0	532
WSW	0	0	1	8	24	48	89	66	64	21	3	0	324
W	0	0	2	3	24	45	96	126	134	22	0	0	452
WNW	0	1	1	13	13	47	164	182	151	45	7	0	624
NW	0	0	0	5	16	54	212	236	178	41	7	0	749
NNW	0	1	4	6	22	95	270	246	106	17	0	0	767
Totals	0	3	33	158	334	1073	2923	2167	1158	225	29	0	8103

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	8103
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, E Stability}

(Page 5 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class E	Delta Temperature	Slightly Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	1	0	8	14	58	218	217	24	15	0	0	555
NNE	0	0	3	5	6	38	247	156	29	3	0	0	487
NE	1	2	6	13	13	69	262	85	4	0	0	0	455
ENE	0	1	1	8	5	53	172	85	8	0	0	0	333
E	0	2	3	9	9	47	214	100	11	0	0	0	395
ESE	0	0	1	5	12	39	230	195	21	1	0	0	504
SE	0	2	0	7	10	38	232	473	137	5	0	0	904
SSE	0	0	2	3	6	36	206	584	224	8	0	0	1069
S	1	0	1	8	11	31	213	531	303	10	0	0	1109
SSW	0	1	1	6	10	45	165	388	232	11	0	0	859
SW	0	0	1	9	8	41	171	195	128	6	0	0	559
WSW	0	2	1	4	13	30	116	126	74	8	2	0	376
W	0	1	2	7	11	40	130	244	145	7	2	0	589
WNW	1	1	2	5	15	41	165	238	121	9	0	0	598
NW	0	0	4	2	14	42	249	315	143	17	1	0	787
NNW	0	0	0	4	8	48	217	281	98	9	0	0	665
Totals	3	13	28	103	165	696	3207	4213	1702	109	5	0	10244

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	10244
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, F Stability}

(Page 6 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class F	Delta Temperature	Moderately Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	2	0	1	1	3	9	35	47	13	0	0	0	111
NNE	0	0	0	2	5	10	35	55	6	0	0	0	113
NE	0	0	1	10	8	25	84	33	0	0	0	0	161
ENE	0	0	1	4	6	11	53	55	0	0	0	0	130
E	0	3	1	1	3	12	64	42	0	0	0	0	126
ESE	0	0	0	1	4	26	78	55	1	0	0	0	165
SE	0	0	1	2	4	16	109	120	3	0	0	0	255
SSE	0	0	0	2	2	20	117	209	55	0	0	0	405
S	1	0	1	3	3	28	160	200	23	0	0	0	419
SSW	0	0	0	0	4	11	114	154	37	0	0	0	320
SW	0	0	0	1	5	21	66	98	73	1	0	0	265
WSW	0	1	0	4	7	16	56	59	17	0	0	0	160
W	1	1	0	1	9	19	52	40	8	0	0	0	131
WNW	0	0	1	2	4	18	45	68	19	0	0	0	157
NW	0	0	1	2	4	12	54	59	2	0	0	0	134
NNW	1	0	1	0	2	11	32	57	10	0	0	0	114
Totals	5	5	9	36	73	265	1154	1351	267	1	0	0	3166

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	3166
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, G Stability}

(Page 7 of 8)

Joint Frequency Distribution							
Hours at Each Wind Speed and Direction							
	Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
	Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
	Stability Class G	Delta Temperature	Extremely Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	0	1	6	9	11	0	0	0	0	27
NNE	0	0	2	2	2	5	16	10	0	0	0	0	37
NE	0	0	0	1	2	5	21	8	0	0	0	0	37
ENE	0	0	0	1	3	4	35	15	0	0	0	0	58
E	0	0	0	3	3	5	8	2	0	0	0	0	21
ESE	0	0	2	3	2	7	8	2	0	0	0	0	24
SE	0	0	0	2	2	4	8	7	0	0	0	0	23
SSE	0	0	3	1	2	8	14	13	0	0	0	0	41
S	0	0	1	4	2	11	42	18	1	0	0	0	79
SSW	0	0	1	2	2	6	37	21	4	0	0	0	73
SW	0	0	0	1	0	1	7	17	1	0	0	0	27
WSW	0	0	0	2	3	4	5	5	0	0	0	0	19
W	0	0	0	2	3	5	5	2	0	0	0	0	17
WNW	0	0	0	2	1	5	4	7	0	0	0	0	19
NW	0	0	0	2	0	1	4	8	0	0	0	0	15
NNW	0	1	0	1	4	7	9	4	1	0	0	0	27
Totals	0	1	9	29	32	84	232	150	7	0	0	0	544

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	544
Total Hours for the Period	26304

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Table 2.7-37— {Callaway Site Joint Frequency Distribution -2004-2006, 60m, All Stabilities}

(Page 8 of 8)

Joint Frequency Distribution						
Hours at Each Wind Speed and Direction						
Period of Record =	01/01/04 0:00	-	12/31/06 23:00	Total Period		
Elevation:	**Speed:**	SPD60M	**Direction:**	DIR60M	**Lapse:**	DT60M
Stability Class G	Delta Temperature	Extremely Stable				

	Wind Speed (m/s)												
Wind Direction (from)	**0.22 -0.50**	**5.10 -0.75**	**0.76 -1.0**	**1.1 -1.5**	**1.6 -2.0**	**2.1 -3.0**	**3.1 -5.0**	**5.1 -7.0**	**7.1 -10.0**	**10.1 -13.0**	**13.1 -18.0**	**> 18.0**	**Total**
N	0	0	0	0	1	6	9	11	0	0	0	0	27
NNE	0	0	2	2	2	5	16	10	0	0	0	0	37
NE	0	0	0	1	2	5	21	8	0	0	0	0	37
ENE	0	0	0	1	3	4	35	15	0	0	0	0	58
E	0	0	0	3	3	5	8	2	0	0	0	0	21
ESE	0	0	2	3	2	7	8	2	0	0	0	0	24
SE	0	0	0	2	2	4	8	7	0	0	0	0	23
SSE	0	0	3	1	2	8	14	13	0	0	0	0	41
S	0	0	1	4	2	11	42	18	1	0	0	0	79
SSW	0	0	1	2	2	6	37	21	4	0	0	0	73
SW	0	0	0	1	0	1	7	17	1	0	0	0	27
WSW	0	0	0	2	3	4	5	5	0	0	0	0	19
W	0	0	0	2	3	5	5	2	0	0	0	0	17
WNW	0	0	0	2	1	5	4	7	0	0	0	0	19
NW	0	0	0	2	0	1	4	8	0	0	0	0	15
NNW	0	1	0	1	4	7	9	4	1	0	0	0	27
Totals	0	1	9	29	32	84	232	150	7	0	0	0	544

Number of Calm Hours for this Table	2
Number of Variable Direction Hours for this Table	0
Number of Invalid Hours	2432
Number of Valid Hours for this Table	544
Total Hours for the Period	26304

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Table 2.7-38—{Monthly Mean Wind Speed and Prevailing Wind Direction}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	mph	10.7	10.6	11.5	11.4	9.4	8.3	7.9	7.7	8.4	9.4	10.7	10.5	9.7
	deg	310	310	320	190	190	190	190	190	190	170	190	310	190
St. Louis, MO	mph	10.3	10.2	10.9	10.7	9.4	8.4	7.9	7.5	7.9	8.7	10.0	9.9	9.3
	deg	310	310	310	310	190	190	250	190	190	190	310	310	310
Kansas City, MO	mph	11.2	10.9	12.1	12.3	10.5	9.8	9.3	8.7	9.6	10.3	11.1	10.7	10.5
	deg	200	200	200	200	190	190	200	190	190	190	190	200	200

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Table 2.7-39—{Monthly Maximum Two Minute Wind Speed and Direction}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	mph	41	41	41	54	44	48	44	59	38	47	45	37	59
	deg	230	240	220	230	30	330	250	10	270	250	190	60	10
St. Louis, MO	mph	39	39	40	53	41	43	43	45	41	43	41	38	53
	deg	300	230	170	260	290	170	270	310	250	310	240	310	260
Kansas City, MO	mph	39	40	46	48	46	51	58	39	41	40	37	40	58
	deg	330	200	230	200	240	10	20	300	140	210	310	190	20

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Table 2.7-40—{Monthly Maximum Five Second Wind Speed and Direction}

SITE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Columbia, MO	mph	49	51	49	68	54	74	55	81	46	59	53	45	81
	deg	310	240	220	330	40	320	250	360	330	250	240	300	360
St. Louis, MO	mph	46	54	52	70	60	64	55	55	51	51	53	47	70
	deg	300	230	300	270	40	170	60	310	260	300	240	300	270
Kansas City, MO	mph	48	52	58	59	61	61	74	55	49	52	52	48	74
	deg	320	190	230	180	250	360	10	140	140	230	330	190	10

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Table 2.7-41—{Callaway Site Meteorological Persistence (2004-2006), 10 m, 1 sector}

(Page 1 of 2)

Site Name: Callaway Site

Start Date: 1/1/2004 00:00End Date:12/31/2006 23:00

Number of Sectors Included: 1 Width in Degrees: 22.5

Measurement Height, m: 10 Speed Sensor: 1 Direction Sensor: 1

Speed Greater than or Equal to: 5.00 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	1120	785	514	435	469	571	1677	2073	1862	1119	927	536	906	977	1207	1243
2	671	435	266	210	254	300	1008	1191	1164	571	490	248	503	556	716	748
4	286	173	113	69	106	112	456	483	561	190	161	77	208	222	313	361
8	61	38	31	15	26	28	131	111	182	34	27	13	52	39	75	118
12	7	8	6	5	9	2	49	22	61	8	8	5	13	14	22	49
18	0	0	0	0	3	0	8	0	14	0	2	0	0	3	7	11
24	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater than or Equal to: 10.00 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	272	137	32	47	79	77	236	385	522	294	205	143	255	300	399	418
2	158	79	13	24	50	33	120	195	303	151	102	80	143	170	239	248
4	63	31	1	7	26	14	45	63	119	56	35	30	55	65	109	107
8	9	7	0	0	13	0	9	6	29	9	8	4	5	9	29	25
12	0	1	0	0	6	0	1	0	9	0	0	0	0	1	12	8
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater than or Equal to: 15.00 Mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	36	6	0	0	14	3	9	45	66	39	35	25	22	36	39	60
2	18	2	0	0	9	0	2	21	30	19	22	11	10	19	19	33
4	5	0	0	0	7	0	0	7	4	6	9	3	2	8	5	13
8	0	0	0	0	3	0	0	0	0	2	2	0	0	1	0	2
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table 2.7-41—{Callaway Site Meteorological Persistence (2004-2006), 10 m, 1 sector}

(Page 2 of 2)

Site Name: Callaway Site

Start Date: 1/1/2004 00:00End Date:12/31/2006 23:00

Number of Sectors Included: 1 Width in Degrees: 22.5

Measurement Height, m: 10 Speed Sensor: 1 Direction Sensor: 1

Speed Greater than or Equal to: 20.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	6	0	0	0	0	0	0	1	0	5	7	3	0	1	3	3
2	2	0	0	0	0	0	0	0	0	2	4	0	0	0	2	0
4	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 25.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 30.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table 2.7-42—{Callaway Site Meteorological Persistence (2004-2006), 60 m, 1 sector}

(Page 1 of 2)

Site Name: Callaway Site

Start Date: 1/1/2004 00:00End Date:12/31/2006 23:00

Number of Sectors Included: 1 Width in Degrees: 22.5

Measurement Height, m: 60 Speed Sensor: 2 Direction Sensor: 2

Speed Greater than or Equal to: 5.00mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	1395	1260	1088	909	854	1029	1853	2417	2515	2027	1605	915	1258	1537	1803	1682
2	871	777	639	482	444	540	1137	1523	1543	1155	940	419	700	910	1150	1083
4	404	353	275	171	167	207	510	695	696	471	383	137	292	377	552	545
8	95	87	66	37	37	50	125	197	201	118	85	22	70	99	171	176
12	18	25	22	10	9	21	32	72	66	30	24	9	16	28	64	64
18	0	7	8	0	3	12	2	12	11	1	0	3	0	3	17	17
24	0	0	2	0	0	6	0	0	0	0	0	0	0	0	5	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater than or Equal to: 10.00mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	852	657	397	424	416	595	1242	1789	1880	1465	1113	601	929	1156	1362	1150
2	521	383	222	225	205	317	782	1170	1220	899	668	293	553	697	892	752
4	246	192	85	73	79	109	361	562	571	396	279	107	246	301	439	392
8	61	53	18	19	22	38	93	152	164	111	73	18	60	84	139	139
12	12	17	6	3	9	17	28	45	52	26	23	9	13	27	54	58
18	0	6	0	0	3	8	2	0	3	1	0	3	0	3	17	15
24	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Speed Greater than or Equal to: 15.00 mph

Direction

Hours	N	NNE	NE	ENE	E	ESE	SE	SSE	S	WSW	SW	WSW	W	WNW	NW	NNW
1	188	102	14	35	48	58	274	522	672	581	431	247	422	502	518	353
2	107	53	5	12	28	28	129	293	407	327	244	111	229	282	319	202
4	45	24	0	5	20	12	42	108	182	125	89	38	86	105	165	99
8	9	8	0	0	12	2	7	14	58	30	17	5	10	19	52	31
12	3	4	0	0	5	0	1	1	22	6	2	1	0	3	16	9
18	0	0	0	0	0	0	0	0	2	0	0	0	0	0	3	0

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Table 2.7-42—{Callaway Site Meteorological Persistence (2004-2006), 60 m, 1 sector}

(Page 2 of 2)

Site Name: Callaway Site

Start Date: 1/1/2004 00:00End Date:12/31/2006 23:00

Number of Sectors Included: 1 Width in Degrees: 22.5

Measurement Height, m: 60 Speed Sensor: 2 Direction Sensor: 2

24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 20.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	36	12	1	2	15	2	22	52	96	90	82	79	97	138	143	82
2	27	6	0	1	9	0	12	27	46	51	42	47	44	81	80	42
4	16	1	0	0	7	0	5	10	8	21	14	19	12	35	37	19
8	7	0	0	0	3	0	0	0	0	5	3	3	0	8	9	5
12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	16	2	0	0	1	1	4	7	5	16	24	16	19	31	24	4
2	11	1	0	0	0	0	1	4	0	7	15	6	6	19	13	0
4	8	0	0	0	0	0	0	0	0	0	6	2	0	8	5	0
8	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Speed Greater than or Equal to: 30.00 mph																
Direction																
Hours	**N**	**NNE**	**NE**	**ENE**	**E**	**ESE**	**SE**	**SSE**	**S**	**WSW**	**SW**	**WSW**	**W**	**WNW**	**NW**	**NNW**
1	0	0	0	0	0	0	0	0	0	4	8	4	1	6	6	0
2	0	0	0	0	0	0	0	0	0	1	6	3	0	2	3	0
4	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Table 2.7-43—{Callaway Site 33 ft (10m) Annual Stability Persistence Summary for Years 2004-2006}

STABILITY PERSISTENCE (HOURS)/PERCENT																										
STABILITY	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**GT.24**	**TOTAL**
A	208	110	98	74	95	95	72	70	48	25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	905
	22	35	45	54	64	75	83	90	96	98	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
B	730	149	42	17	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	945
	77	93	97	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
C	806	142	44	23	3	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1024
	78	92	96	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
D	1056	406	203	105	75	50	35	28	32	19	12	17	8	7	9	7	10	11	10	8	3	5	3	2	38	2159
	48	67	77	81	85	87	89	90	92	93	93	94	94	95	95	95	96	96	97	97	97	98	98	98	100	
E	825	367	173	134	99	82	54	40	44	38	31	22	23	22	7	5	2	3	0	0	0	0	0	0	0	1971
	41	60	69	76	81	85	87	90	92	94	95	96	98	99	99	99	99	100	100	100	100	100	100	100	100	
F	477	250	151	103	60	54	36	25	21	20	20	8	6	1	1	0	0	0	0	0	0	0	0	0	0	1233
	38	58	71	79	84	88	91	93	95	97	98	99	99	99	100	100	100	100	100	100	100	100	100	100	100	
G	114	55	52	34	30	17	17	15	14	21	15	11	5	0	0	0	0	0	0	0	0	0	0	0	0	400
	28	42	55	63	71	75	79	83	87	92	96	98	100	100	100	100	100	100	100	100	100	100	100	100	100	
TOTAL	4216	1479	763	490	367	301	217	179	160	123	88	58	42	30	17	12	12	14	10	8	3	5	3	2	38	8637

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Table 2.7-44—{Callaway Site 197 ft (60m) Annual Stability Persistence Summary for Years 2004-2006}

STABILITY PERSISTENCE (HOURS)/PERCENT																										
STABILITY	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**GT.24**	**Total**
A	203	109	99	75	90	93	70	69	47	25	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	890
	22	35	46	54	64	75	83	90	96	98	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
B	718	146	42	17	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	930
	77	92	97	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
C	787	142	42	23	3	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1003
	78	92	96	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
D	1035	393	199	101	74	48	33	27	32	19	12	17	8	7	9	7	9	11	9	8	3	5	3	2	38	2109
	49	67	77	81	85	87	89	90	92	92	93	94	94	95	95	95	96	96	97	97	97	97	98	98	100	
E	812	358	168	130	99	82	54	41	43	37	31	22	22	21	7	5	2	3	0	0	0	0	0	0	0	1937
	41	60	69	75	80	85	87	90	92	94	95	96	98	99	99	99	99	100	100	100	100	100	100	100	100	
F	469	247	150	100	58	54	35	23	20	20	20	8	6	1	1	0	0	0	0	0	0	0	0	0	0	1212
	38	59	71	79	84	88	91	93	95	97	98	99	99	99	100	100	100	100	100	100	100	100	100	100	100	
G	111	54	52	34	31	17	17	15	13	20	15	11	5	0	0	0	0	0	0	0	0	0	0	0	0	395
	28	41	54	63	71	75	80	83	87	92	95	98	100	100	100	100	100	100	100	100	100	100	100	100	100	
TOTAL	4135	1449	752	480	360	297	212	176	156	121	88	58	41	29	17	12	11	14	9	8	3	5	3	2	38	8476

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Table 2.7-45—{Normal Effluent Annual Average, Undecayed, Undepleted χ/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors}

Downwind Sector	χ/Q (sec/m³) 0.5 miles	χ/Q (sec/m³) 1.5 miles	χ/Q (sec/m³) 2.5 mile	χ/Q (sec/m³) 3.5 miles	χ/Q (sec/m³) 4.5 miles	χ/Q (sec/m³) 7.5 miles	χ/Q (sec/m³) 15 miles	χ/Q (sec/m³) 25 miles	χ/Q (sec/m³) 35 miles	χ/Q (sec/m³) 45 miles
N	7.55E-07	1.66E-07	9.21E-08	6.18E-08	4.61E-08	2.56E-08	1.13E-08	6.16E-09	4.15E-09	3.08E-09
NNE	5.41E-07	1.13E-07	6.19E-08	4.17E-08	3.11E-08	1.73E-08	7.69E-09	4.21E-09	2.85E-09	2.12E-09
NE	4.74E-07	1.01E-07	5.62E-08	3.79E-08	2.84E-08	1.59E-08	7.11E-09	3.90E-09	2.63E-09	1.96E-09
ENE	2.87E-07	6.45E-08	3.66E-08	2.49E-08	1.87E-08	1.28E-08	5.45E-09	2.86E-09	1.88E-09	1.38E-09
E	4.76E-07	1.05E-07	6.28E-08	4.20E-08	3.13E-08	1.95E-08	8.19E-09	4.27E-09	2.80E-09	2.06E-09
ESE	5.04E-07	1.10E-07	6.04E-08	4.03E-08	2.99E-08	1.98E-08	8.42E-09	4.43E-09	2.91E-09	2.14E-09
SE	5.37E-07	1.26E-07	7.05E-08	4.71E-08	3.49E-08	1.90E-08	8.10E-09	5.01E-09	3.27E-09	2.38E-09
SSE	4.55E-07	1.14E-07	6.59E-08	4.46E-08	3.31E-08	1.79E-08	7.58E-09	5.39E-09	3.44E-09	2.48E-09
S	4.18E-07	1.06E-07	6.26E-08	4.29E-08	3.21E-08	2.01E-08	8.62E-09	4.61E-09	3.66E-09	2.65E-09
SSW	3.71E-07	9.31E-08	5.56E-08	3.85E-08	2.88E-08	1.59E-08	6.84E-09	4.26E-09	2.79E-09	2.03E-09
SW	3.66E-07	8.94E-08	5.39E-08	3.76E-08	2.84E-08	1.58E-08	6.85E-09	3.68E-09	2.46E-09	1.81E-09
WSW	2.41E-07	6.11E-08	3.70E-08	2.58E-08	1.95E-08	1.32E-08	5.56E-09	2.91E-09	1.91E-09	1.39E-09
W	2.35E-07	5.87E-08	3.51E-08	2.43E-08	1.83E-08	1.08E-08	4.62E-09	2.46E-09	1.63E-09	1.19E-09
WNW	3.08E-07	7.43E-08	4.38E-08	3.03E-08	2.28E-08	1.47E-08	6.39E-09	3.42E-09	2.27E-09	1.67E-09
NW	7.72E-07	1.71E-07	9.66E-08	6.59E-08	4.96E-08	3.21E-08	1.42E-08	8.28E-09	5.46E-09	4.02E-09
NNW	1.03E-06	2.15E-07	1.19E-07	8.09E-08	6.09E-08	3.46E-08	1.58E-08	8.85E-09	6.04E-09	4.53E-09

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Table 2.7-46— {Normal Effluent Annual Average, Undecayed Undepleted χ/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special Receptors}

Downwind Sector	χ/Q (sec/m^3) Site Boundary	χ/Q (sec/m^3) Nearest Residents	χ/Q (sec/m^3) Nearest Gardens	χ/Q (sec/m^3) Nearest Meat Animal	χ/Q (sec/m^3) Nearest Milk Cow
N	2.20E-07	7.21E-08	2.63E-08	2.63E-08	0.00E+00
NNE	2.14E-07	6.44E-08	5.79E-08	5.82E-08	0.00E+00
NE	1.39E-07	5.93E-08	3.24E-08	4.43E-08	0.00E+00
ENE	1.40E-07	5.30E-08	3.19E-08	2.42E-08	0.00E+00
E	1.06E-07	2.42E-08	0.00E+00	2.49E-08	0.00E+00
ESE	1.35E-07	5.19E-08	2.34E-08	5.19E-08	0.00E+00
SE	1.99E-07	1.10E-07	4.77E-08	1.10E-07	0.00E+00
SSE	2.08E-07	1.19E-07	1.17E-07	9.06E-08	9.06E-08
S	2.17E-07	8.47E-08	1.01E-07	1.01E-07	0.00E+00
SSW	2.11E-07	6.56E-08	5.39E-08	5.39E-08	0.00E+00
SW	1.45E-07	5.28E-08	4.37E-08	5.89E-08	0.00E+00
WSW	1.08E-07	8.75E-08	2.75E-08	6.83E-08	0.00E+00
W	1.07E-07	1.01E-07	6.92E-08	7.79E-08	3.57E-08
WNW	1.04E-07	8.19E-08	8.19E-08	6.40E-08	6.40E-08
NW	2.50E-07	8.73E-08	5.32E-08	8.06E-08	6.60E-08
NNW	2.79E-07	9.28E-08	4.48E-08	5.73E-08	0.00E+00

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Table 2.7-47—{Normal Effluent Annual Average, Depleted χ/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors}

