

## **Hanford Site Climatological Data Summary 1999 With Historical Data**

D. J. Hoytink  
K. W. Burk  
J. V. Ramsdell

April 2000

Prepared for  
the U.S. Department of Energy  
under Contract DE-AC06-76RLO 1830

Pacific Northwest National Laboratory  
Richland, Washington 99352



## **DISCLAIMER**

**This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.**

## **DISCLAIMER**

**Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.**

---

## Summary

This document presents the climatological data measured at the U.S. Department of Energy's Hanford Site for calendar year 1999. Pacific Northwest National Laboratory<sup>1</sup> operates the Hanford Meteorology Station and the Hanford Meteorological Monitoring Network from which these data were collected. The information contained herein includes updated historical climatologies for temperature, precipitation, normal and extreme values of temperature and precipitation, and other miscellaneous meteorological parameters. Further, the data are adjunct to and update Hoitink et al. (1999), and Hoitink and Burk (1994, 1995, 1996, 1997, 1998); however, Appendix B-Wind Climatology (1994) is excluded.

1999 was warmer than normal at the Hanford Meteorology Station with an average temperature of 54.4°F, 1.1°F above normal (53.3°F). The hottest temperature was 105°F on July 28, while the coldest was 18°F on January 3. The maximum temperature of 64°F on August 30 was the lowest maximum temperature ever recorded in August, while the maximum temperature of 76°F on November 13 was the highest maximum temperature ever recorded in November. For the 12-month period, 6 months were warmer than normal and 6 were cooler than normal.

1999 was the fourth driest year on record. Precipitation totaled 3.75 inches, 60% of normal (6.26 inches); snowfall totaled 0.6 inch, the least calendar year snowfall on record (compared to the normal of 13.8 inches).

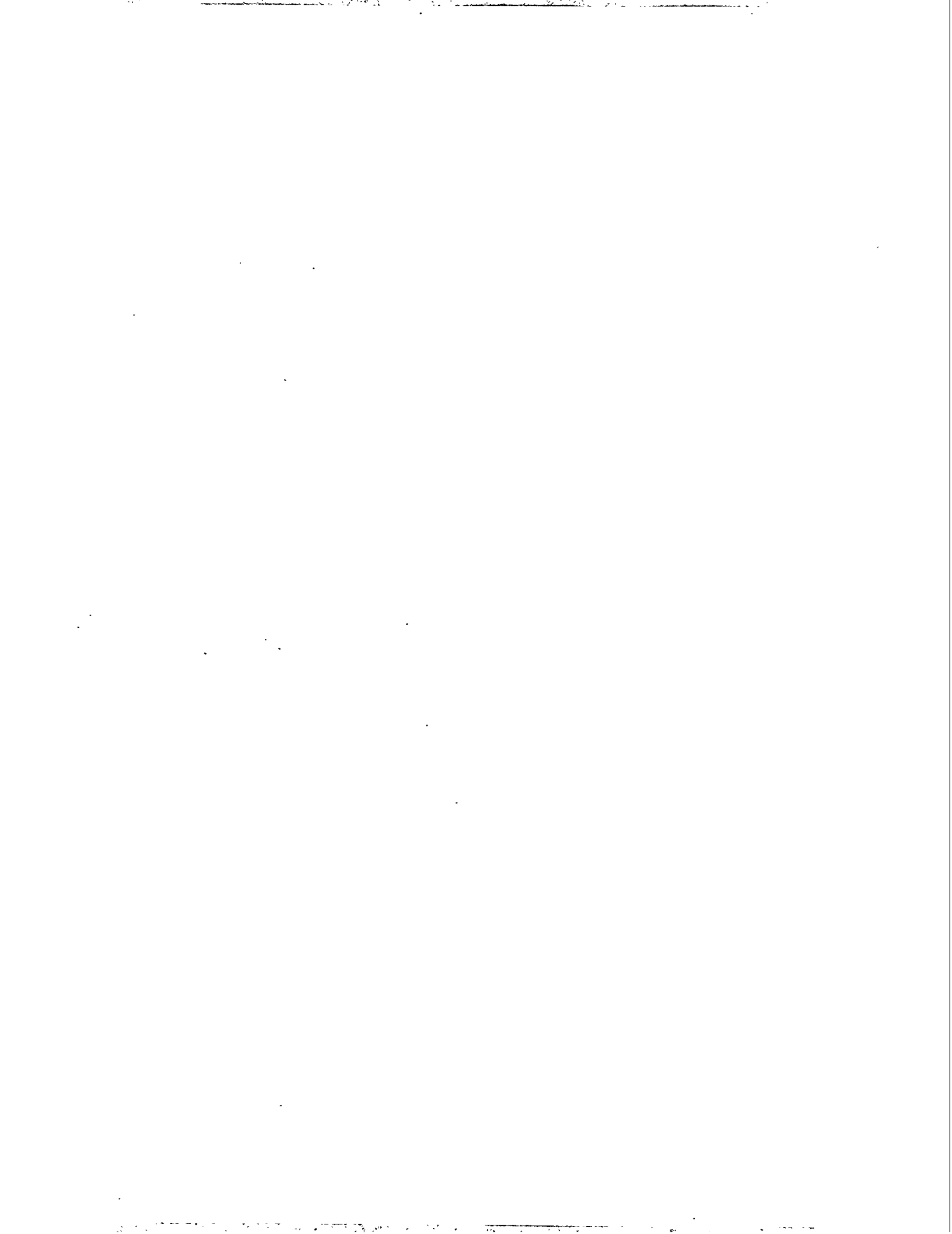
1999 was the windiest year on record with an average wind speed of 8.8 mph, 1.1 mph above normal (7.7 mph). There were 48 days with peak gusts  $\geq 40$  mph, compared to a yearly average of 26 mph. The peak gust during the year was 65 mph on February 6.

The heating-degree days for 1998-1999 were 4,802 (8% below the 5,231 normal). Cooling-degree days for 1999 were 891 (10% below the 994 normal).

For inquiries regarding this report, contact Mr. D. J. Hoitink at Pacific Northwest National Laboratory, P.O. Box 999, Richland, Washington 99352, or by electronic mail at [dana.j.hoitink@pnl.gov](mailto:dana.j.hoitink@pnl.gov).

---

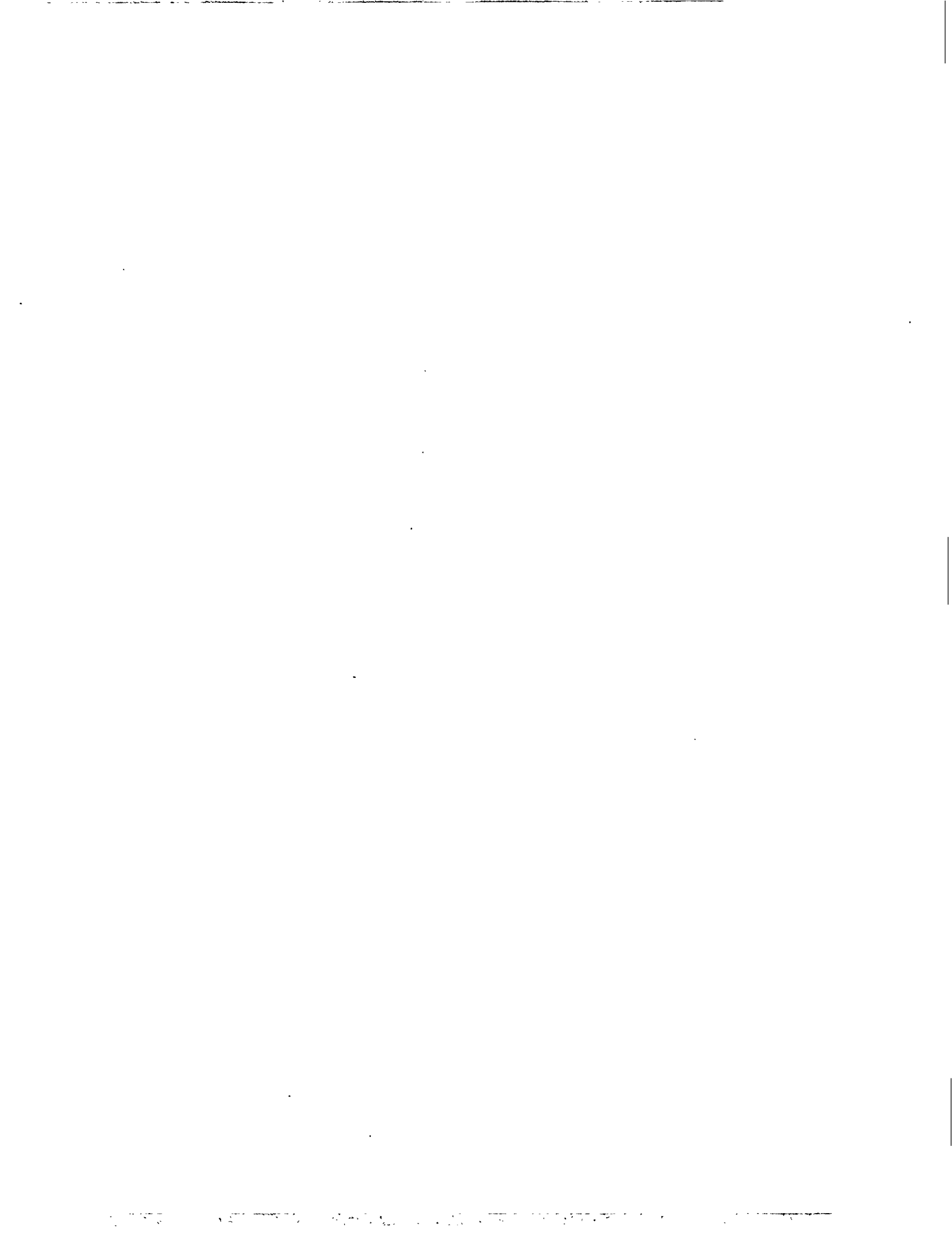
<sup>1</sup> Pacific Northwest National Laboratory is operated by Battelle for the U.S. Department of Energy.



---

## Acknowledgments

The authors wish to acknowledge Dana Ward, the Department of Energy Richland Operations Office Technical Monitor for the Meteorological and Climatological Services Project, and Roger Dirkes, Manager of the Public Safety and Resource Protection Program (PNNL), for their continued strong support.