Downwind Sector	χ/Q (sec/m^3) **0.5 miles**	χ/Q (sec/m^3) **1.5 miles**	χ/Q (sec/m^3) **2.5 mile**	χ/Q (sec/m^3) **3.5 miles**	χ/Q (sec/m^3) **4.5 miles**	χ/Q (sec/m^3) **7.5 miles**	χ/Q (sec/m^3) **15 miles**	χ/Q (sec/m^3) **25 miles**	χ/Q (sec/m^3) **35 miles**	χ/Q (sec/m^3) **45 miles**
N	6.94E-07	1.45E-07	7.88E-08	5.21E-08	3.84E-08	2.08E-08	8.83E-09	4.63E-09	3.02E-09	2.18E-09
NNE	4.98E-07	9.78E-08	5.27E-08	3.48E-08	2.56E-08	1.38E-08	5.88E-09	3.09E-09	2.02E-09	1.46E-09
NE	4.36E-07	8.82E-08	4.81E-08	3.19E-08	2.36E-08	1.28E-08	5.51E-09	2.91E-09	1.90E-09	1.38E-09
ENE	2.64E-07	5.64E-08	3.16E-08	2.13E-08	1.58E-08	1.09E-08	4.41E-09	2.19E-09	1.38E-09	9.66E-10
E	4.37E-07	9.18E-08	5.44E-08	3.59E-08	2.64E-08	1.63E-08	6.50E-09	3.19E-09	1.99E-09	1.37E-09
ESE	4.62E-07	9.60E-08	5.18E-08	3.40E-08	2.49E-08	1.64E-08	6.65E-09	3.31E-09	2.08E-09	1.46E-09
SE	4.93E-07	1.10E-07	6.11E-08	4.02E-08	2.94E-08	1.56E-08	6.37E-09	3.73E-09	2.31E-09	1.60E-09
SSE	4.18E-07	1.01E-07	5.79E-08	3.86E-08	2.83E-08	1.49E-08	6.03E-09	3.49E-09	2.01E-09	1.33E-09
S	3.84E-07	9.44E-08	5.52E-08	3.73E-08	2.75E-08	1.71E-08	7.06E-09	3.65E-09	2.16E-09	1.43E-09
SSW	3.42E-07	8.28E-08	4.91E-08	3.35E-08	2.48E-08	1.33E-08	5.47E-09	3.29E-09	2.07E-09	1.45E-09
SW	3.36E-07	7.92E-08	4.74E-08	3.27E-08	2.44E-08	1.32E-08	5.48E-09	2.83E-09	1.83E-09	1.31E-09
WSW	2.22E-07	5.44E-08	3.27E-08	2.26E-08	1.68E-08	1.13E-08	4.56E-09	2.27E-09	1.43E-09	1.00E-09
W	2.17E-07	5.21E-08	3.09E-08	2.12E-08	1.57E-08	9.11E-09	3.77E-09	1.93E-09	1.24E-09	8.86E-10
WNW	2.83E-07	6.55E-08	3.83E-08	2.62E-08	1.95E-08	1.25E-08	5.27E-09	2.73E-09	1.77E-09	1.26E-09
NW	7.09E-07	1.49E-07	8.31E-08	5.58E-08	4.15E-08	2.69E-08	1.15E-08	6.16E-09	3.83E-09	2.68E-09
NNW	9.48E-07	1.87E-07	1.01E-07	6.76E-08	5.03E-08	2.78E-08	1.23E-08	6.68E-09	4.45E-09	3.25E-09

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Table 2.7-48—{Normal Effluent Annual Average, Depleted χ/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special Receptors}

Downwind Sector	χ/Q (sec/m³) Site Boundary	χ/Q (sec/m³) Nearest Residents	χ/Q (sec/m³) Nearest Gardens	χ/Q (sec/m³) Nearest Meat Animal	χ/Q (sec/m³) Nearest Milk Cow
N	1.93E-07	6.37E-08	2.25E-08	2.25E-08	0.00E+00
NNE	1.88E-07	5.70E-08	5.12E-08	5.14E-08	0.00E+00
NE	1.23E-07	5.23E-08	2.80E-08	3.88E-08	0.00E+00
ENE	1.23E-07	4.70E-08	2.81E-08	2.12E-08	0.00E+00
E	9.24E-08	2.11E-08	0.00E+00	2.17E-08	0.00E+00
ESE	1.19E-07	4.55E-08	2.00E-08	4.55E-08	0.00E+00
SE	1.78E-07	9.51E-08	3.99E-08	9.51E-08	0.00E+00
SSE	1.88E-07	1.01E-07	9.98E-08	7.61E-08	7.61E-08
S	1.96E-07	7.23E-08	8.54E-08	8.54E-08	0.00E+00
SSW	1.90E-07	5.60E-08	4.57E-08	4.57E-08	0.00E+00
SW	1.30E-07	4.50E-08	3.70E-08	5.05E-08	0.00E+00
WSW	9.71E-08	7.72E-08	2.35E-08	5.98E-08	0.00E+00
W	9.64E-08	8.82E-08	6.00E-08	6.77E-08	3.03E-08
WNW	9.40E-08	7.08E-08	7.08E-08	5.50E-08	5.50E-08
NW	2.21E-07	7.60E-08	4.57E-08	7.01E-08	5.70E-08
NNW	2.45E-07	8.20E-08	3.88E-08	5.01E-08	0.00E+00

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Table 2.7-49— {Normal Effluent Annual Average, D/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Grid Receptors}

Downwind Sector	D/Q ($1/m^2$) 0.5 miles	D/Q ($1/m^2$) 1.5 miles	D/Q ($1/m^2$) 2.5 mile	D/Q ($1/m^2$) 3.5 miles	D/Q ($1/m^2$) 4.5 miles	D/Q ($1/m^2$) 7.5 miles	D/Q ($1/m^2$) 15 miles	D/Q ($1/m^2$) 25 miles	D/Q ($1/m^2$) 35 miles	D/Q ($1/m^2$) 45 miles
N	7.69E-09	1.44E-09	6.65E-10	3.67E-10	2.41E-10	1.05E-10	3.62E-11	1.49E-11	8.73E-12	5.79E-12
NNE	5.53E-09	1.06E-09	4.85E-10	2.69E-10	1.77E-10	7.78E-11	2.71E-11	1.14E-11	6.73E-12	4.50E-12
NE	4.79E-09	9.24E-10	4.25E-10	2.36E-10	1.56E-10	6.85E-11	2.39E-11	9.99E-12	5.91E-12	3.94E-12
ENE	2.79E-09	5.35E-10	2.48E-10	1.37E-10	9.05E-11	4.06E-11	1.39E-11	5.82E-12	3.58E-12	2.55E-12
E	4.61E-09	8.78E-10	4.18E-10	2.31E-10	1.51E-10	6.64E-11	2.25E-11	9.33E-12	5.67E-12	4.08E-12
ESE	4.91E-09	9.59E-10	4.51E-10	2.52E-10	1.66E-10	7.41E-11	2.50E-11	1.02E-11	6.12E-12	4.28E-12
SE	5.63E-09	1.14E-09	5.40E-10	3.04E-10	2.01E-10	8.80E-11	3.00E-11	1.24E-11	7.50E-12	5.24E-12
SSE	4.69E-09	1.05E-09	5.17E-10	2.98E-10	1.99E-10	8.75E-11	2.99E-11	1.82E-11	9.80E-12	6.21E-12
S	3.73E-09	8.89E-10	4.41E-10	2.57E-10	1.73E-10	7.96E-11	2.66E-11	1.05E-11	9.22E-12	5.84E-12
SSW	2.79E-09	6.97E-10	3.48E-10	2.05E-10	1.38E-10	6.18E-11	2.14E-11	8.75E-12	5.24E-12	3.64E-12
SW	2.08E-09	5.40E-10	2.72E-10	1.62E-10	1.10E-10	4.93E-11	1.73E-11	7.23E-12	4.24E-12	2.79E-12
WSW	1.80E-09	4.61E-10	2.28E-10	1.35E-10	9.10E-11	4.30E-11	1.45E-11	5.97E-12	3.62E-12	2.53E-12
W	1.86E-09	4.46E-10	2.19E-10	1.28E-10	8.58E-11	3.89E-11	1.33E-11	5.43E-12	3.16E-12	2.08E-12
WNW	2.23E-09	5.15E-10	2.50E-10	1.45E-10	9.70E-11	4.45E-11	1.50E-11	6.04E-12	3.55E-12	2.41E-12
NW	5.95E-09	1.20E-09	5.65E-10	3.17E-10	2.10E-10	9.44E-11	3.21E-11	1.46E-11	9.28E-12	6.75E-12
NNW	7.47E-09	1.43E-09	6.64E-10	3.68E-10	2.42E-10	1.06E-10	3.64E-11	1.49E-11	8.70E-12	5.75E-12

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Table 2.7-50—{Normal Effluent Annual Average, D/Q Values for Mixed Mode Release Using 242,458 cfm Flow Rate for Special Receptors}

Downwind Sector	D/Q (1/m^2) Site Boundary	D/Q (1/m^2) Nearest Residents	D/Q (1/m^2) Nearest Gardens	D/Q (1/m^2) Nearest Meat Animal	D/Q (1/m^2) Nearest Milk Cow
N	1.97E-09	5.33E-10	1.24E-10	1.24E-10	0.00E+00
NNE	1.91E-09	4.25E-10	3.68E-10	3.70E-10	0.00E+00
NE	1.30E-09	3.09E-10	1.31E-10	2.05E-10	0.00E+00
ENE	1.31E-09	3.87E-10	1.84E-10	1.23E-10	0.00E+00
E	8.84E-10	1.27E-10	0.00E+00	1.32E-10	0.00E+00
ESE	1.16E-09	3.16E-10	1.01E-10	3.16E-10	0.00E+00
SE	1.89E-09	6.74E-10	1.95E-10	6.74E-10	0.00E+00
SSE	1.80E-09	6.59E-10	6.50E-10	4.38E-10	4.38E-10
S	1.88E-09	5.87E-10	5.18E-10	5.18E-10	0.00E+00
SSW	1.82E-09	5.23E-10	3.95E-10	3.95E-10	0.00E+00
SW	8.59E-10	3.87E-10	2.92E-10	4.53E-10	0.00E+00
WSW	8.08E-10	7.49E-10	1.60E-10	5.70E-10	0.00E+00
W	8.27E-10	8.30E-10	4.81E-10	5.70E-10	1.83E-10
WNW	8.06E-10	6.61E-10	6.61E-10	4.85E-10	4.85E-10
NW	1.80E-09	7.11E-10	3.62E-10	6.42E-10	4.92E-10
NNW	1.88E-09	8.05E-10	2.99E-10	4.24E-10	0.00E+00

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Table 2.7-51— {Specific Locations of Receptors of Interest}

(Page 1 of 2)

Receptor	Distance Downwind m (ft)	Sector
Site Boundary	1,971 (6,464)	N
Site Boundary	2,009 (6,589)	NNE
Site Boundary	1,927 (6,320)	NE
Site Boundary	1,918 (6,291)	ENE
Site Boundary	2,404 (7,885)	E
Site Boundary	2,012 (6,599)	ESE
Site Boundary	1,703 (5,585)	SE
Site Boundary	1,406 (4,611)	SSE
Site Boundary	1,363 (4,470)	S
Site Boundary	1,394 (4,572)	SSW
Site Boundary	1,655 (5,428)	SW
Site Boundary	1,536 (5,038)	WSW
Site Boundary	1,502 (4,926)	W
Site Boundary	1,532 (5,024)	WNW
Site Boundary	1,831 (6,005)	NW
Site Boundary	2,013 (6,602)	NNW
Nearest Resident	3,508 (11,506)	N
Nearest Resident	3,476 (11,401)	NNE
Nearest Resident	3,653 (11,981)	NE
Nearest Resident	2,672 (8,764)	ENE
Nearest Resident	5,649 (18,528)	E
Nearest Resident	3,412 (11,191)	ESE
Nearest Resident	3,573 (13,247)	SE
Nearest Resident	4,039 (13,247)	SSE
Nearest Resident	4,313 (14,146)	S
Nearest Resident	3,830 (12,562)	SSW
Nearest Resident	4,249 (13,936)	SW
Nearest Resident	1,931 (6,333)	WSW
Nearest Resident	2,511 (8,236)	W
Nearest Resident	3,106 (10,187)	WNW
Nearest Resident	3,331 (10,925)	NW
Nearest Resident	2,929 (9,607)	NNW
Nearest Garden	8,996 (29,506)	N
Nearest Garden	3,862 (12,667)	NNE
Nearest Garden	6,437 (21,113)	NE
Nearest Garden	4,619 (15,15)	ENE
Nearest Garden	N/A	E
Nearest Garden	7,081 (23,225)	ESE
Nearest Garden	7,580 (24,862)	SE
Nearest Garden	4,072 (13,356)	SSE
Nearest Garden	4,635 (15,202)	S
Nearest Garden	4,522 (14,832)	SSW
Nearest Garden	4,989 (16,363)	SW
Nearest Garden	5,166 (16,944)	WSW
Nearest Garden	3,653 (11,981)	W
Nearest Garden	3,106 (10,187)	WNW
Nearest Garden	5,086 (16,682)	NW
Nearest Garden	5,617 (18,423)	NNW
Nearest Meat Animal	8,996 (29,506)	N

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Table 2.7-51— {Specific Locations of Receptors of Interest}

(Page 2 of 2)

Receptor	Distance Downwind m (ft)	Sector
Nearest Meat Animal	3,846 (12,614)	NNE
Nearest Meat Animal	4,828 (15,835)	NE
Nearest Meat Animal	5,955 (19,532)	ENE
Nearest Meat Animal	5,504 (18,053)	E
Nearest Meat Animal	3,412 (11,191)	ESE
Nearest Meat Animal	3,573 (11,719)	SE
Nearest Meat Animal	5,102 (16,734)	SSE
Nearest Meat Animal	4,635 (15,202)	S
Nearest Meat Animal	4,522 (14,832)	SSW
Nearest Meat Animal	3,862 (12,667)	SW
Nearest Meat Animal	2,317 (7,599)	WSW
Nearest Meat Animal	3,251 (10,663)	W
Nearest Meat Animal	3,830 (12,562)	WNW
Nearest Meat Animal	3,573 (11,719)	NW
Nearest Meat Animal	4,538 (14,884)	NNW
Nearest Milk Cow	N/A	N
Nearest Milk Cow	N/A	NNE
Nearest Milk Cow	N/A	NE
Nearest Milk Cow	N/A	ENE
Nearest Milk Cow	N/A	E
Nearest Milk Cow	N/A	ESE
Nearest Milk Cow	N/A	SE
Nearest Milk Cow	5,102 (16,734)	SSE
Nearest Milk Cow	N/A	S
Nearest Milk Cow	N/A	SSW
Nearest Milk Cow	N/A	SW
Nearest Milk Cow	N/A	WSW
Nearest Milk Cow	6,470 (21,221)	W
Nearest Milk Cow	3,830 (12,562)	WNW
Nearest Milk Cow	4,249 (13,936)	NW
Nearest Milk Cow	0 N/A	NNW

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Table 2.7-52—{50th Percentile χ/Q Values}

Time Period	0-2 hrs	2-8 hrs	8-24 hrs	1-4 days	4-30 days	annual average
0.43 mile	8.332E-05					
EAB (0.83 mile)	3.718E-05					
1.5 miles	1.524E-05	1.110E-05	8.364E-06	5.419E-06	2.906E-06	1.356E-06
LPZ (2.6 miles)	8.902E-06	6.297E-06	4.623E-06	2.878E-06	1.458E-06	6.342E-07

The EAB analytical distance for the atmospheric dispersion factor corresponds to 0.75 mile and is bounding for the Callaway site EAB distance of 0.83 miles. Similarly, the LPZ analytical distance corresponds to 2.5 miles and is bounding for the site LPZ distance of 2.6 miles

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ER Section 2.7

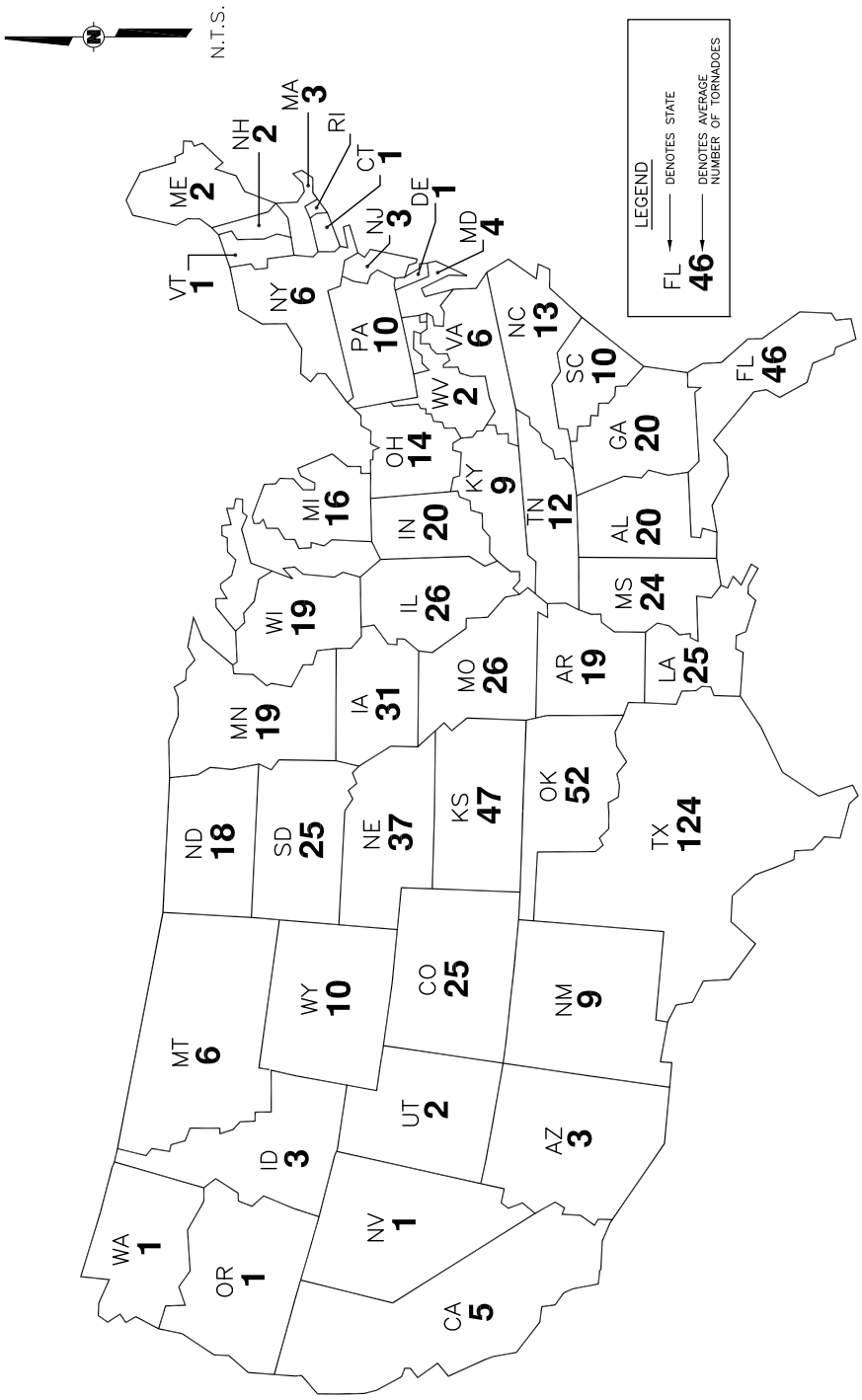

Figure 2.7-1—Annual Average Number of Tornadoes 1950-1995

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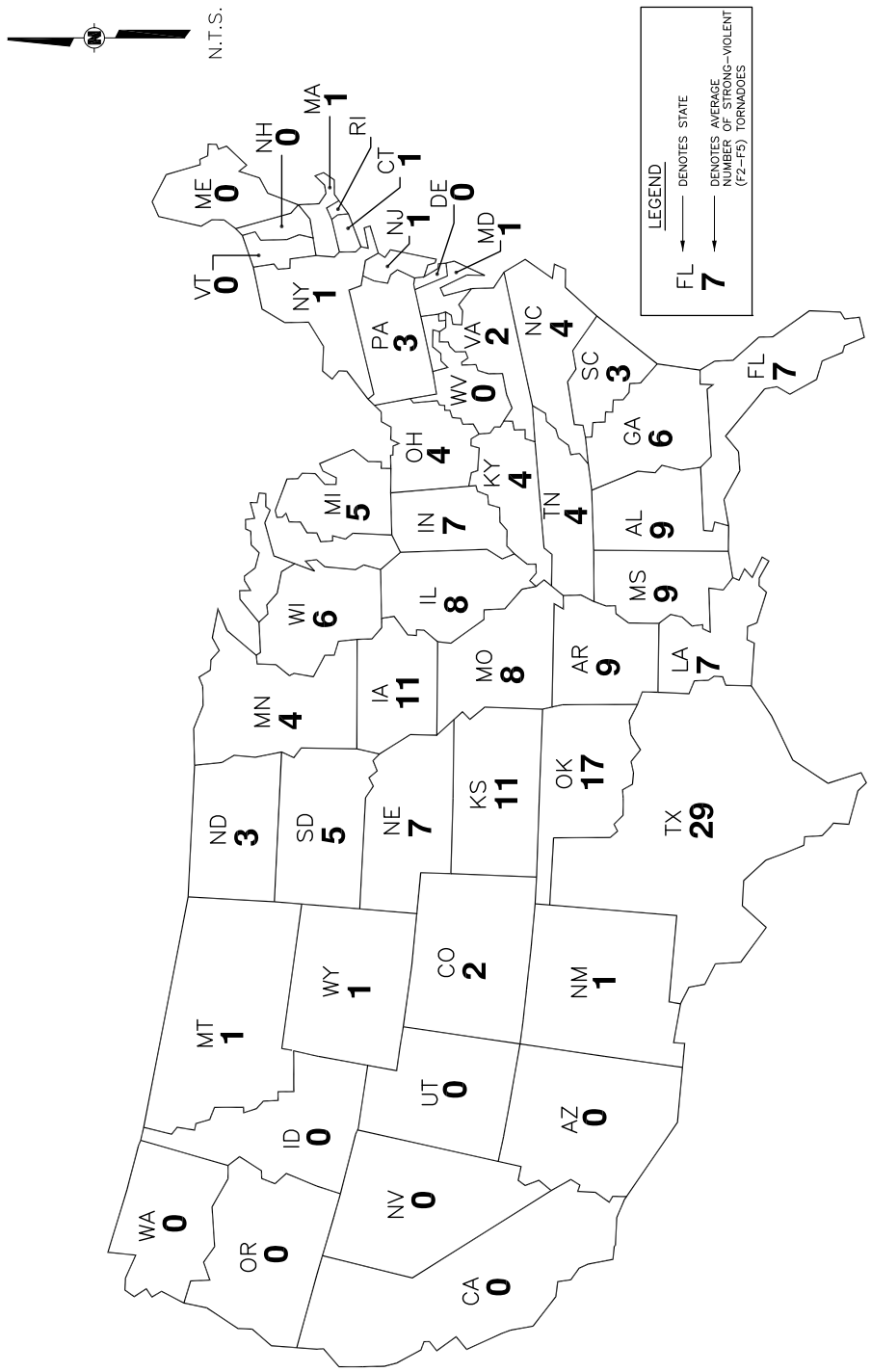