---

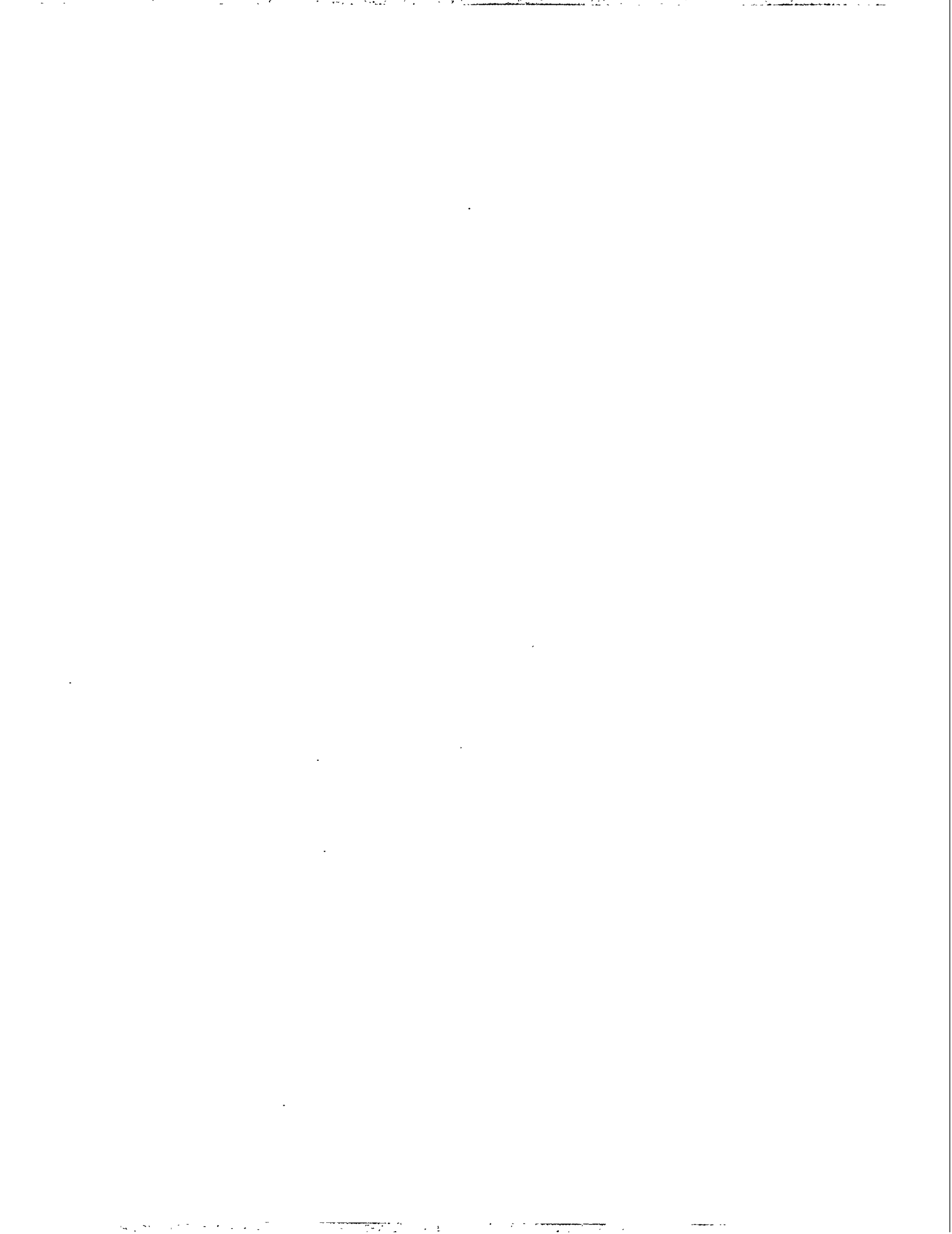
## Notes on Units of Measure

This document mainly uses English units (e.g., miles per hour [mph], inches [in.], degrees Fahrenheit [°F]) when presenting all information. This decision to use English units was based on the fact that English units are still the standard in National Oceanic and Atmospheric Administration (specifically, the National Climatic Data Center and National Weather Service) reporting and publications.

Throughout this document the term “normal” is used to indicate climatological normal, defined as an average value over a period of years of any meteorological element such as temperature, pressure, and rainfall. The accepted convention uses a 30-year time period, ending with the first year of each new decade (such as 1951-1980, 1961-1990, 1971-2000). The current time period used for climatological normals is 1961-1990.

Some useful conversions between English units and metric equivalents are:

1 foot (ft) = 0.3048 meter (m)  
1 mile (mi) = 1.609 kilometers (km)  
1 inch (in.) = 2.54 centimeters (cm)  
1 mile per hour (mph) = 0.447 meter/second (m/s)  
degrees Fahrenheit (°F) =  $(9/5 \times \text{°C}) + 32$   
degrees Celsius (°C) =  $5/9 \times (\text{°F} - 32)$   
1 langley = 1 gm-cal/cm<sup>2</sup>