Figure 2.7-2—Average Number of Strong-Violent (F2-F5) Tornadoes, 1950-1995

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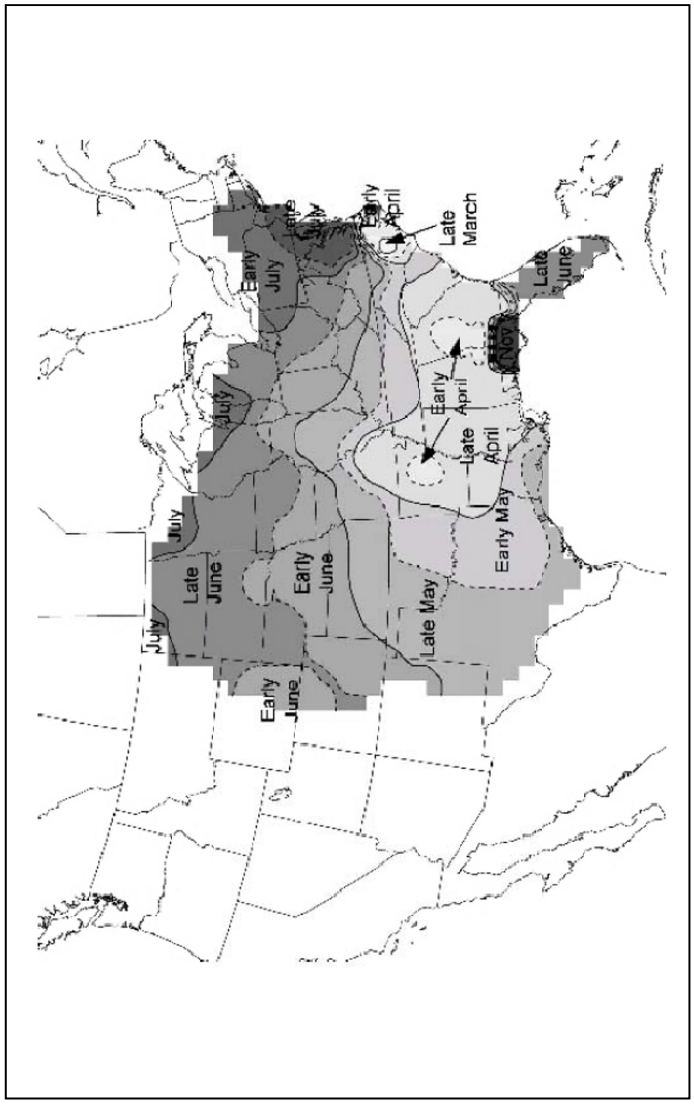
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Early April
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Early May

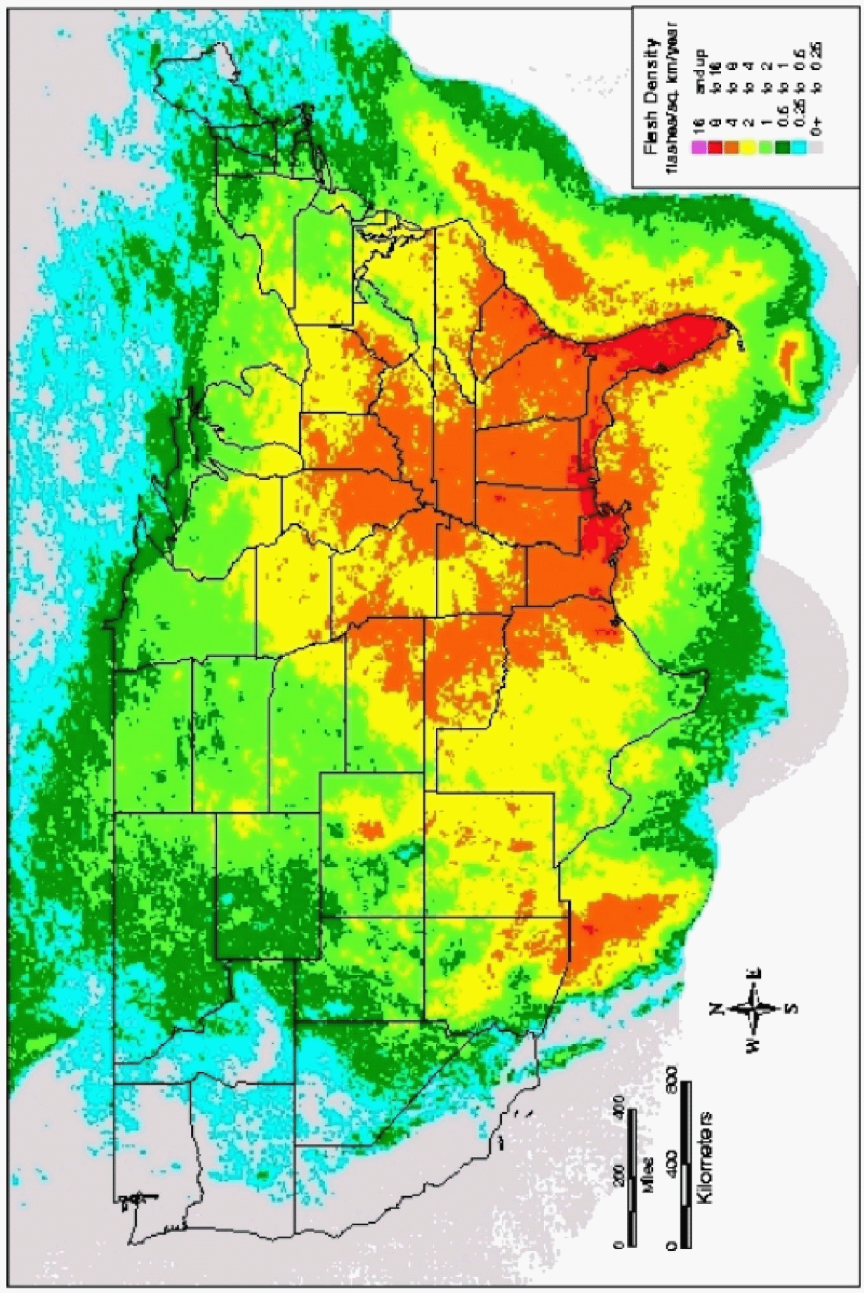

Figure 2.7-4—Five-Year Lightning Flash Density Map

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Figure 2.7-5—{Callaway Site Precipitation Wind Rose January 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

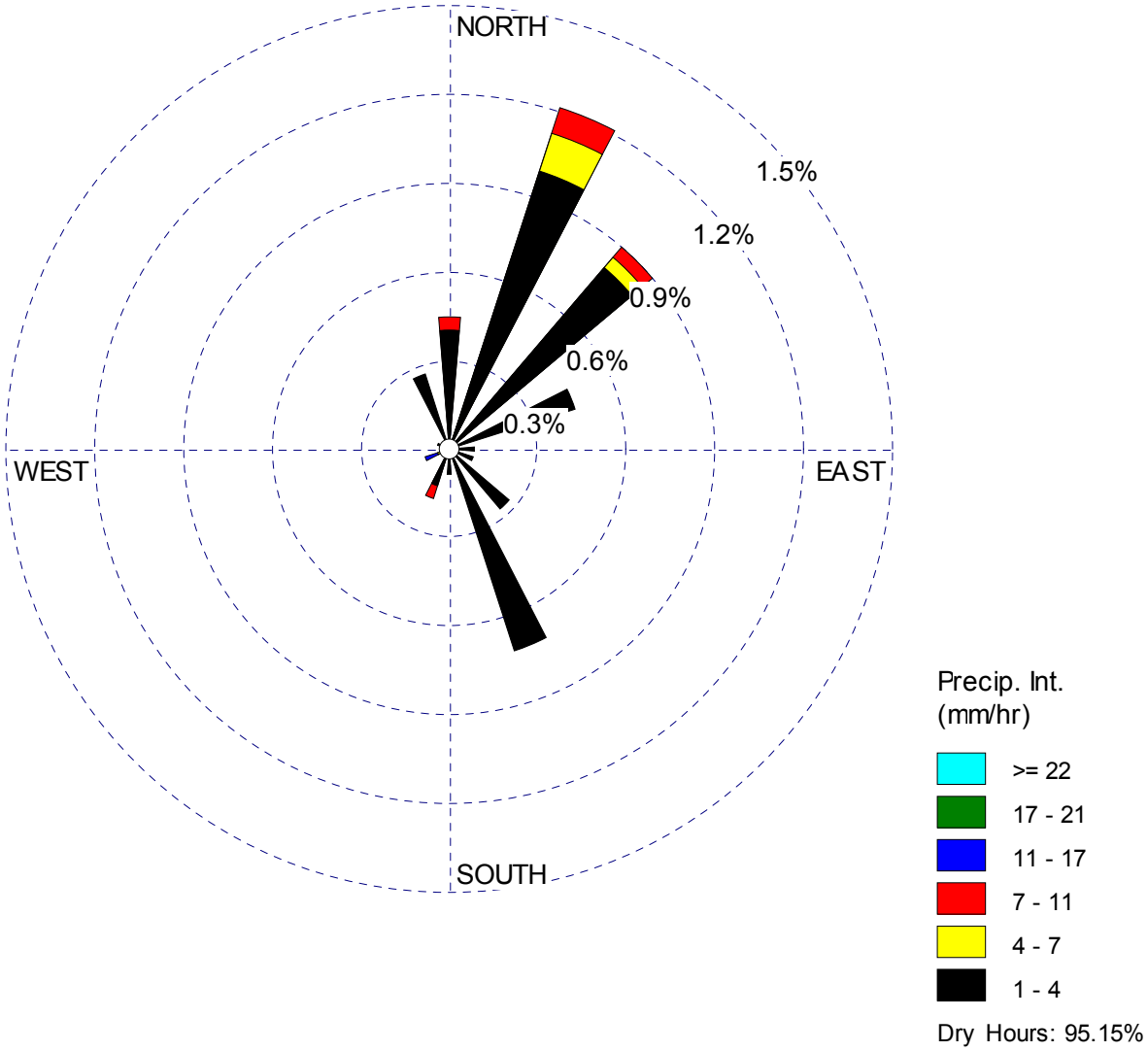

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Figure 2.7-6—{Callaway Site Precipitation Wind Rose February 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

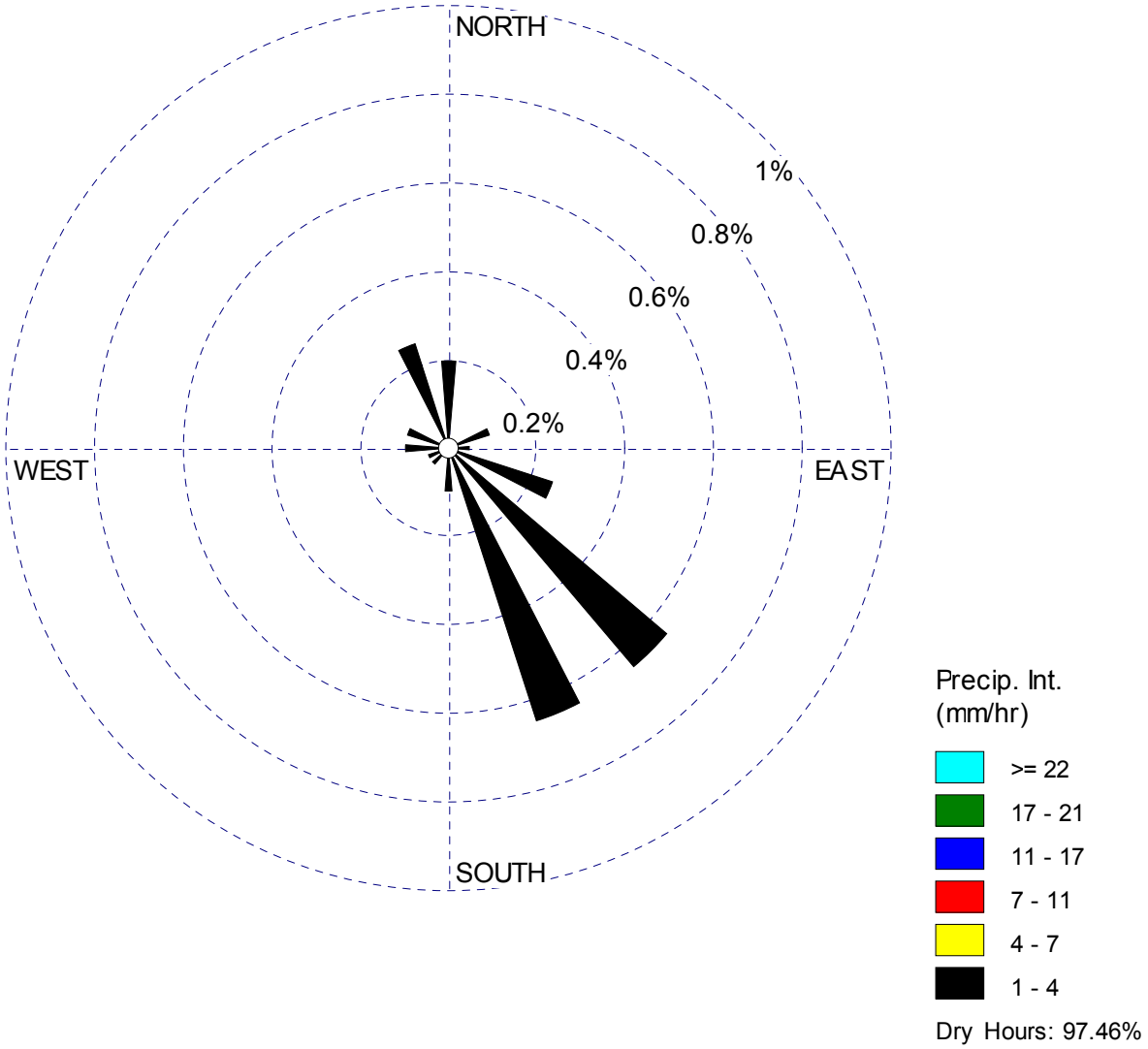

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Figure 2.7-7—{Callaway Site Precipitation Wind Rose March 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

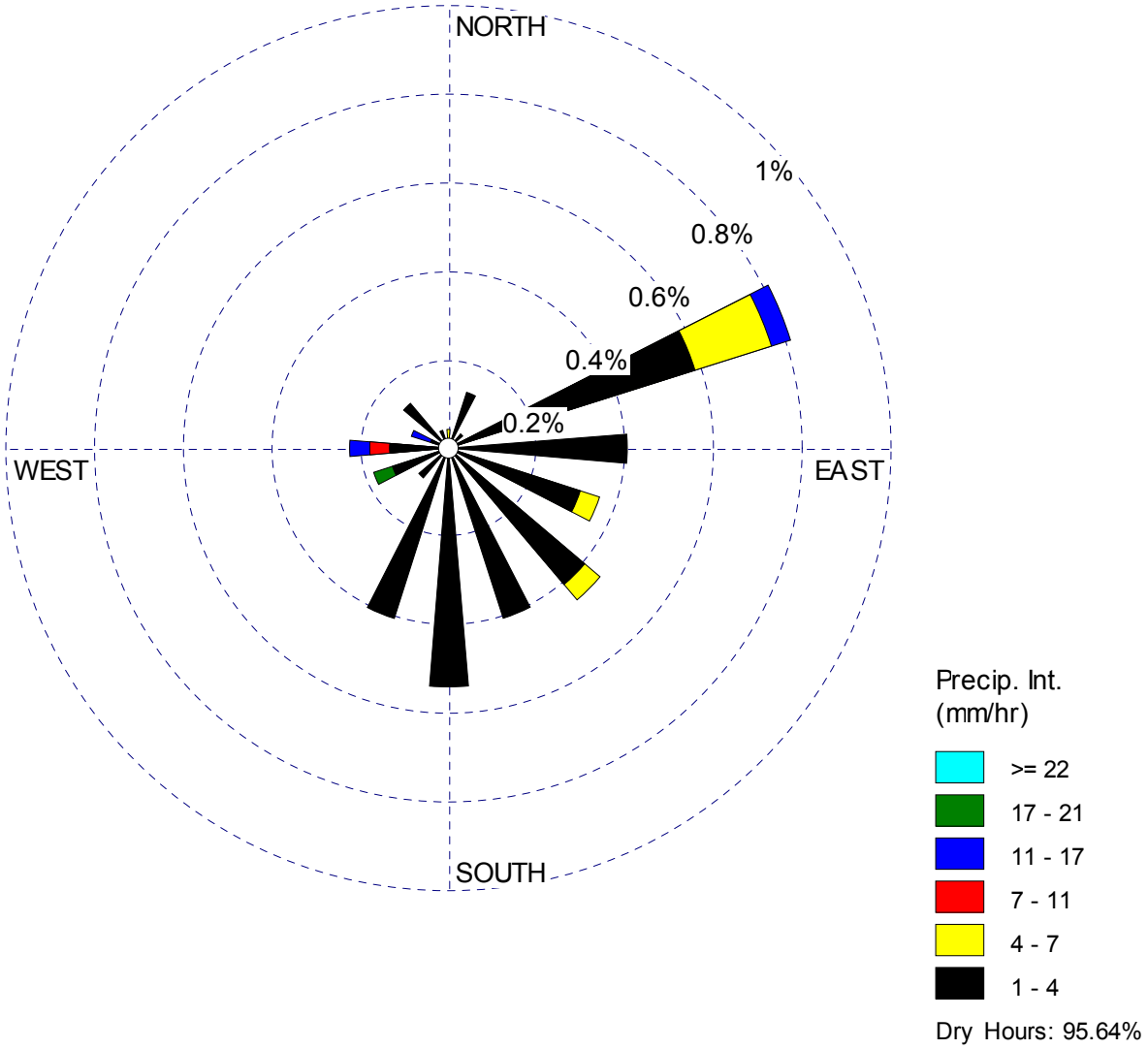

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Figure 2.7-8—{Callaway Site Precipitation Wind Rose April 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

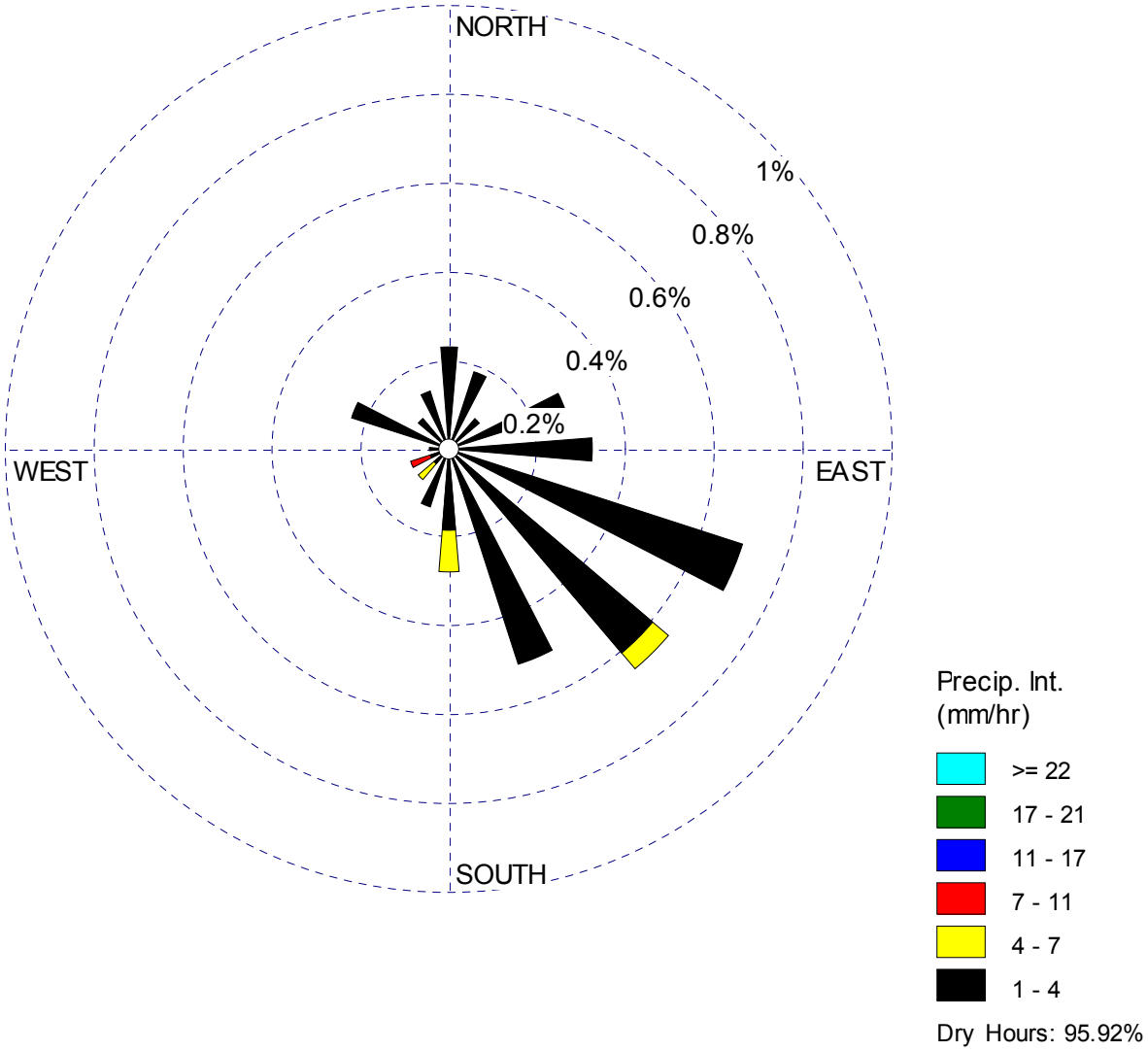

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Figure 2.7-9—{Callaway Site Precipitation Wind Rose May 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

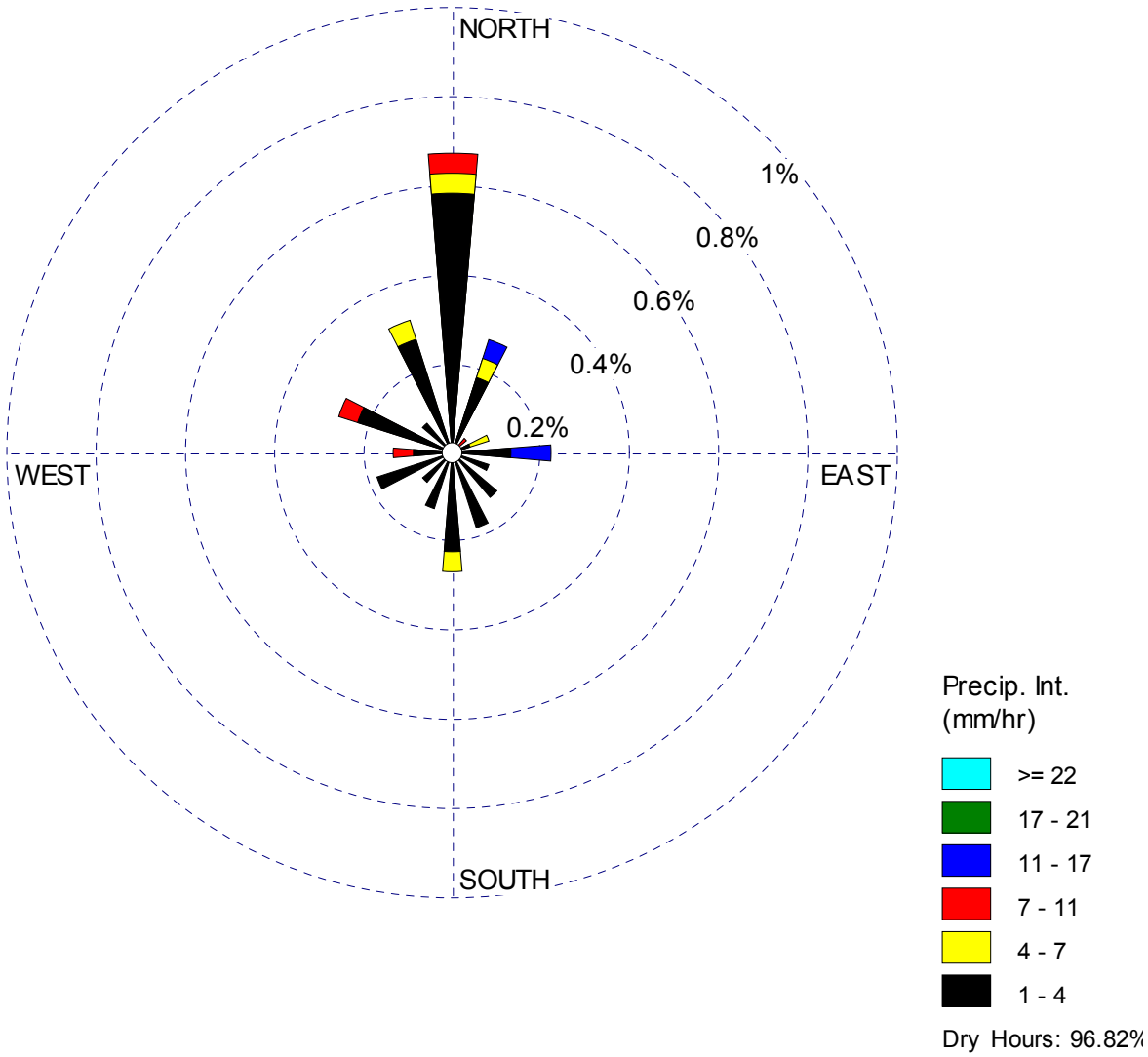

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Figure 2.7-10—{Callaway Site Precipitation Wind Rose June 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

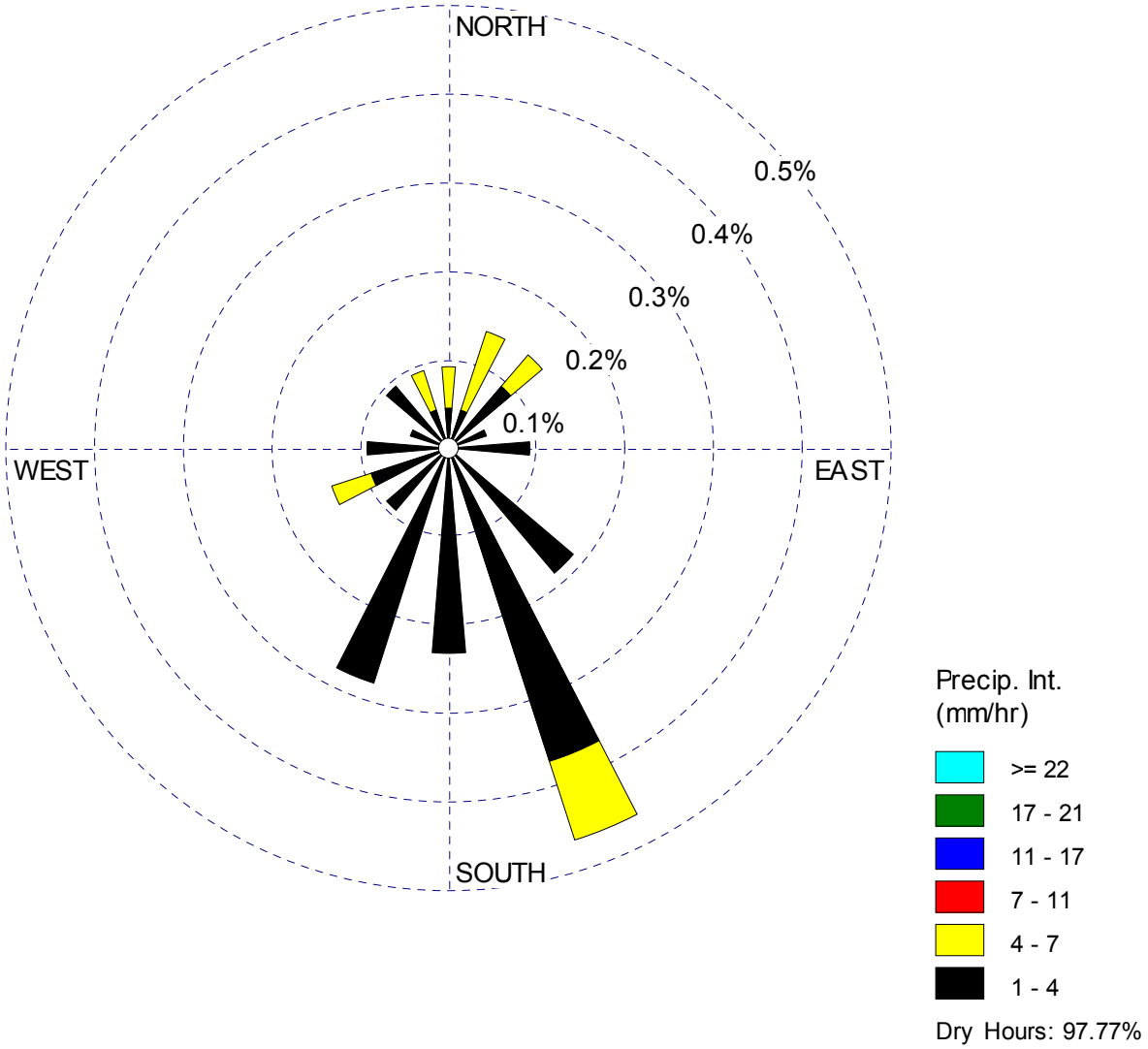

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Figure 2.7-11—{Callaway Site Precipitation Wind Rose July 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

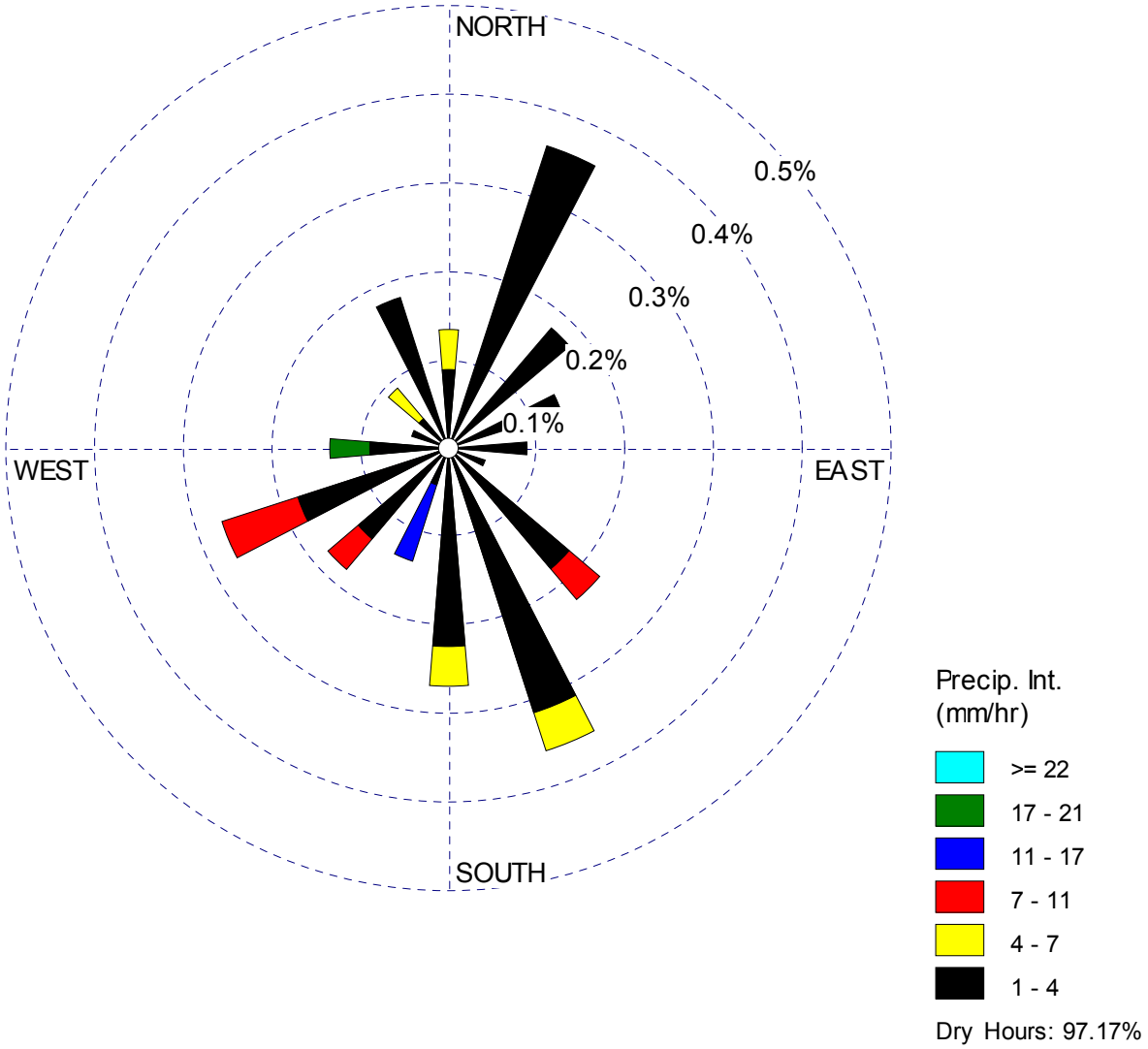

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Figure 2.7-12—{Callaway Site Precipitation Wind Rose August 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

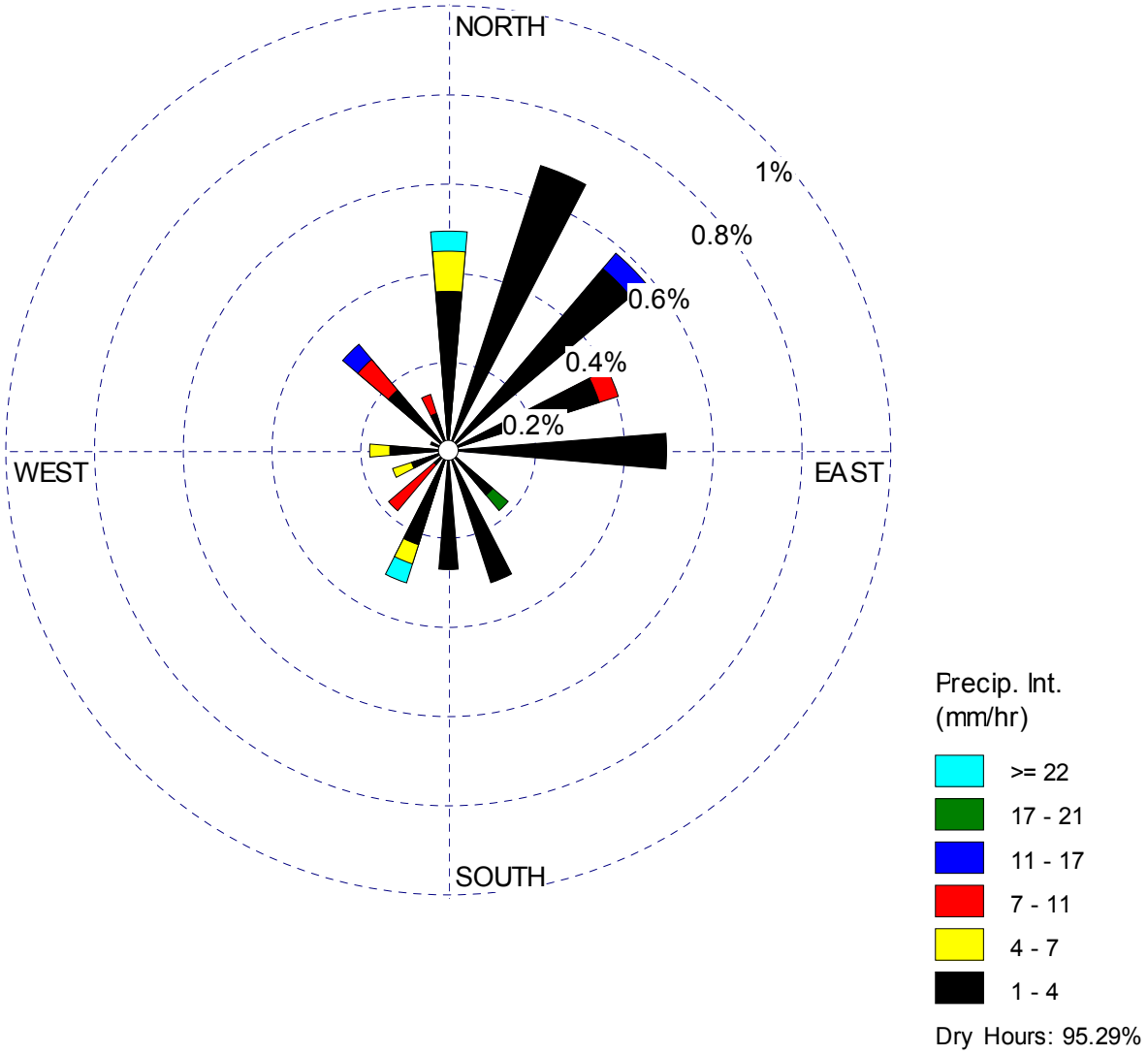

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Figure 2.7-13—{Callaway Site Precipitation Wind Rose September 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

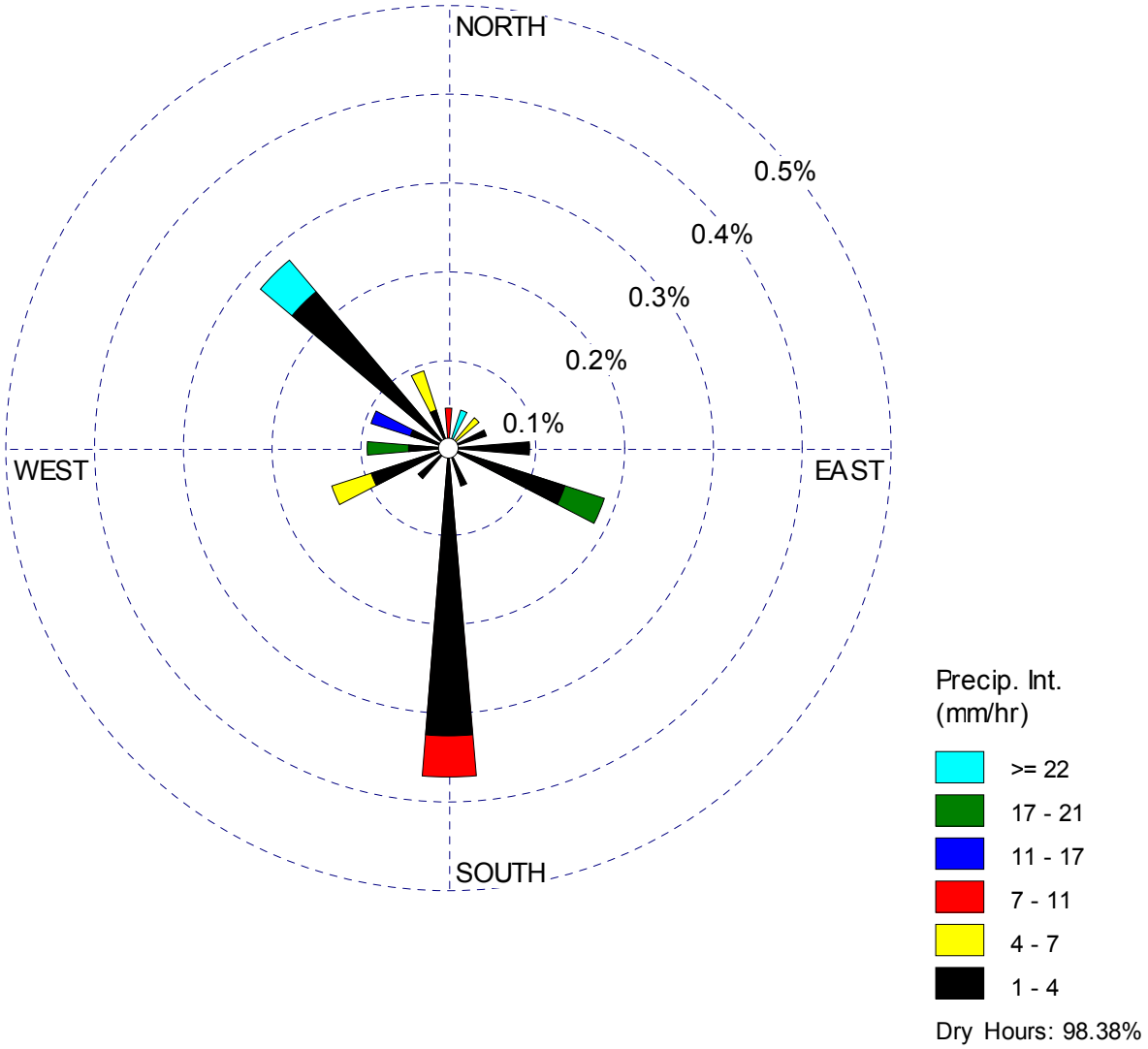

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Figure 2.7-14—{Callaway Site Precipitation Wind Rose October 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

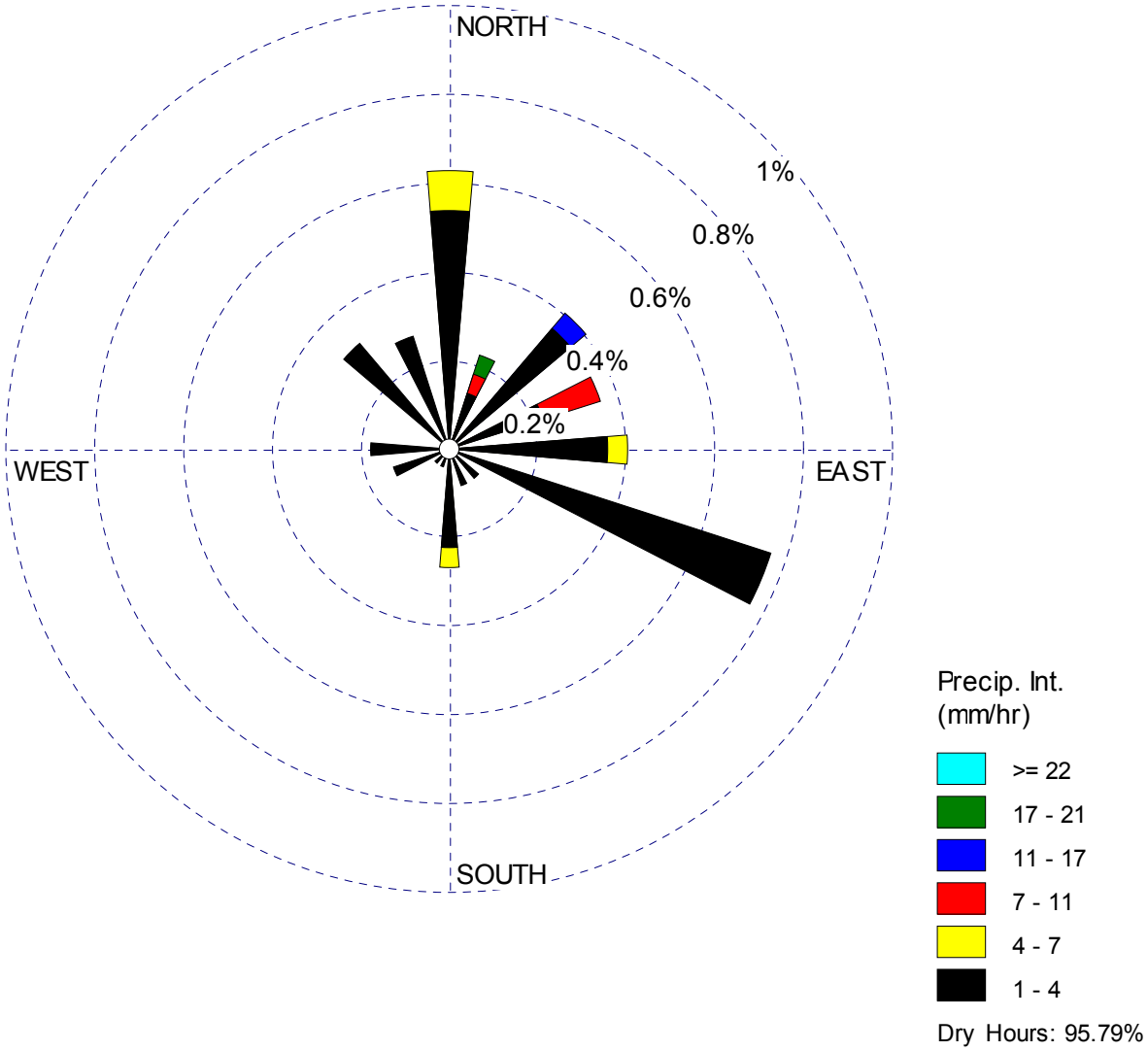

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Figure 2.7-15—{Callaway Site Precipitation Wind Rose November 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

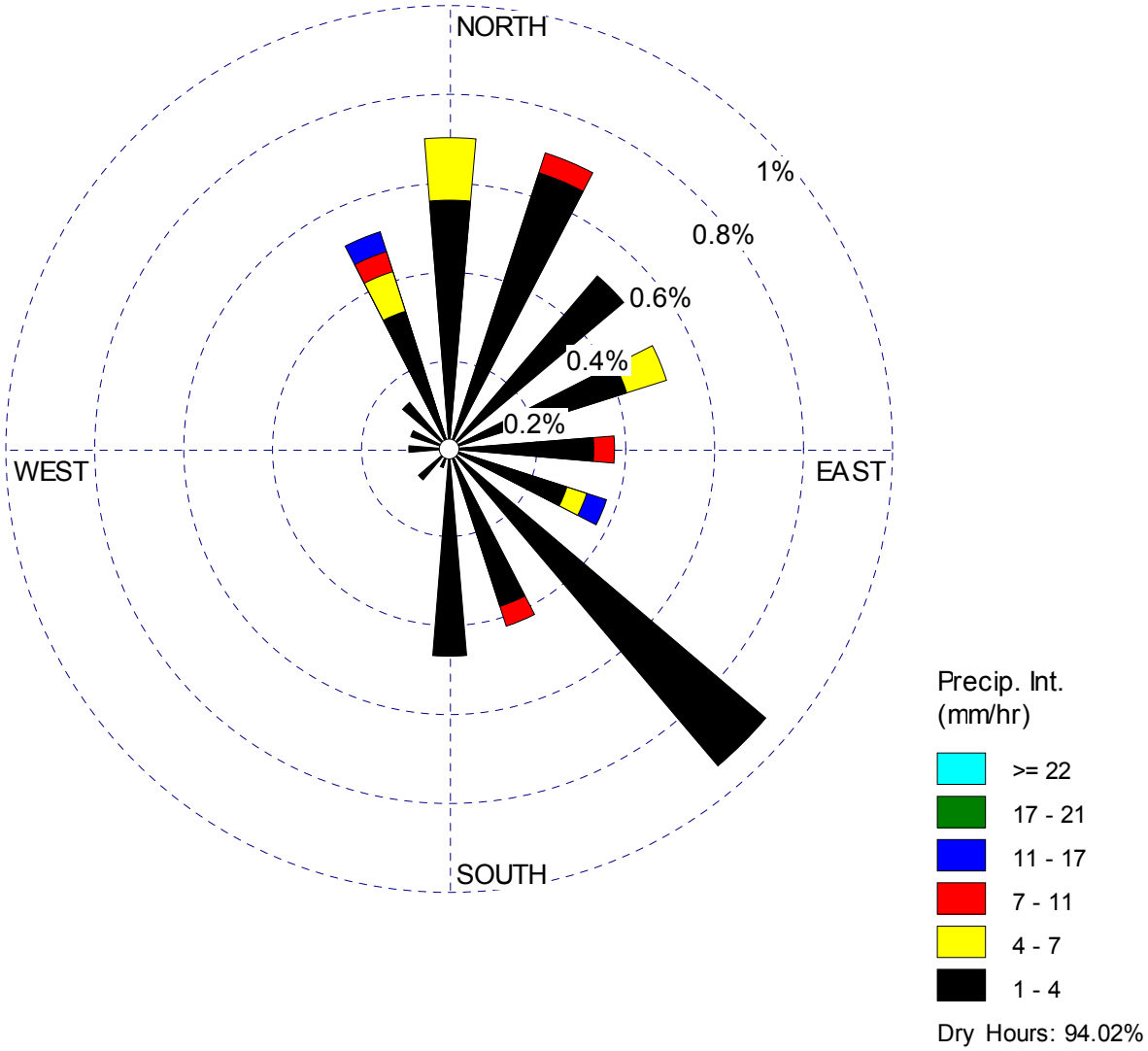

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Figure 2.7-16—{Callaway Site Precipitation Wind Rose December 2004-2006, 10 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