# Contents

|   |      |
|---|------|
| Summary .....   | iii  |
| Acknowledgments .....   | v    |
| Notes on Units of Measure .....   | vii  |
| 1.0 Introduction .....  | 1.1  |
| 2.0 Calendar Year 1999 Summary .....  | 2.1  |
| 2.1 Temperature .....   | 2.2  |
| 2.2 Precipitation .....   | 2.11 |
| 2.3 Wind .....  | 2.13 |
| 3.0 Temperature Climatology .....   | 3.1  |
| 3.1 Monthly, Seasonal, and Annual Average .....   | 3.1  |
| 3.2 Days with Maximum Temperatures $\geq 100^{\circ}\text{F}$ , $\geq 90^{\circ}\text{F}$ , and $\leq 32^{\circ}\text{F}$ ..... | 3.1  |
| 3.3 Days with Minimum Temperatures $\leq 32^{\circ}\text{F}$ or $\leq 0^{\circ}\text{F}$ .....                                  | 3.8  |
| 3.4 Monthly Extremes Daily Maximum and Minimum Temperatures .....   | 3.13 |
| 3.5 Daily Temperature Distributions .....   | 3.13 |
| 3.6 Average Daily Temperature Range .....   | 3.15 |
| 3.7 Normal and Extreme Daily Temperatures .....   | 3.15 |
| 3.8 Subsurface Soil Temperatures .....  | 3.25 |
| 3.9 Heating- and Cooling-Degree Days .....  | 3.25 |
| 4.0 Precipitation Climatology .....   | 4.1  |
| 4.1 Monthly and Annual Totals .....   | 4.1  |
| 4.2 Total Monthly Precipitation Distributions .....   | 4.1  |
| 4.3 Seasonal Precipitation .....  | 4.4  |
| 4.4 Average Number of Days with Specified Amounts of Precipitation .....  | 4.4  |

---

|     |   |      |
|-----|---|------|
| 4.5 | Total Time with Precipitation Observed .....  | 4.4  |
| 4.6 | Notable Wet Periods.....  | 4.9  |
| 4.7 | Notable Dry Periods.....  | 4.9  |
| 4.8 | Snowfall .....  | 4.10 |
| 4.9 | Normal and Maximum Daily Precipitation.....   | 4.15 |
| 5.0 | Wind Climatology .....  | 5.1  |
| 5.1 | Monthly and Annual Prevailing Wind Directions, Average Speeds, and Peak Gusts .....                           | 5.1  |
| 5.2 | Days with Peak Gusts Above or Below Specific Thresholds .....   | 5.1  |
| 5.3 | Frequency of Monthly and Annual Wind Direction and Speed at 50-Foot Level .....                               | 5.3  |
| 5.4 | Composite Wind Roses and Joint Frequency Distributions for the Hanford Meteorological Monitoring Network..... | 5.4  |
| 6.0 | Miscellaneous Climatological Statistics.....  | 6.1  |
| 6.1 | Sky Cover.....  | 6.1  |
| 6.2 | Fog and Dense Fog .....   | 6.1  |
| 6.3 | Psychrometric Data.....   | 6.1  |
| 6.4 | Solar Radiation.....  | 6.3  |
| 6.5 | Thunderstorms, Dust and Glaze.....  | 6.5  |
| 6.6 | Atmospheric Pressure .....  | 6.5  |
| 7.0 | Extreme Values .....  | 7.1  |
| 7.1 | Annual Temperature Extremes .....   | 7.1  |
| 7.2 | Precipitation Rates .....   | 7.1  |
| 7.3 | Snow .....  | 7.3  |
| 7.4 | Peak Wind Gusts.....  | 7.5  |
| 8.0 | References .....  | 8.1  |
|     | Appendix - 1999 Wind Climatology .....  | A.1  |