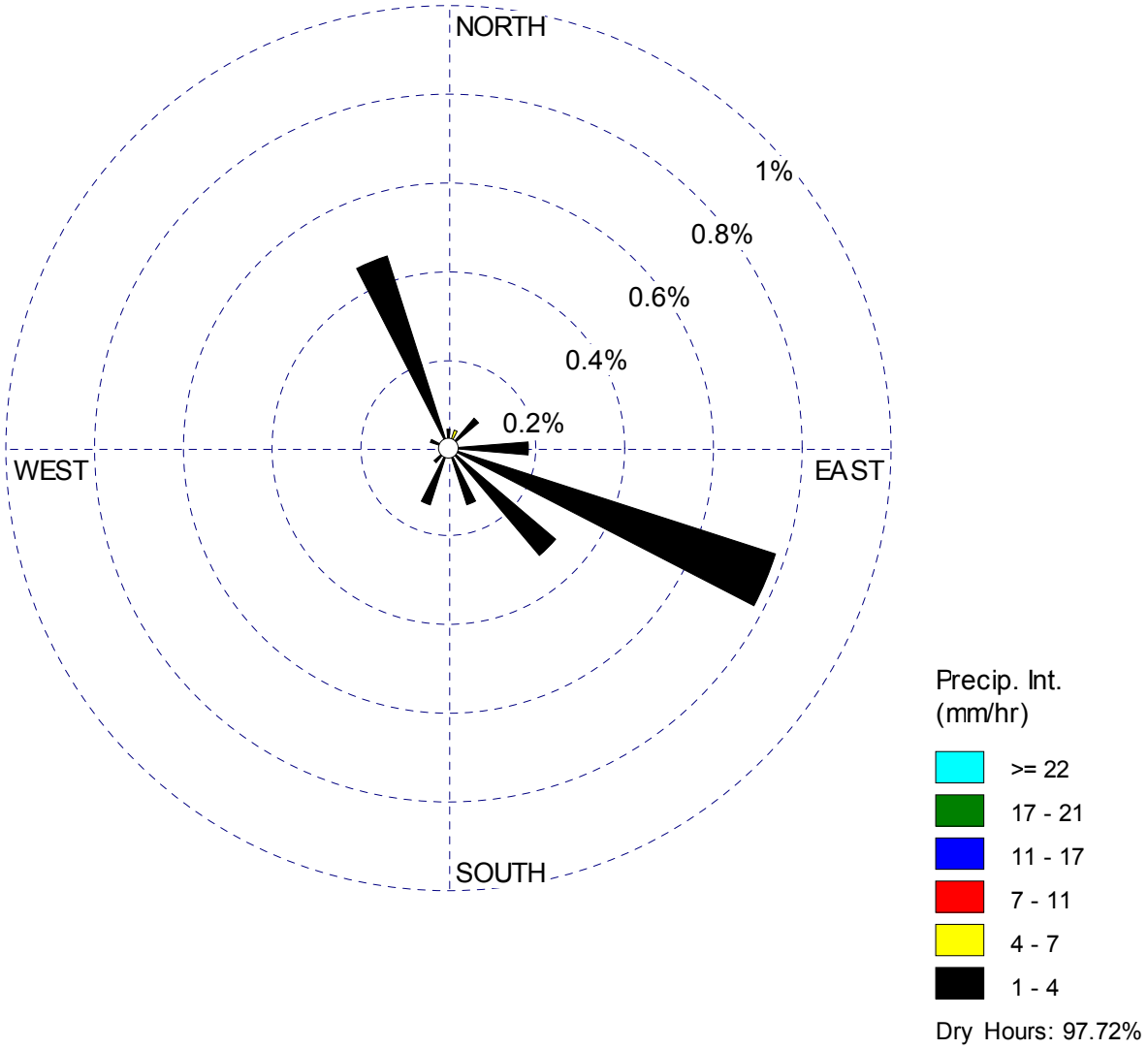

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Figure 2.7-17—{Callaway Site Precipitation Wind Rose January 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

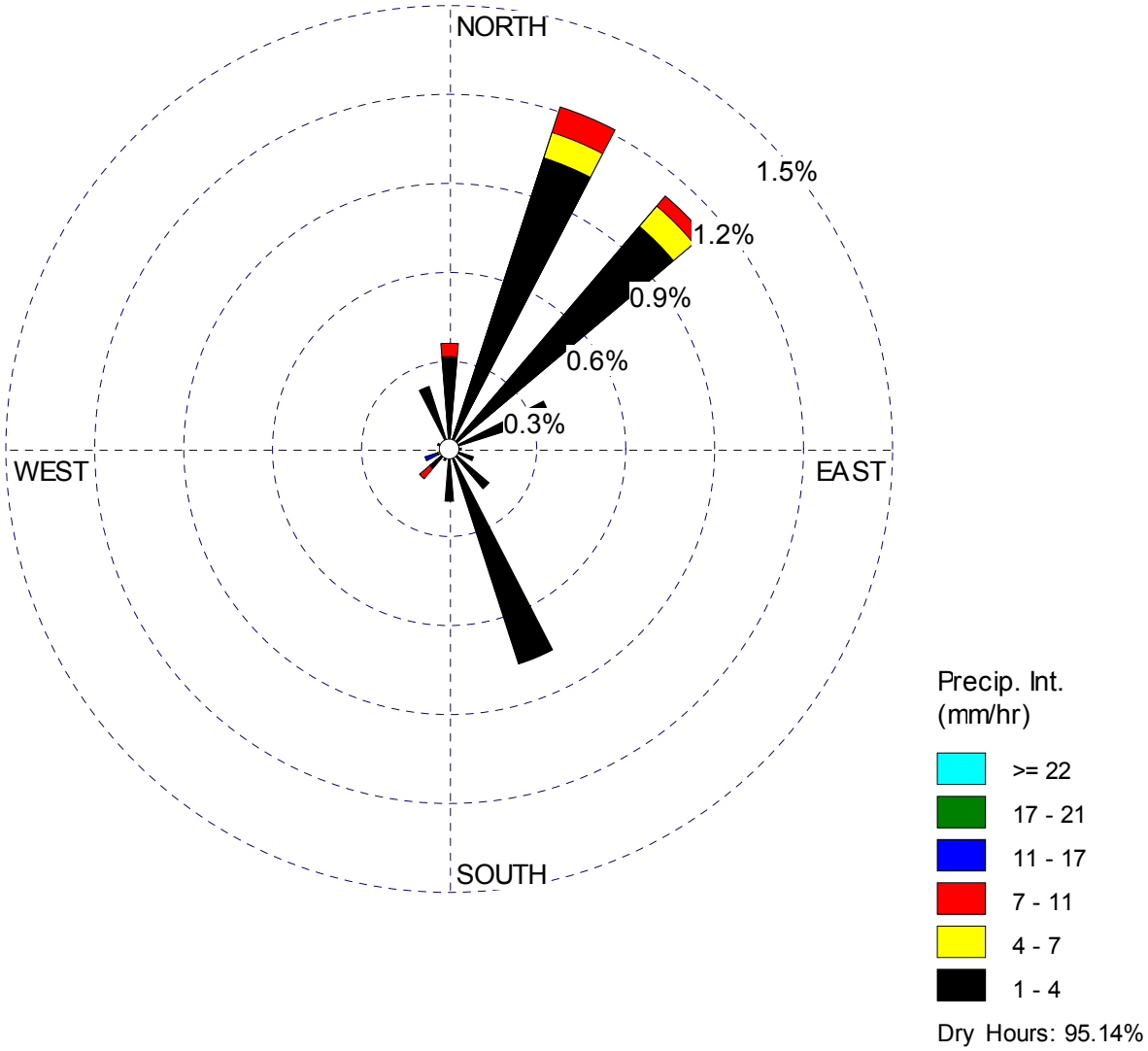

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Figure 2.7-18—{Callaway Site Precipitation Wind Rose February 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

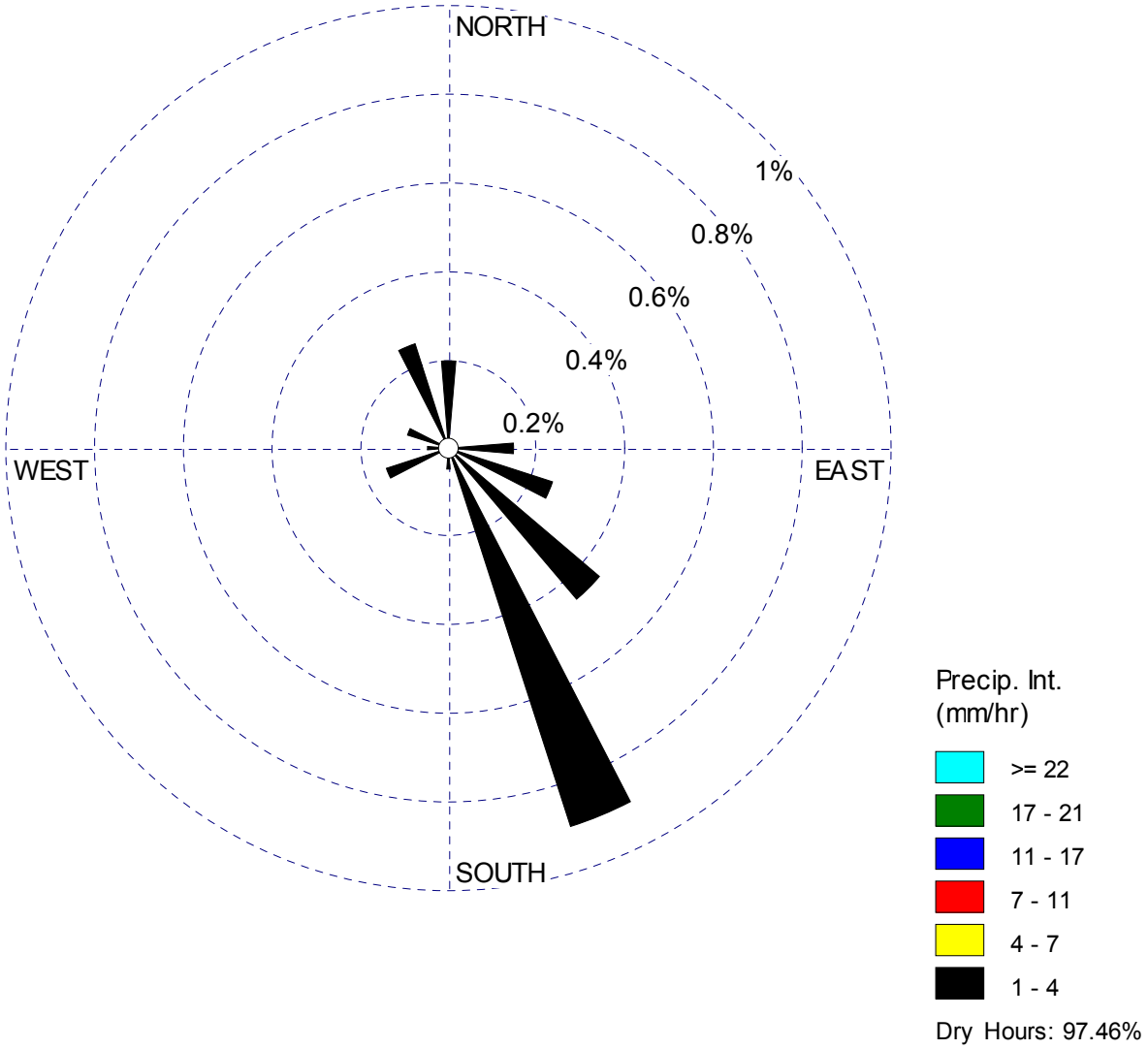

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Figure 2.7-19—{Callaway Site Precipitation Wind Rose March 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

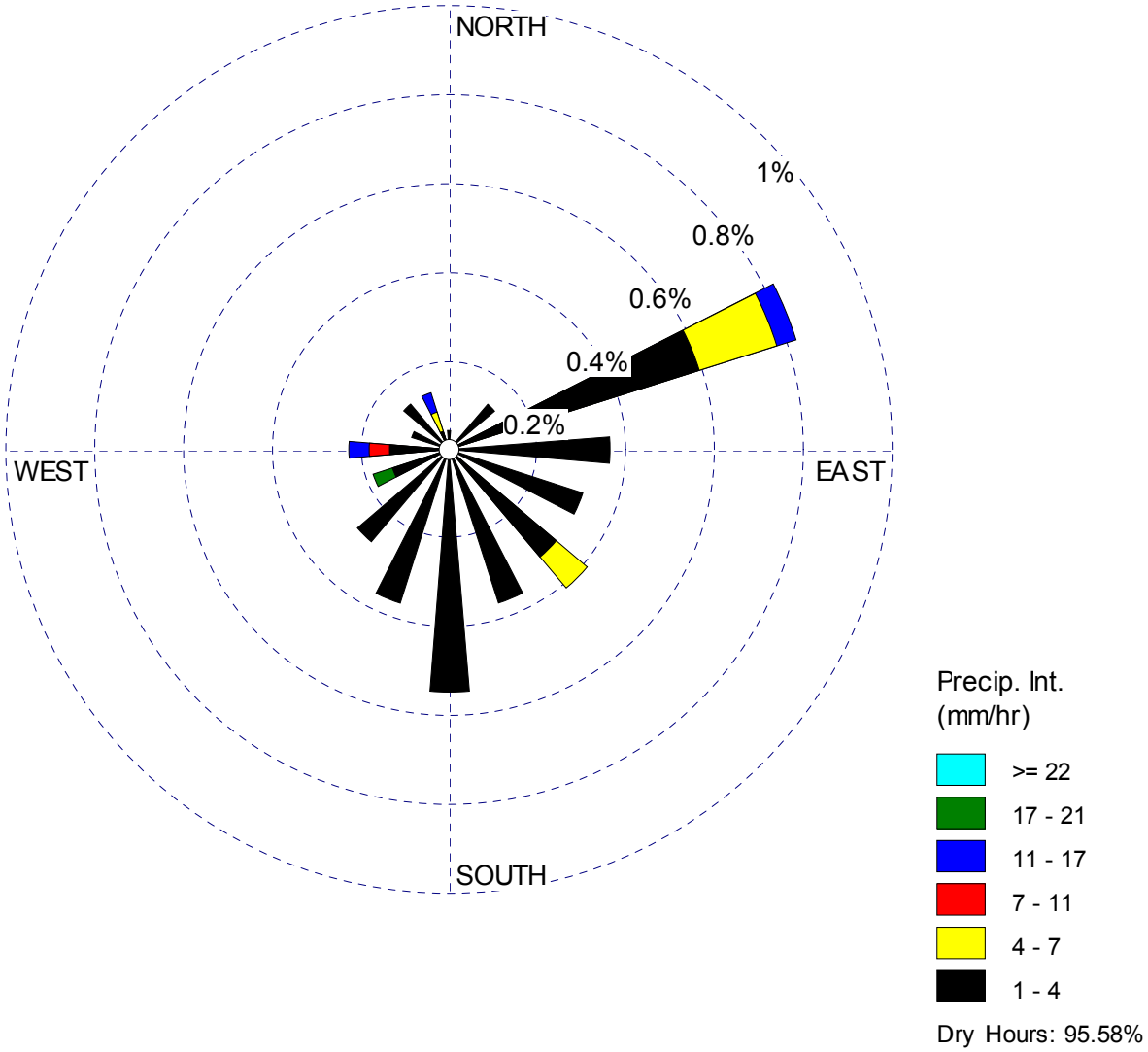

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Figure 2.7-20—{Callaway Site Precipitation Wind Rose April 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

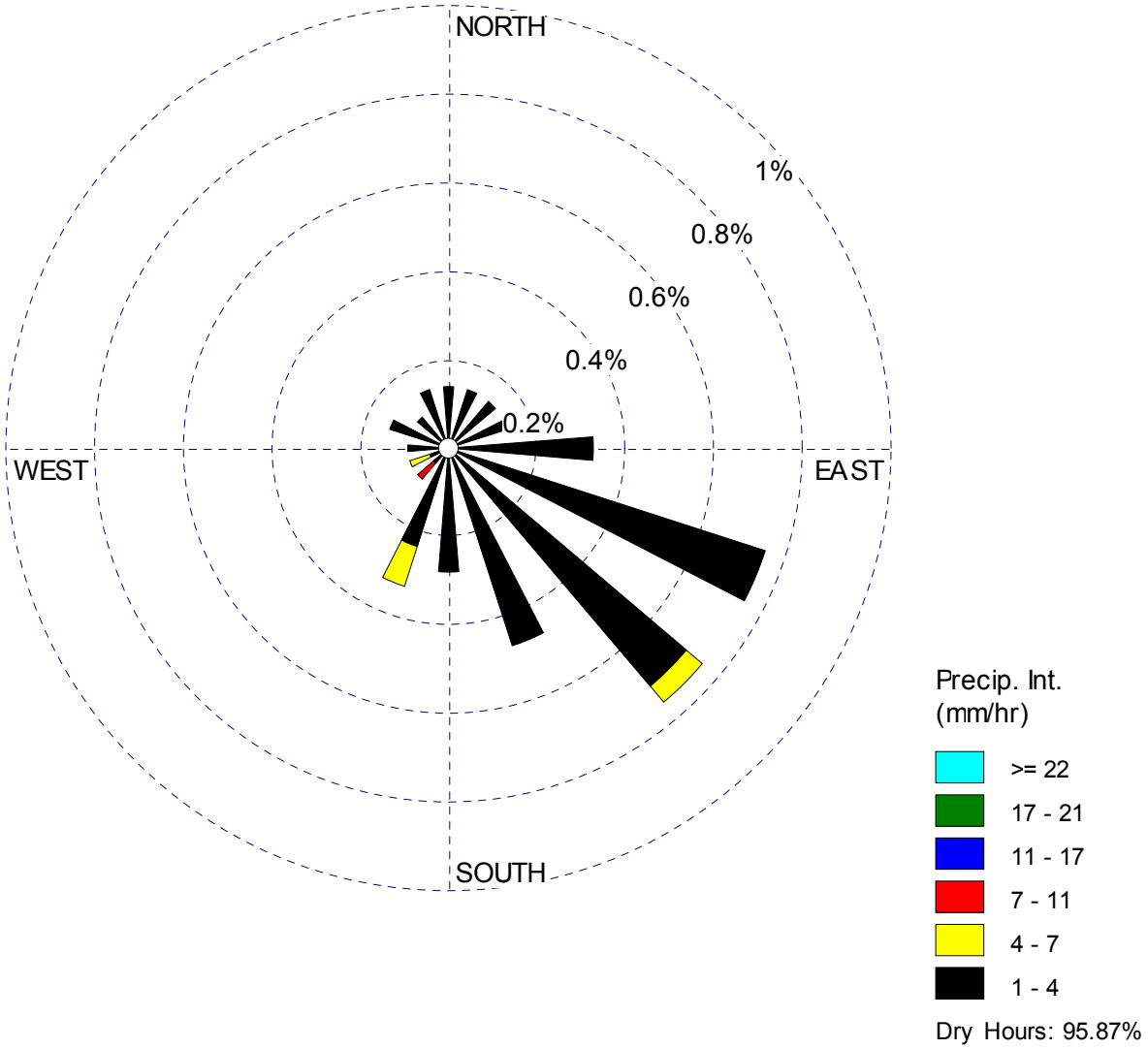

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Figure 2.7-21—{Callaway Site Precipitation Wind Rose May 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

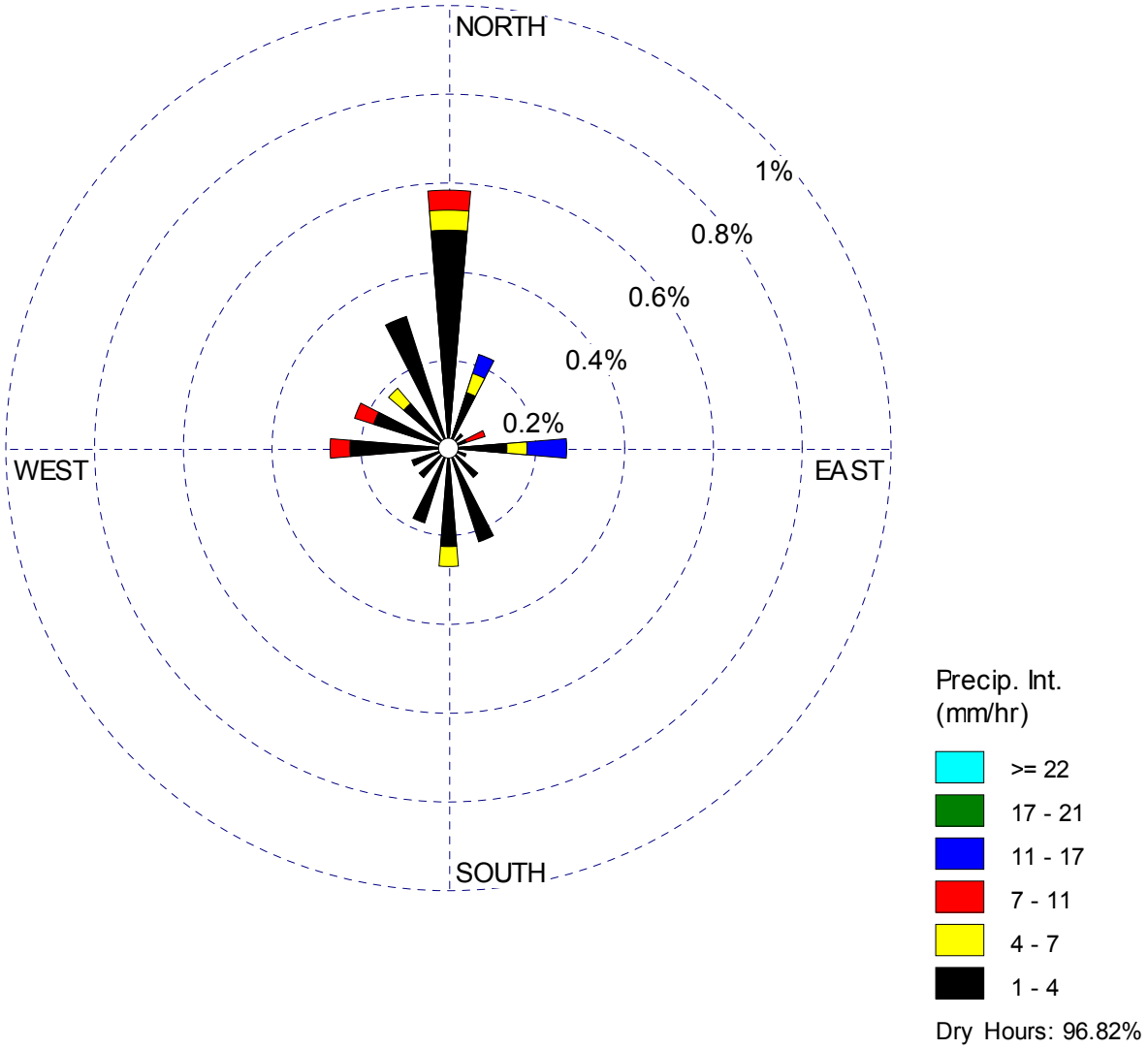

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Figure 2.7-22—{Callaway Site Precipitation Wind Rose June 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

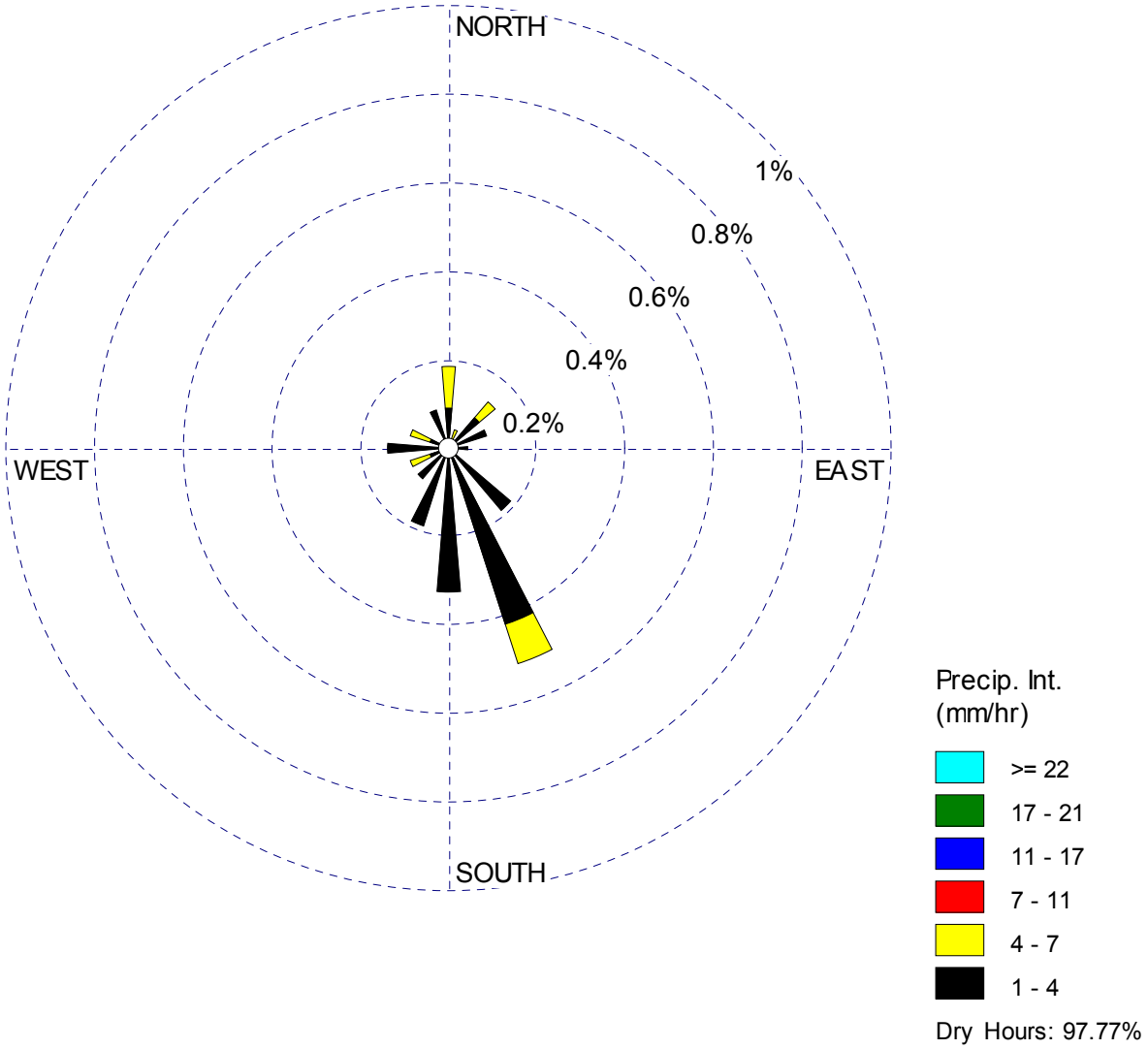

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Figure 2.7-23—{Callaway Site Precipitation Wind Rose July 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

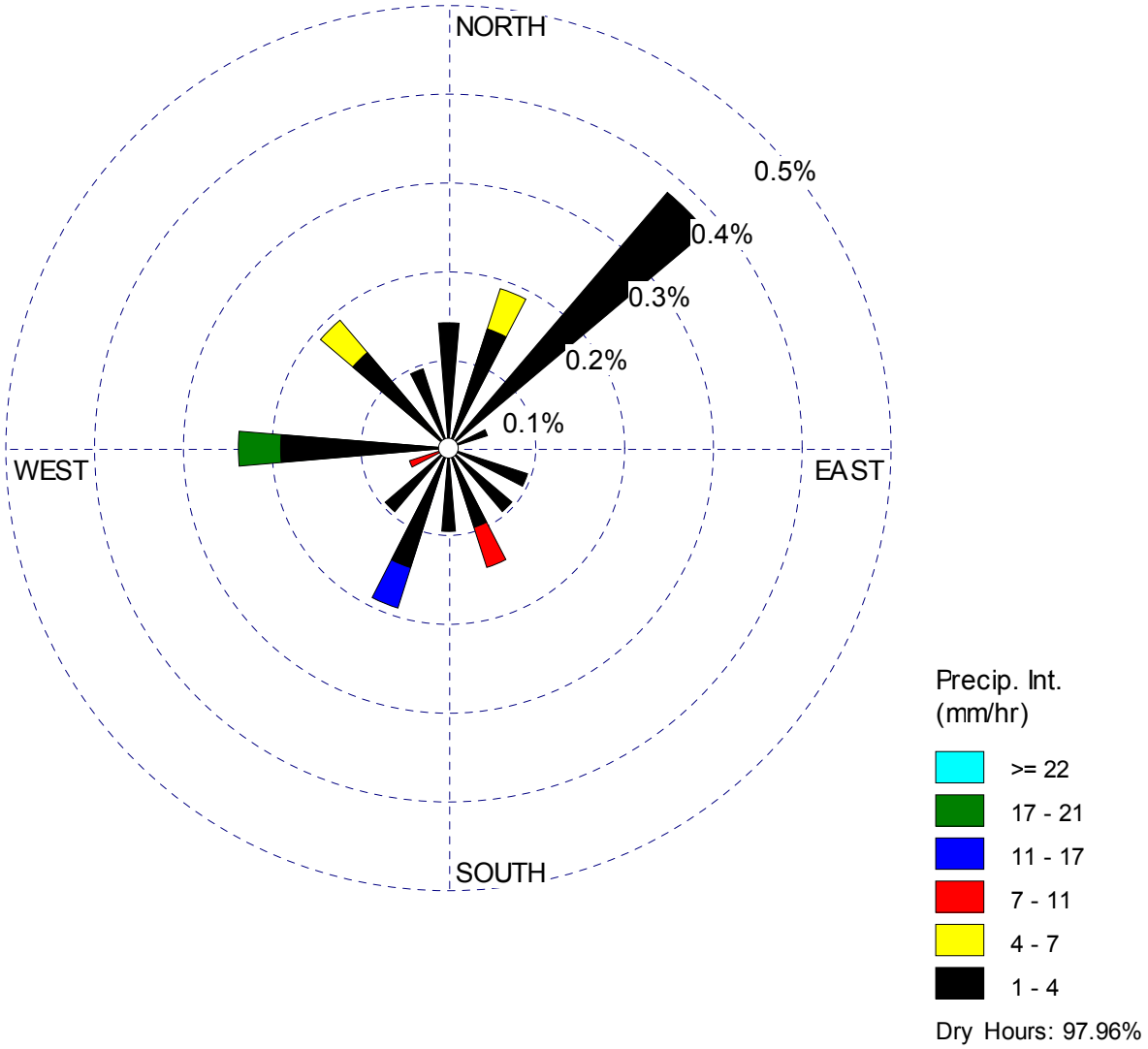

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Figure 2.7-24—{Callaway Site Precipitation Wind Rose August 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

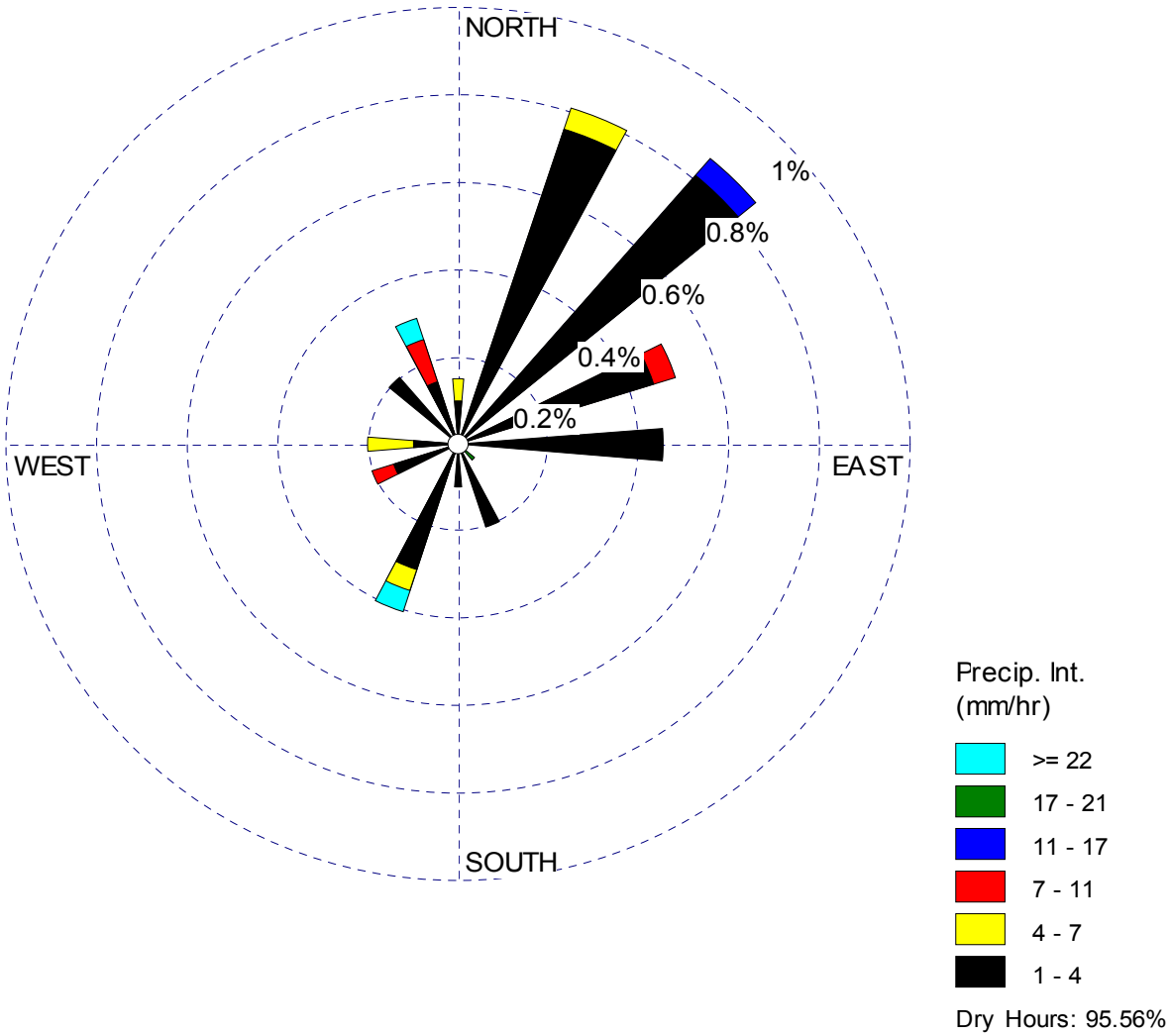

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Figure 2.7-25—{Callaway Site Precipitation Wind Rose September 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

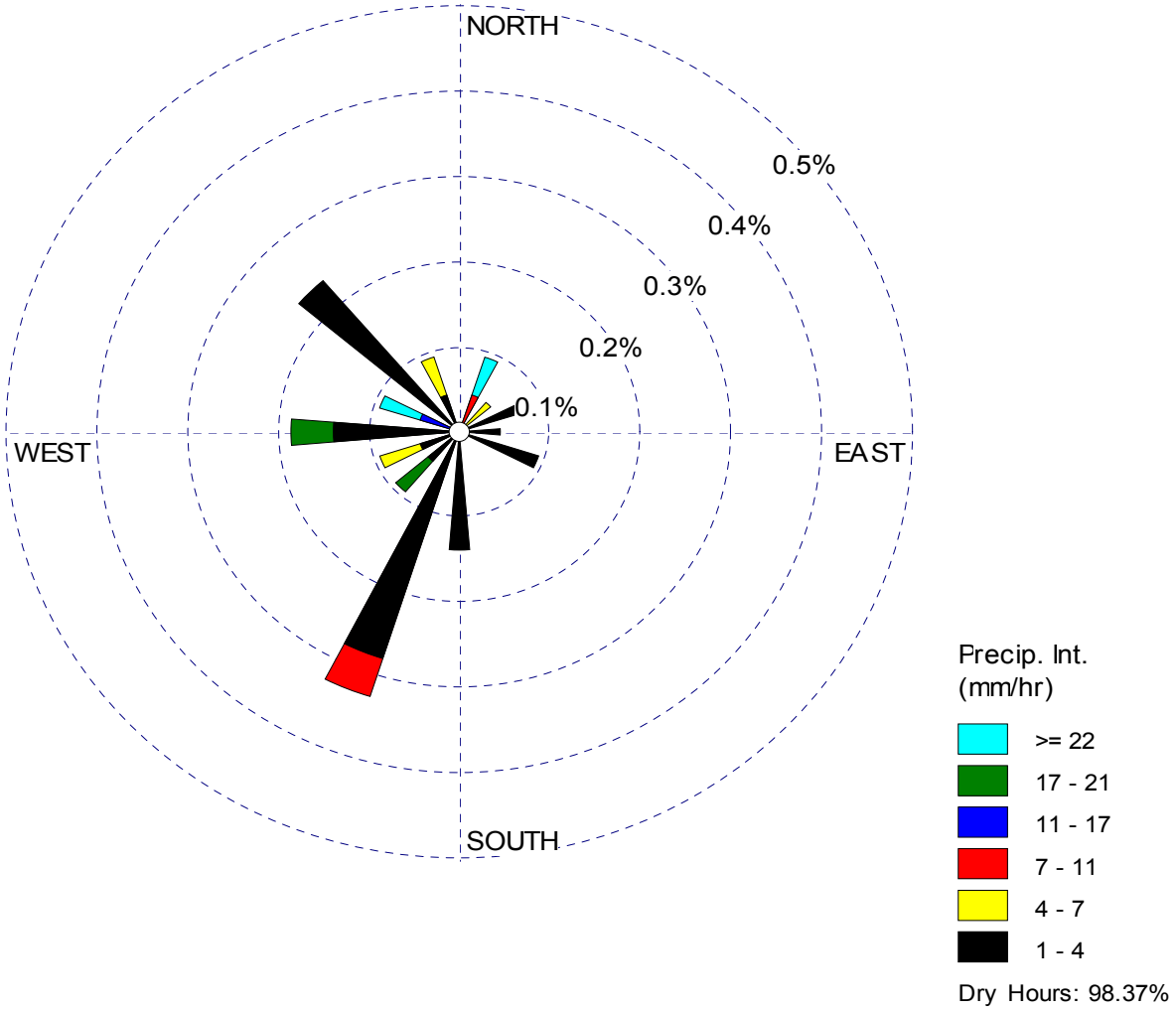

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Figure 2.7-26—{Callaway Site Precipitation Wind Rose October 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

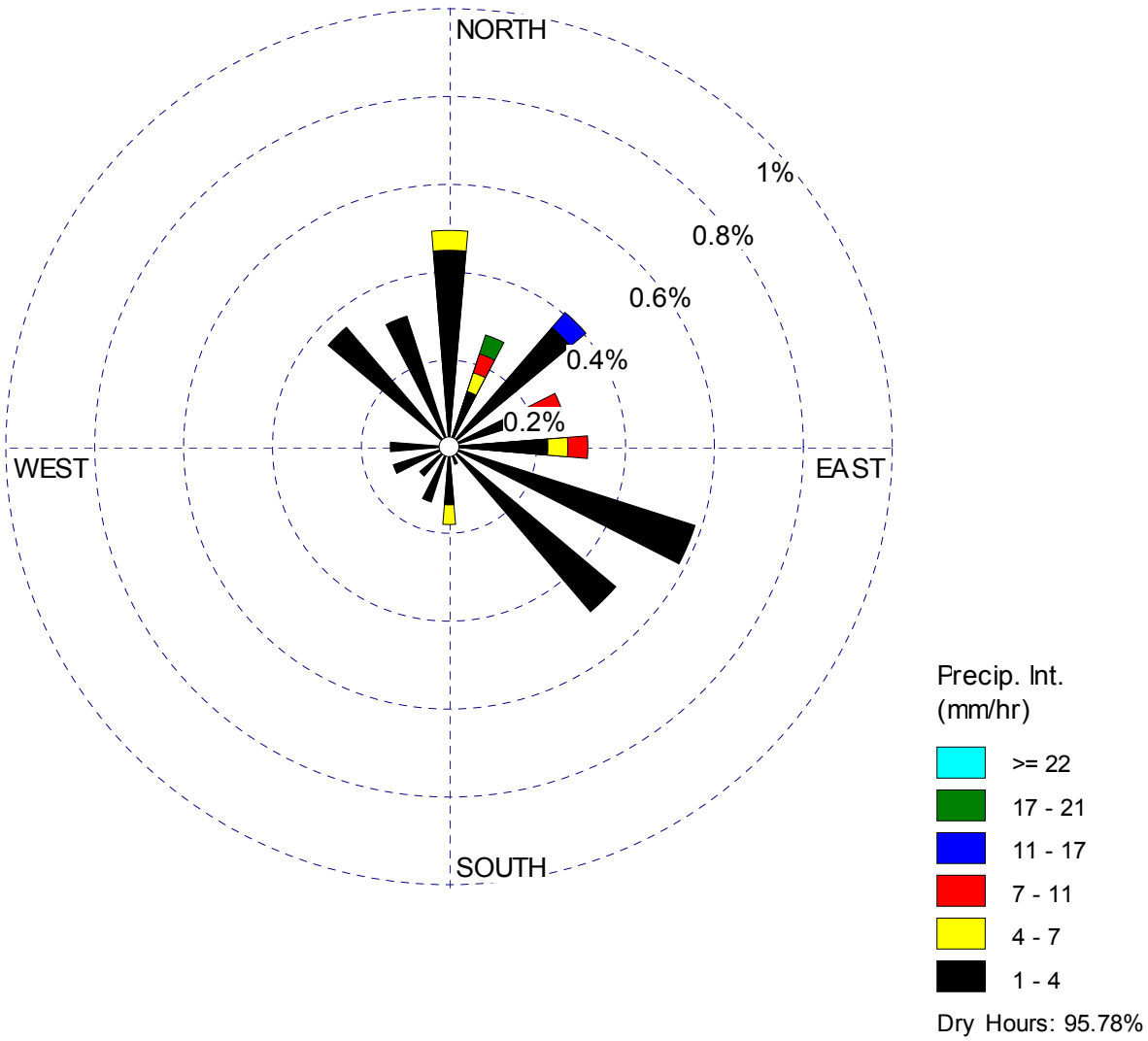

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Figure 2.7-27—{Callaway Site Precipitation Wind Rose November 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

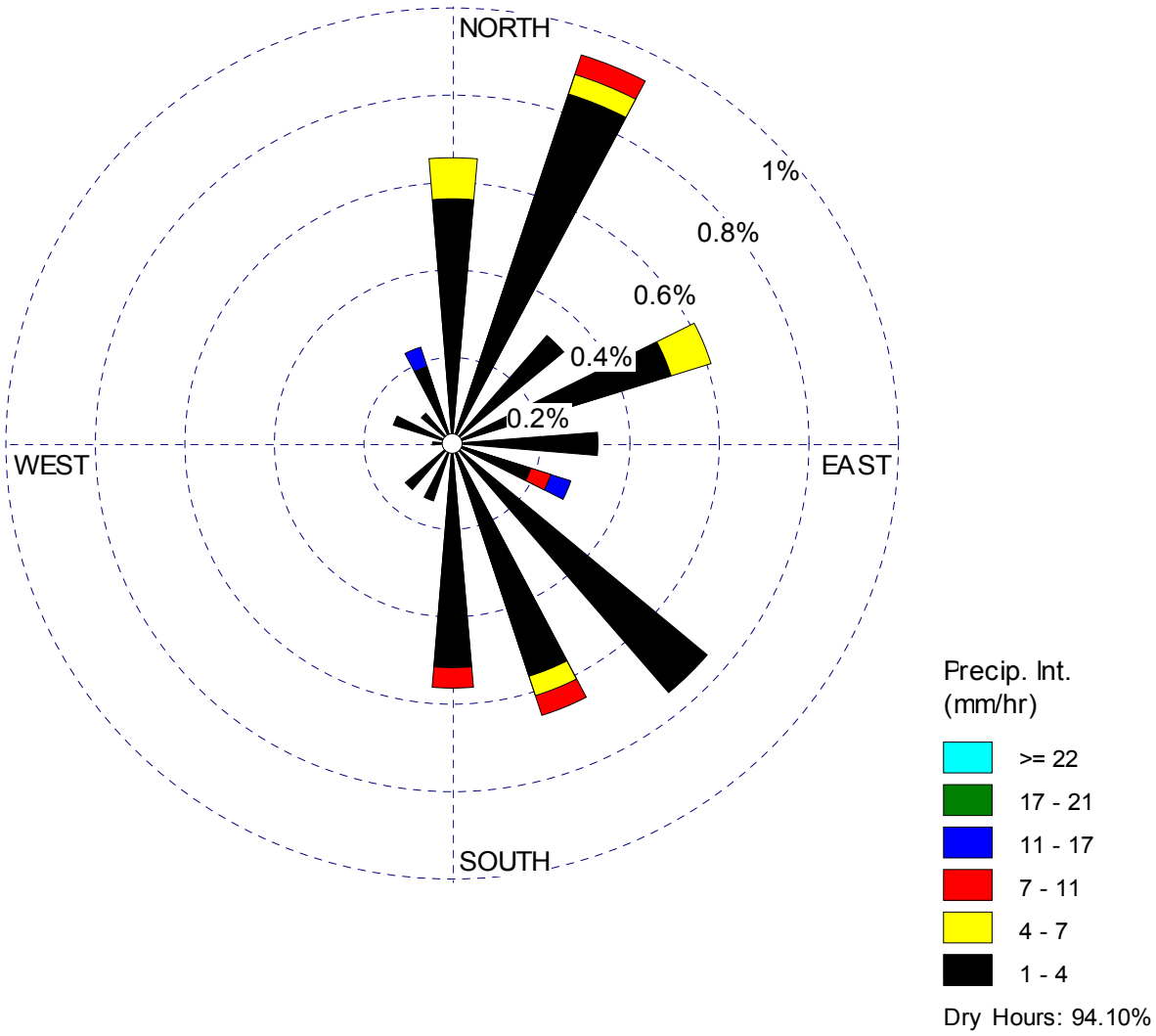

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Figure 2.7-28—{Callaway Site Precipitation Wind Rose December 2004-2006, 60 m, All Precipitation Hours}

(Indicates the direction from which the wind is blowing)

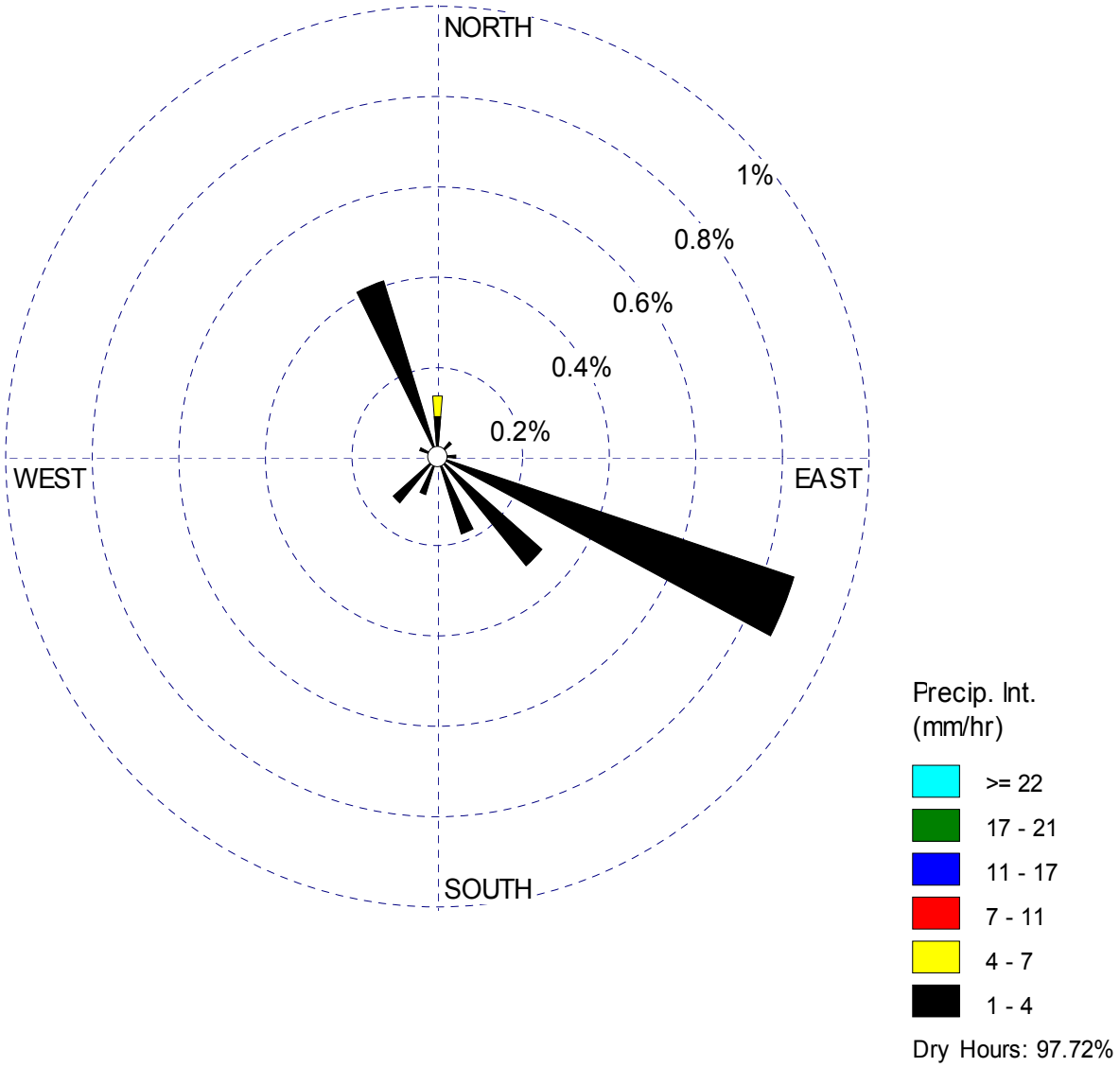

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Figure 2.7-29—{Monthly Average Mixing Height Values (Springfield, MO)}

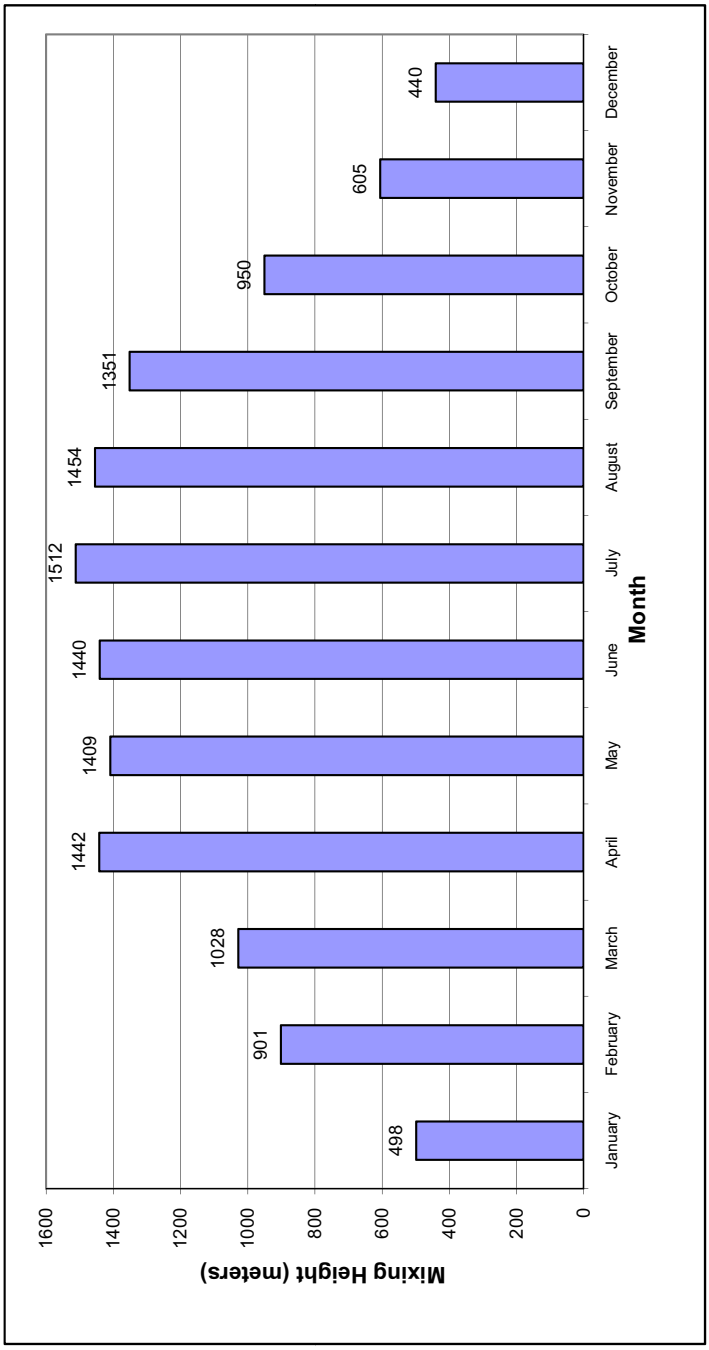

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Figure 2.7-30—{Callaway Site Wind Rose – 2004-2006, 10 m}

(Indicates the direction from which the wind is blowing)

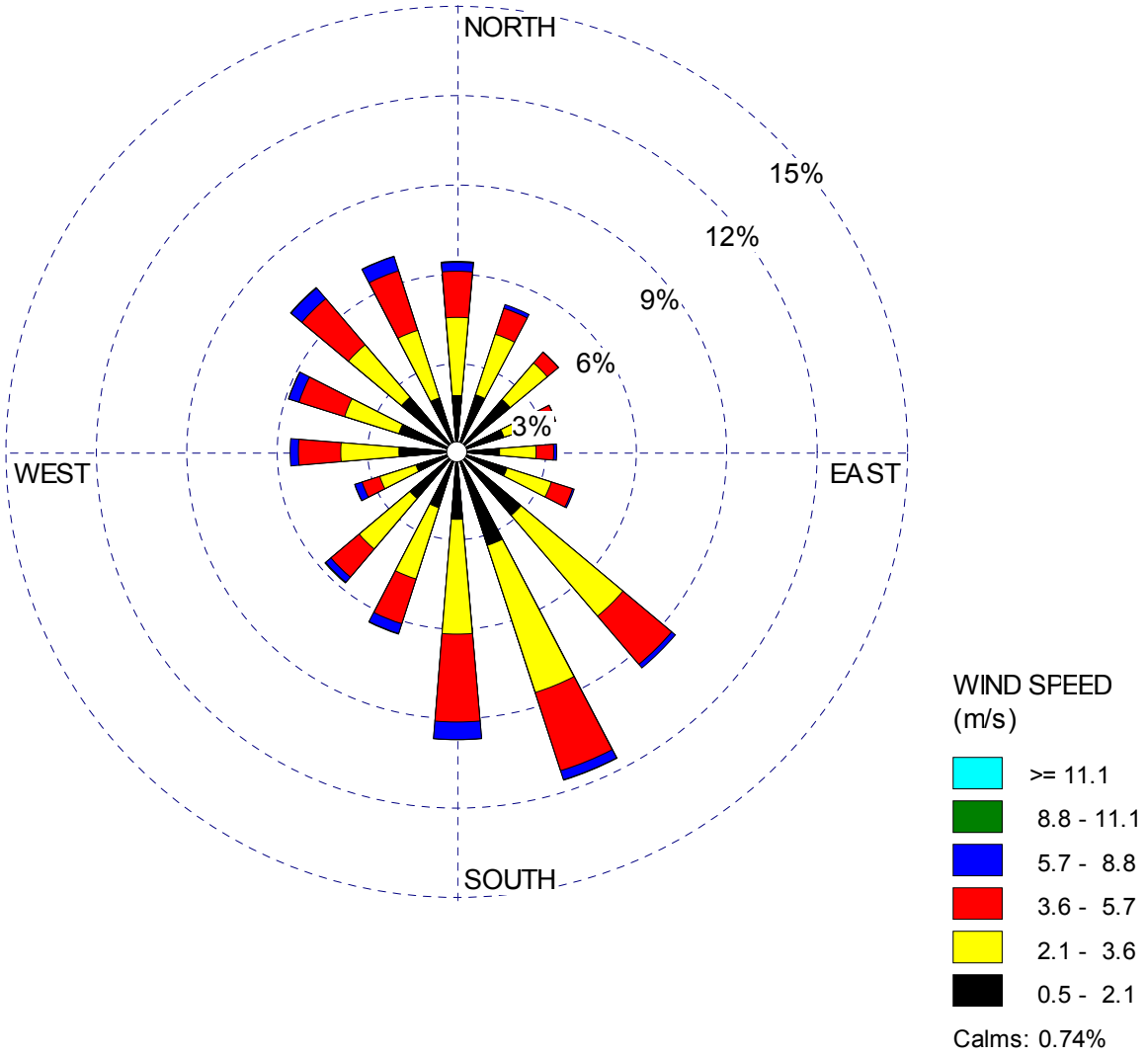

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Figure 2.7-31—{Callaway Site Wind Rose – 2004-2006, 60 m}

(Indicates the direction from which the wind is blowing)

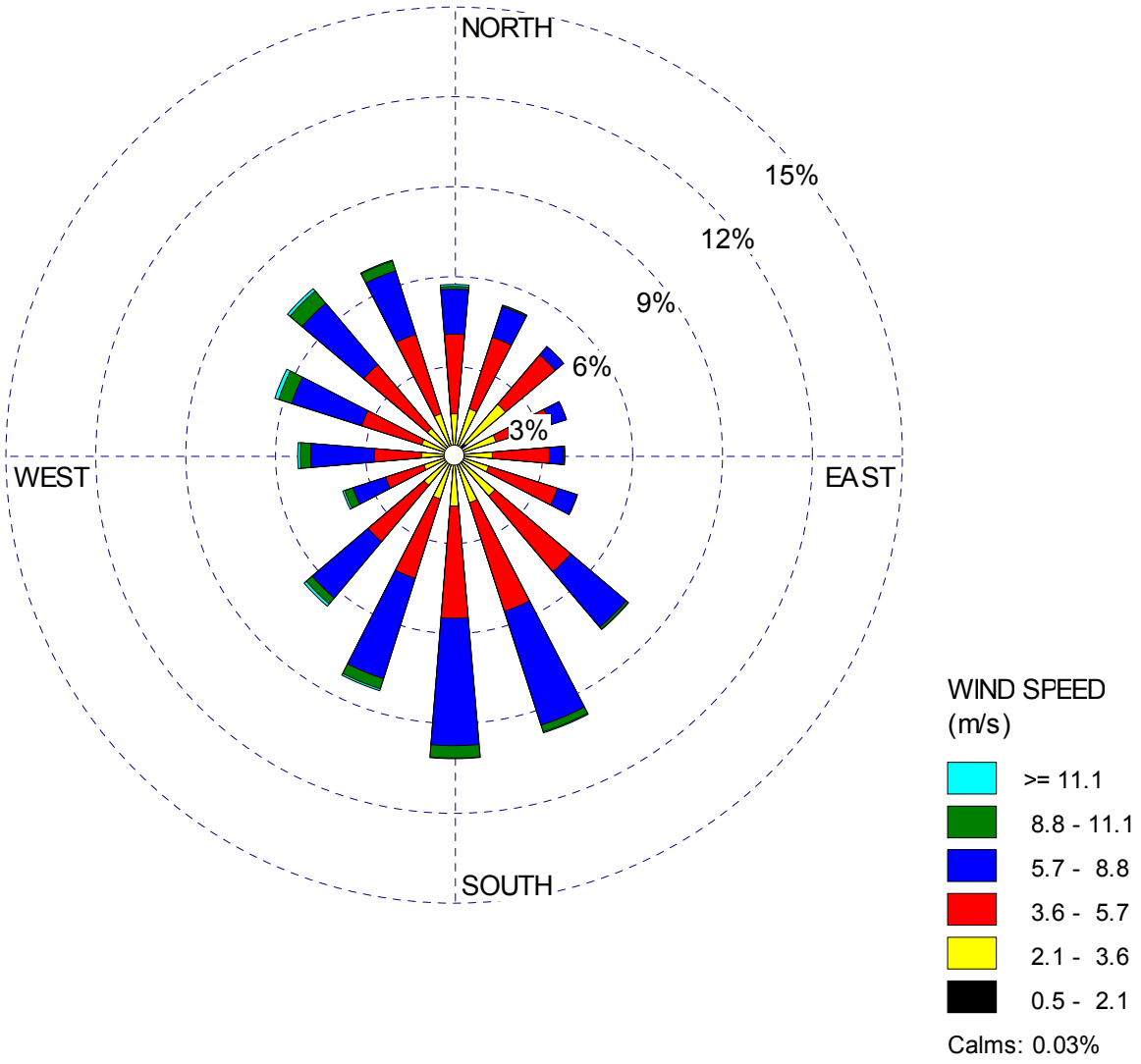

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Figure 2.7-32—{Columbia, MO Wind Rose – 2004-2006}

(Indicates the direction from which the wind is blowing)

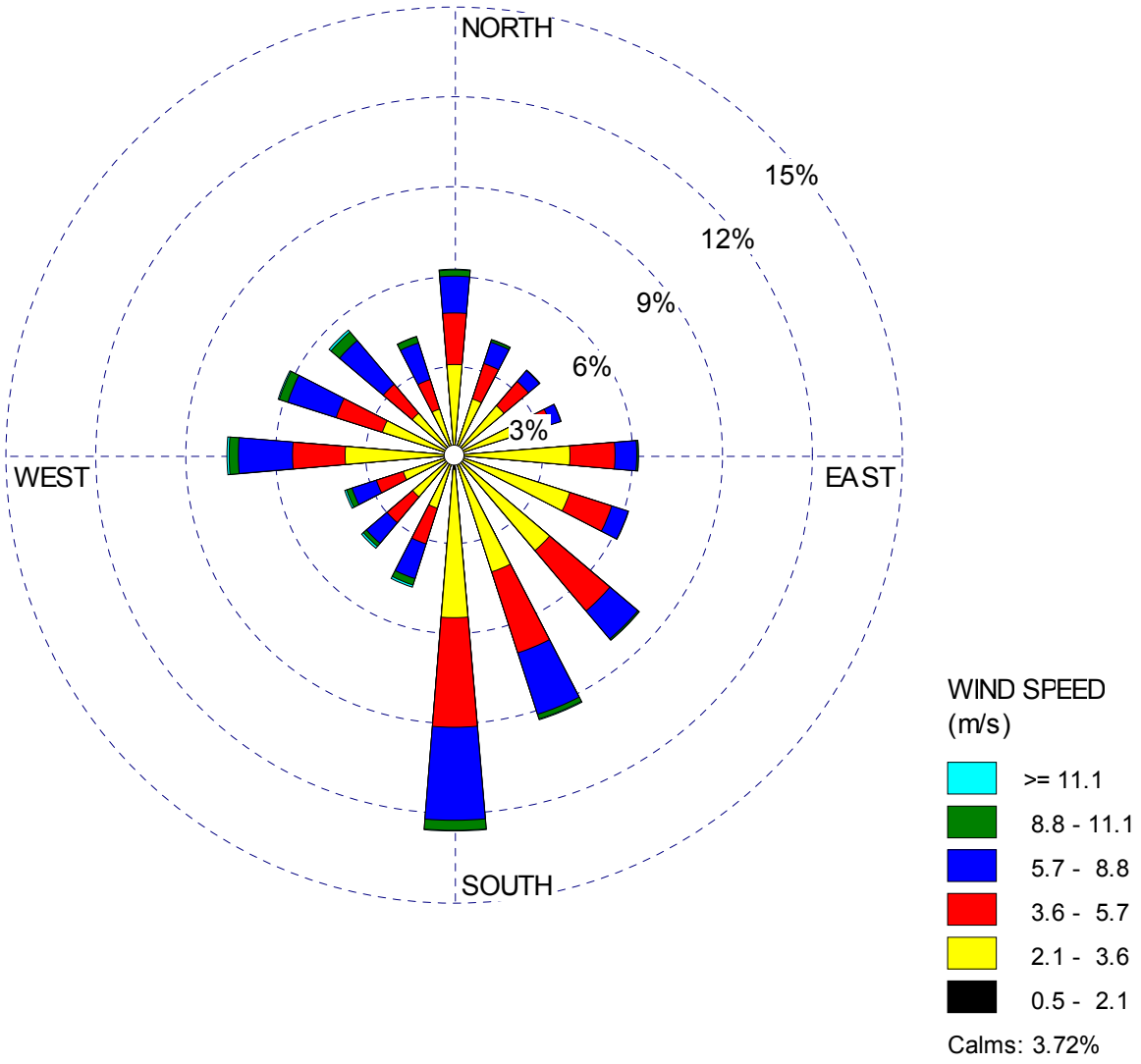

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Figure 2.7-33—{St. Louis, MO Wind Rose – 2004-2006}

(Indicates the direction from which the wind is blowing)

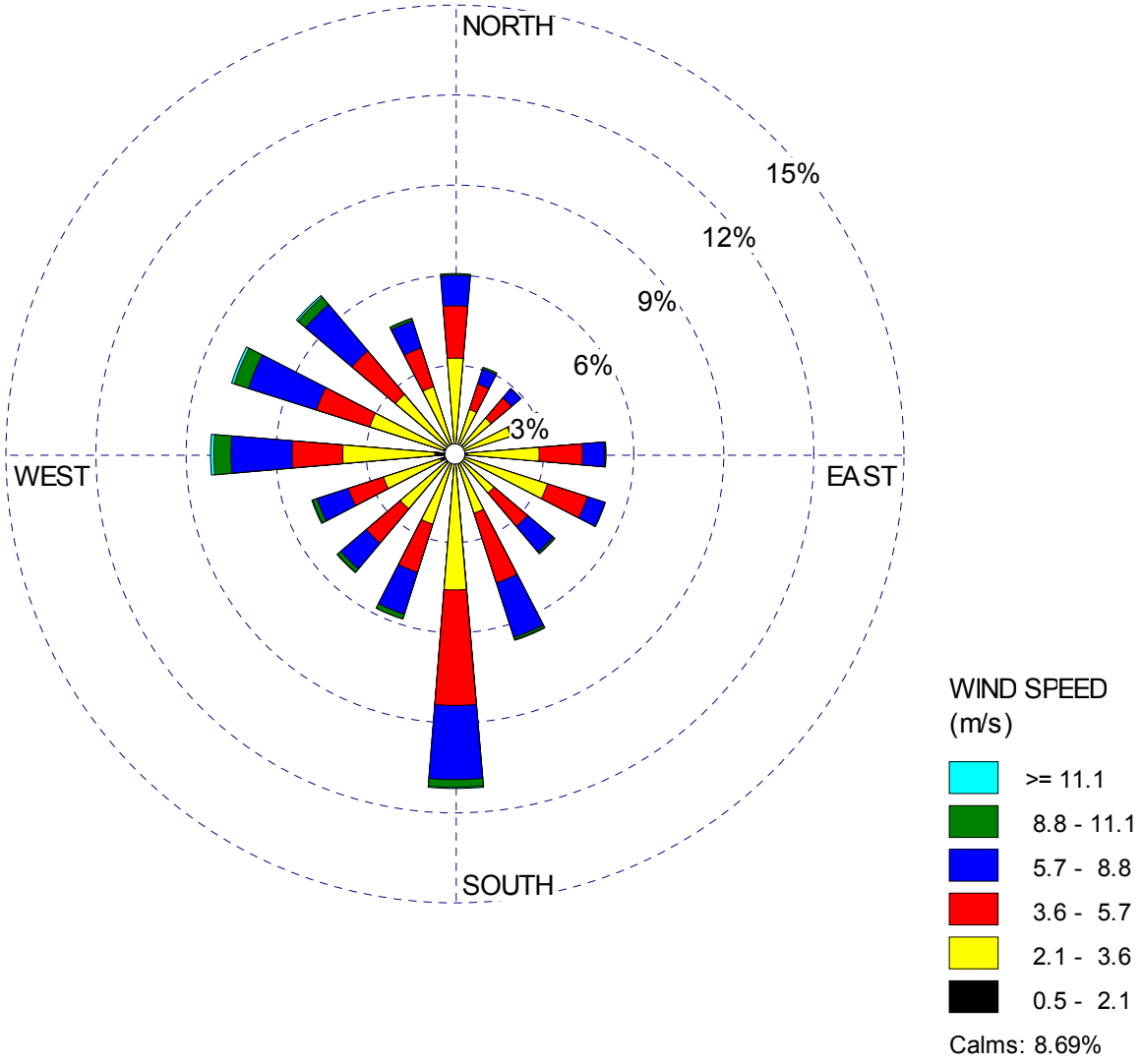

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Figure 2.7-34—{Kansas City, MO Wind Rose – 2004-2006}

(Indicates the direction from which the wind is blowing)

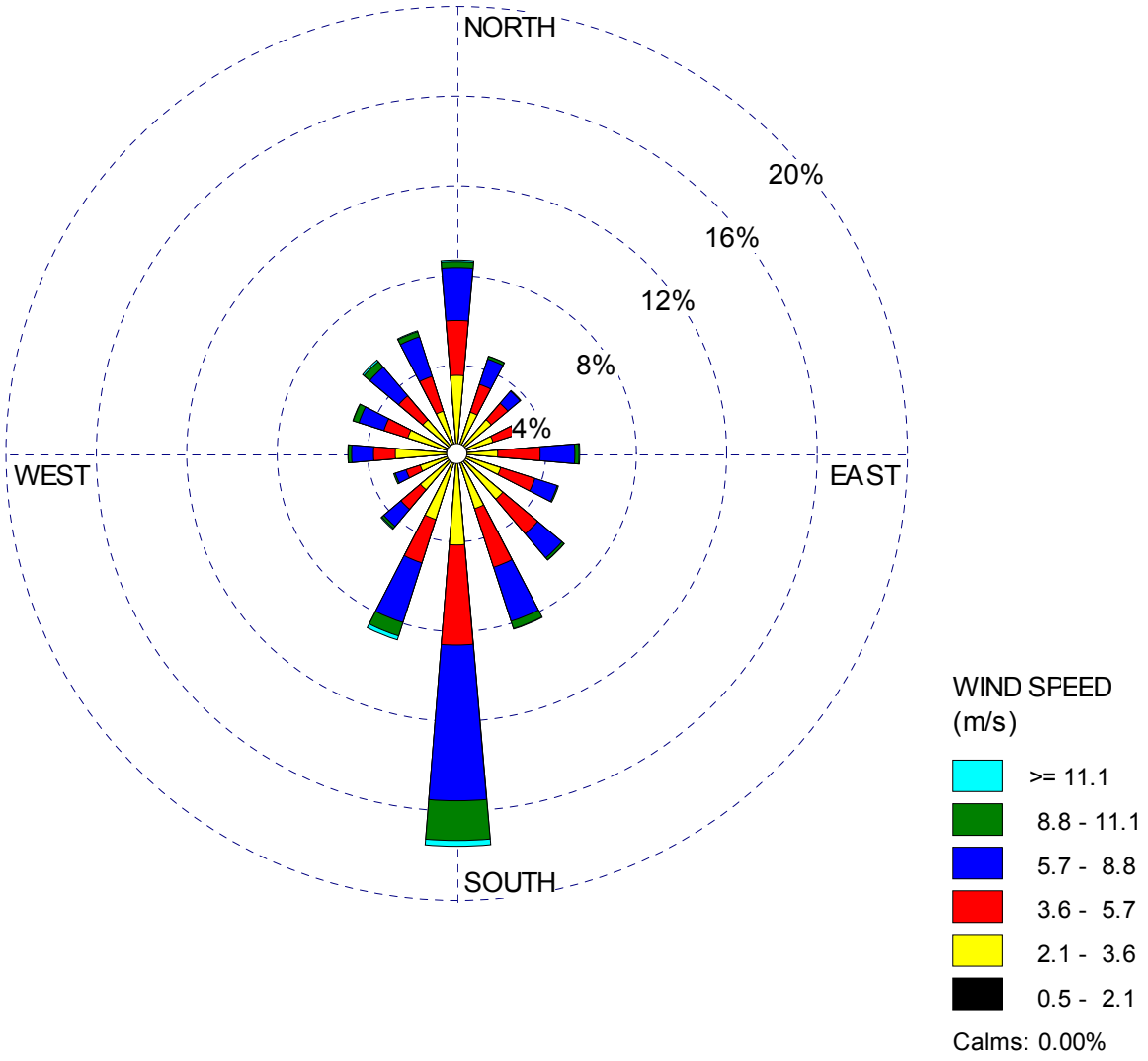

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Figure 2.7-35—{Jefferson City, MO Wind Rose – 2004-2006}

(Indicates the direction from which the wind is blowing)

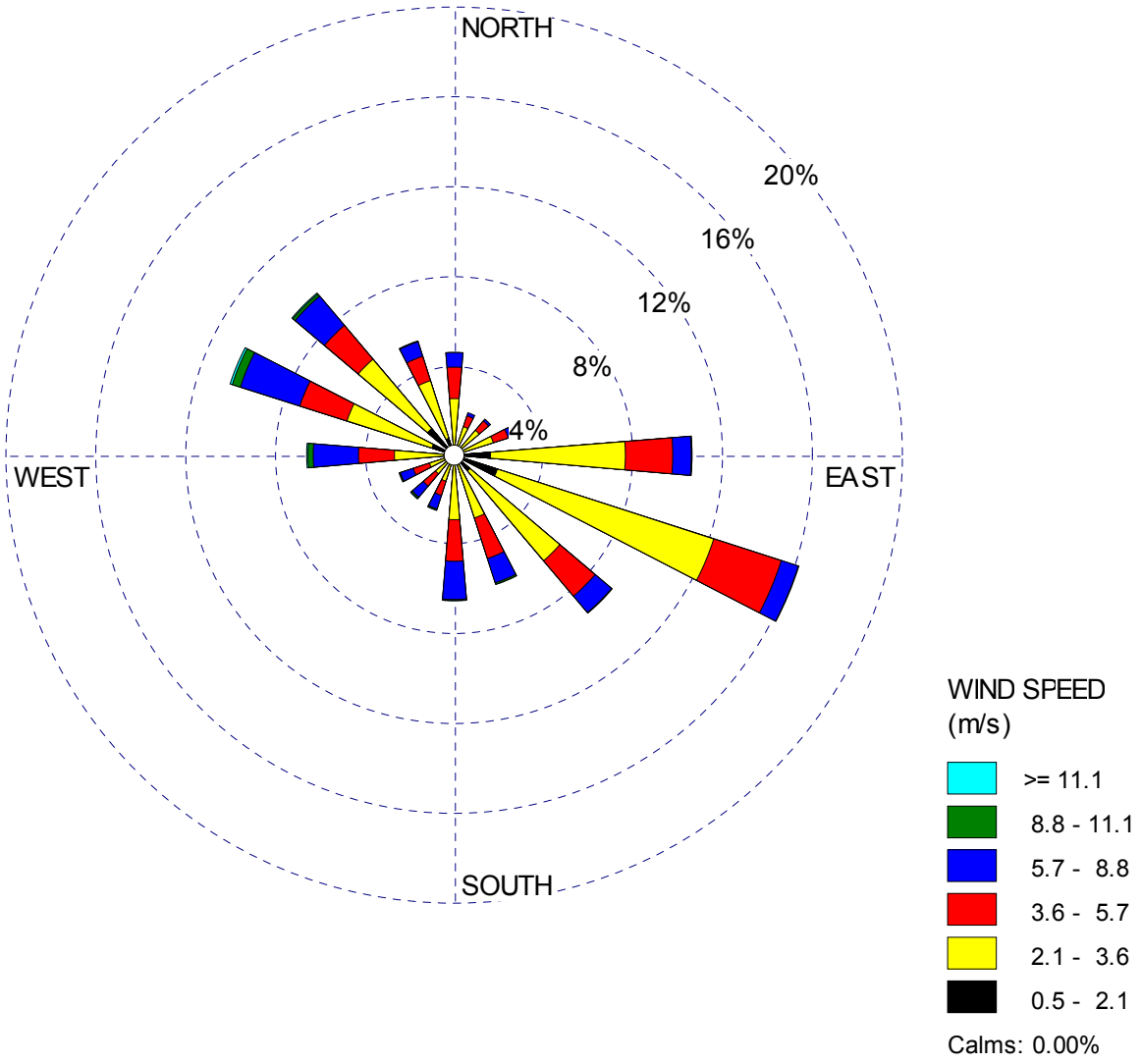

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Figure 2.7-36—{Vichy Rolla, MO Wind Rose – 2004-2006}

(Indicates the direction from which the wind is blowing)

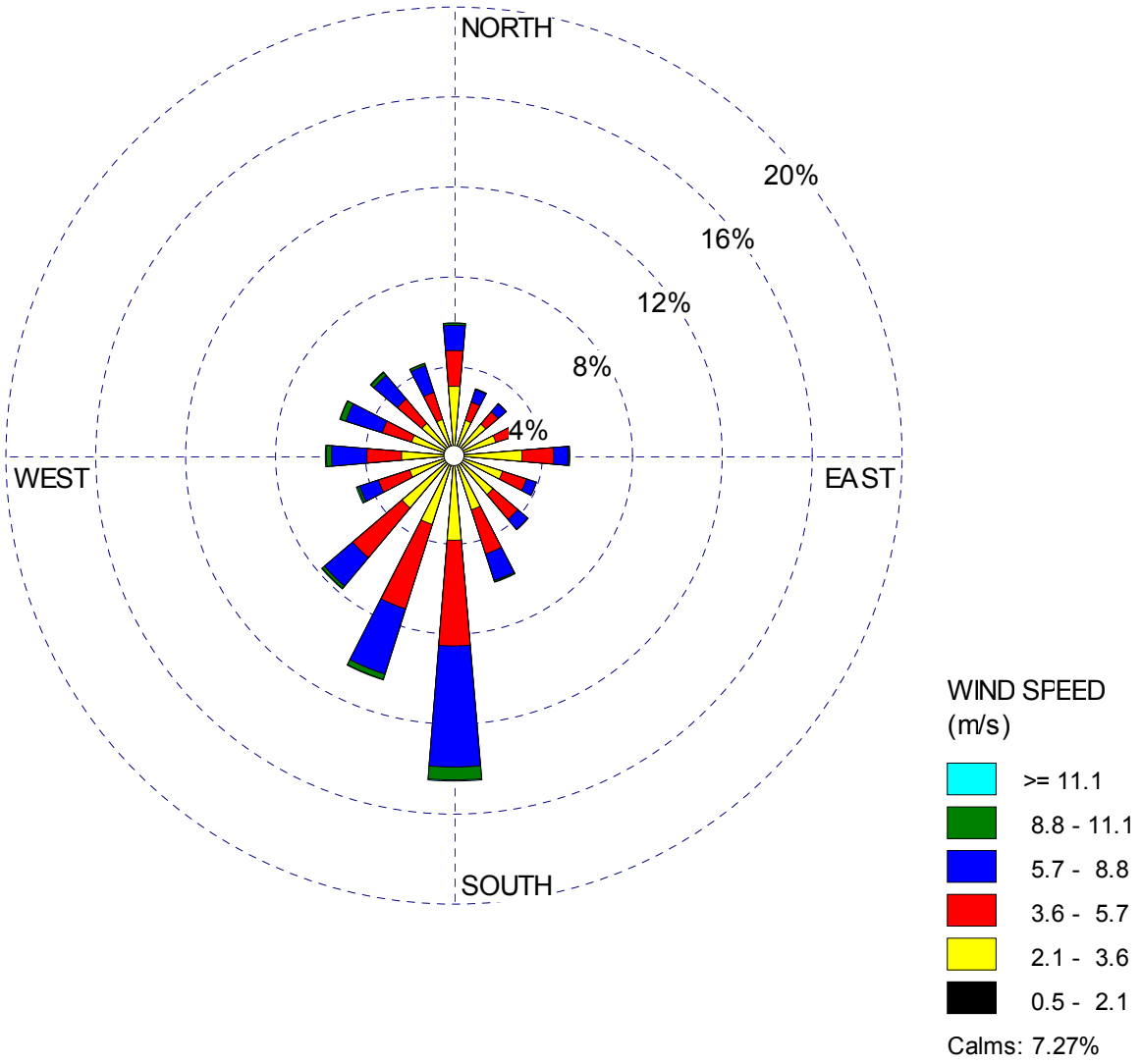

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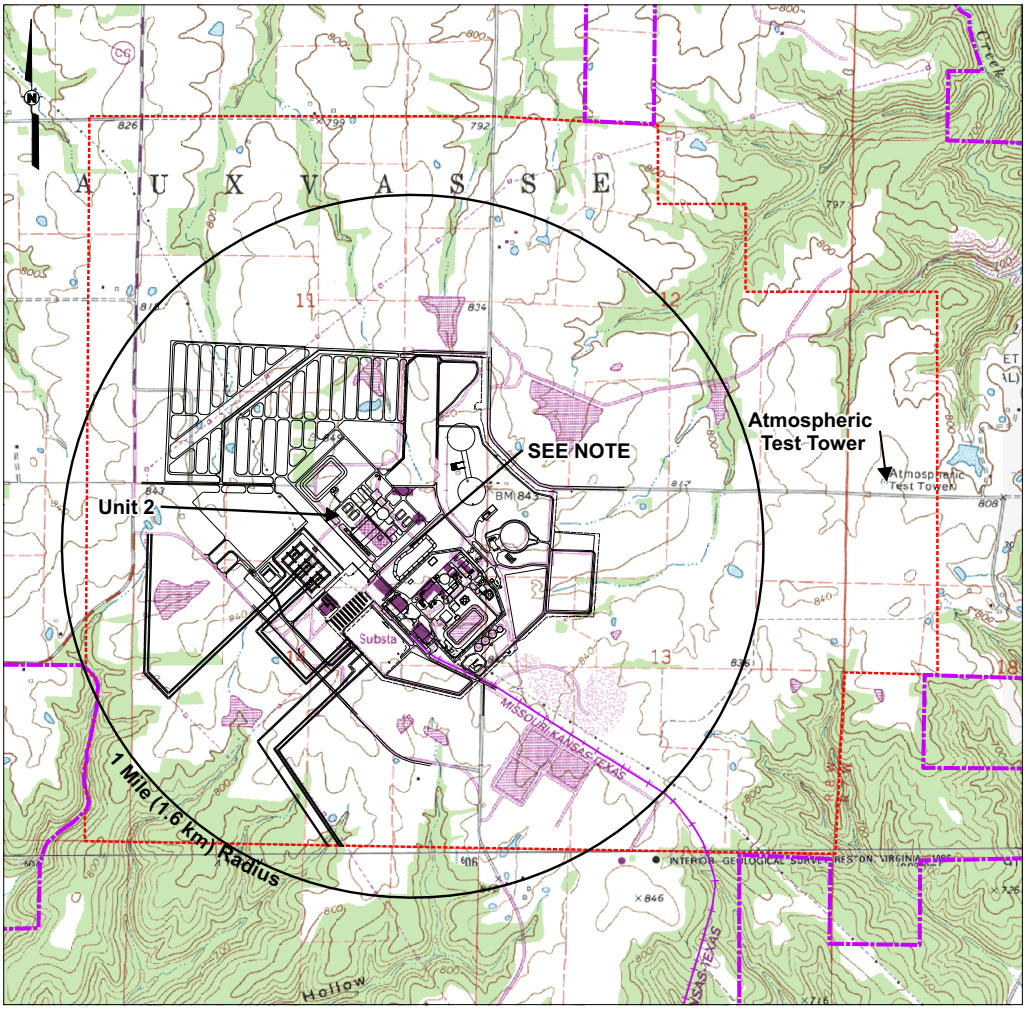
Figure 2.7-37—{Topography within 1 Mile (1.6 km) Radius of the Site}



LEGEND:

- Callaway Plant Site Area
- Ameren Property Boundary
- Railroad - NOT IN USE (MISSOURI-KANSAS-TEXAS RAILROAD)

0 1,100 2,200 4,400 Feet

NOTE:

REFERENCE CENTER POINT OF PLANT SITE IS DEFINED AS THE MIDPOINT BETWEEN EXISTING REACTOR FOR CALLAWAY PLANT UNIT 1 AND REACTOR FOR CALLAWAY PLANT UNIT 2.

REFERENCE:

Railroad not in use digitized from USGS 1:24K Topographic Maps. USGS Missouri Topological Quadrangles: Mokane East, Morrison, Readsville, and Reform. Photo revised 1985.

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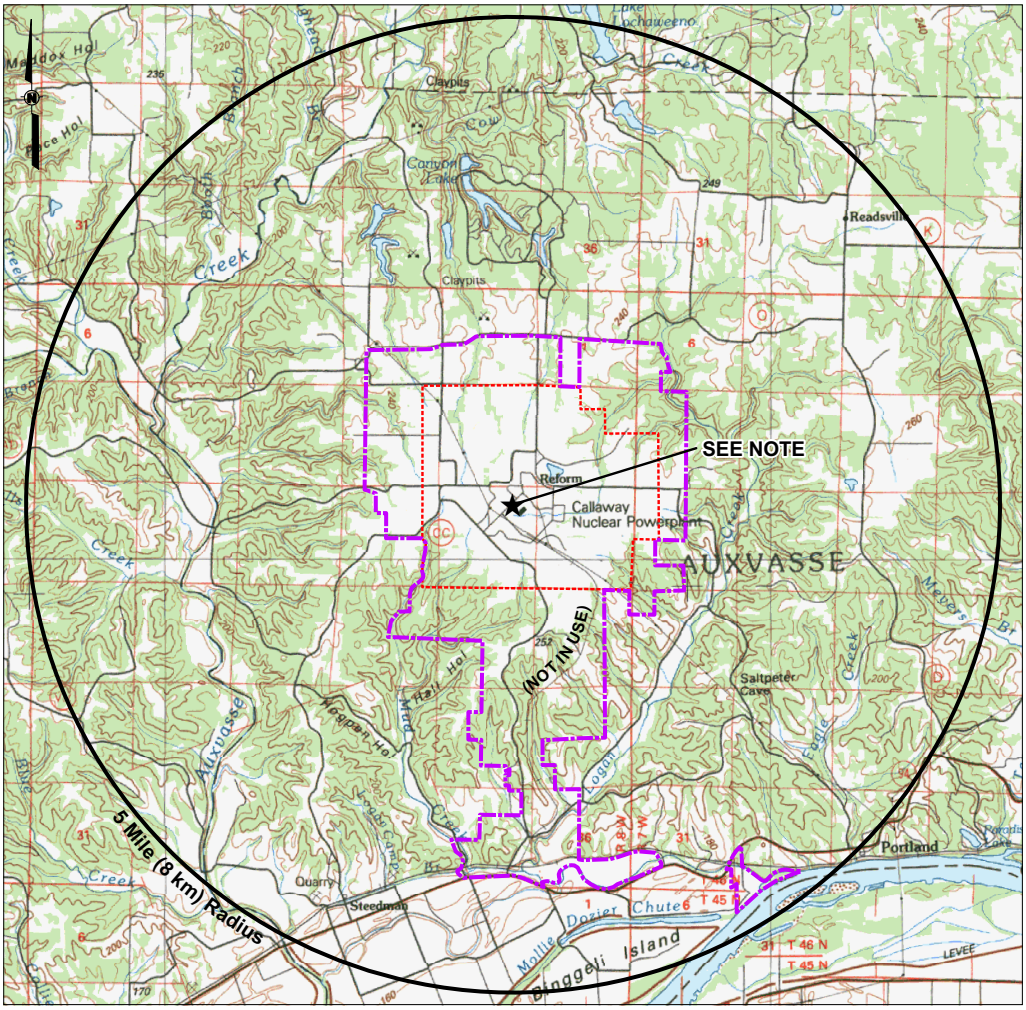
Figure 2.7-38—{Topography within 5 Mile (8 km) Radius of the Site}



LEGEND:

- Callaway Plant Site Area
- Ameren Property Boundary

0 0.75 1.5 3 Miles

NOTE:
REFERENCE CENTER POINT OF PLANT SITE IS DEFINED AT THE MIDPOINT BETWEEN EXISTING REACTOR FOR CALLAWAY PLANT UNIT 1 AND REACTOR FOR CALLAWAY PLANT UNIT 2.

REFERENCE:
USGS Missouri 1:100K Topological Quadrangles: Fulton. Photo revised 1985.

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Figure 2.7-39—{Topography within 50 Mile (80 km) Radius of Site}

LEGEND:
Contours in meters 244 meters = 800 feet

0 5 10 20 Miles

NOTE:
REFERENCE CENTER POINT OF PLANT SITE IS DEFINED AT THE MIDPOINT BETWEEN EXISTING REACTOR FOR CALLAWAY PLANT UNIT 1 AND REACTOR FOR CALLAWAY PLANT UNIT 2.

REFERENCE:
USGS Missouri 1:250K Topological Quadrangles: Jefferson City,

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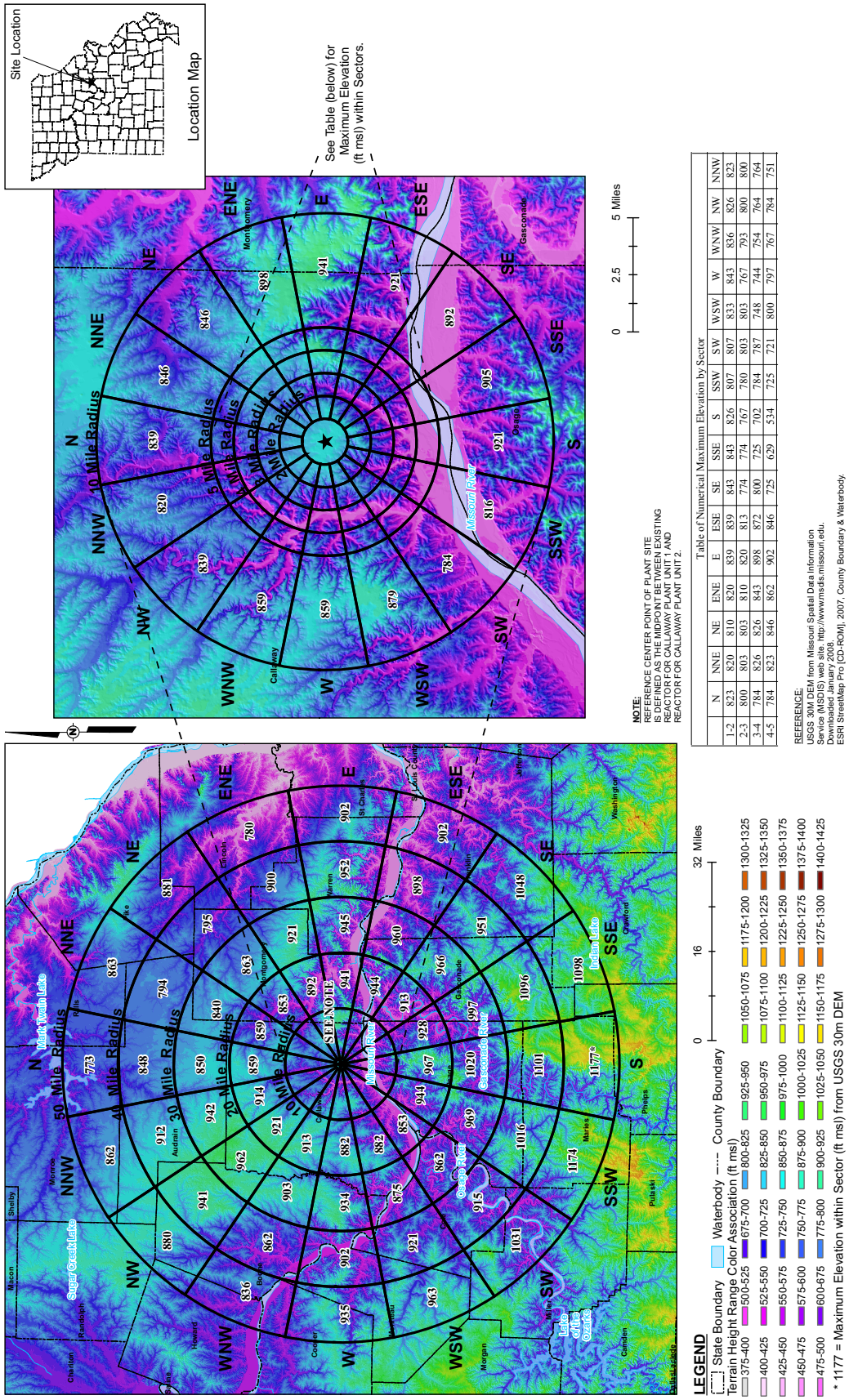
Figure 2.7-40—{Terrain Height 0-50 Miles Downwind of the Callaway site, by Compass Sector}



NOTE:
REFERENCE CENTER POINT OF PLANT SITE IS DEFINED AS THE MIDPOINT BETWEEN EXISTING REACTOR FOR CALLAWAY PLANT UNIT 1 AND REACTOR FOR CALLAWAY PLANT UNIT 2.

Table of Numerical Maximum Elevation by Sector

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1-2	823	820	810	820	839	839	843	843	826	807	807	833	843	836	826	823
2-3	800	803	803	810	820	813	774	774	767	780	803	803	767	793	800	800
3-4	784	826	826	843	898	872	890	725	702	784	787	748	744	754	764	764
4-5	784	823	846	862	902	846	725	629	534	725	721	800	797	767	784	751

REFERENCE:
USGS 30M DEM from Missouri Spatial Data Information Service (MSDIS) web site. http://www.msdis.missouri.edu. Downloaded January 2008.
ESRI StreetMap Pro [CD-ROM], 2007, County Boundary & Waterbody.

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