## Figures

|     |   |      |
|-----|---|------|
| 1.1 | Map of the Hanford Site and Surrounding Areas .....   | 1.3  |
| 2.1 | 1999 Observed Daily Temperatures from the Hanford Meteorology Station .....                     | 2.12 |
| 2.2 | 1999 Hanford Meteorological Monitoring Network Wind Roses at 10-Meter Level .....               | 2.15 |
| 2.3 | 1999 Hanford Meteorological Monitoring Network Wind Roses at 60-Meter Level .....               | 2.16 |
| 3.1 | Graphical Presentation of Daily Maximum Temperatures .....                                      | 3.14 |
| 3.2 | Climatological Statistics of Daily Maximum Temperatures at the Hanford Meteorology Station..... | 3.14 |
| 3.3 | Climatological Statistics of Daily Minimum Temperatures at the Hanford Meteorology Station..... | 3.15 |
| 4.1 | Graphical Representation of Total Monthly Precipitation .....                                   | 4.2  |
| 4.2 | Climatological Statistics of Total Monthly Precipitation .....                                  | 4.3  |
| 4.3 | Climatological Statistics of Precipitation Accumulation.....                                    | 4.3  |
| 5.1 | Hanford Meteorological Monitoring Network Wind Roses at 10-Meter Level, 1982 Through 1999 ..... | 5.5  |
| 5.2 | Hanford Meteorological Monitoring Network Wind Roses at 60-Meter Level, 1986 Through 1999 ..... | 5.14 |
| 7.1 | Probability of an Annual Maximum Temperature Exceeding a Given Value .....                      | 7.2  |
| 7.2 | Probability of an Annual Minimum Temperature Being Less Than a Given Value.....                 | 7.2  |
| 7.3 | Probability of Precipitation Rate Exceeding Given Values by Duration.....                       | 7.4  |
| 7.4 | Probability of Exceeding a Given Seasonal Snowfall .....  | 7.5  |
| 7.5 | Probability of Exceeding a Given Snowfall in a Single Storm .....                               | 7.5  |
| 7.6 | Probability of Exceeding a Given Snow Depth.....  | 7.6  |
| 7.7 | Probabilities of Peak Wind Gusts Exceeding Given Values.....                                    | 7.7  |

## Tables

|  |      |
|--|------|
| 1.1 Station Numbers, Names, and Codes for the Hanford Meteorological Monitoring Network.....   | 1.2  |
| 2.1 1999 Daily Temperature Records.....  | 2.4  |
| 2.2 1999 Climatological Data Summary .....   | 2.5  |
| 2.3 1999 Monthly and Seasonal Temperature and Precipitation.....   | 2.7  |
| 2.4 1999 Monthly and Annual Average Temperatures from the Hanford Meteorological Monitoring Network.....   | 2.8  |
| 2.5 1999 Monthly and Annual Average Precipitation from the Hanford Meteorological Monitoring Network.....  | 2.9  |
| 2.6 1999 Monthly and Annual Average Wind Speed from the Hanford Meteorological Monitoring Network.....   | 2.10 |
| 3.1 Monthly and Annual Average Temperatures .....  | 3.2  |
| 3.2 Seasonal Average Temperatures .....  | 3.3  |
| 3.3 Monthly and Seasonal Number of Days with Maximum Temperatures Above or Below Certain Thresholds .....  | 3.4  |
| 3.4 Days with Maximum Temperatures $\geq 104^{\circ}\text{F}$ .....  | 3.6  |
| 3.5 Record of Annual First and Last Dates with Maximum Temperatures $\geq 90^{\circ}\text{F}$ and Minimum Temperatures $\leq 32^{\circ}\text{F}$ ..... | 3.7  |
| 3.6 Monthly and Annual Maximum Temperatures .....  | 3.9  |
| 3.7 Monthly and Seasonal Number of Days with Minimum Temperatures Below Certain Thresholds .....   | 3.10 |
| 3.8 Days with Minimum Temperatures $\leq 0^{\circ}\text{F}$ .....  | 3.11 |
| 3.9 Monthly and Annual Minimum Temperatures.....   | 3.12 |
| 3.10 Monthly Normal Temperatures and Monthly Extremes of Maximum and Minimum Temperatures.....   | 3.16 |
| 3.11 Average Daily Temperature Range .....   | 3.17 |

---

|   |      |
|---|------|
| 3.12 Normal and Extreme Daily Maximum and Minimum Temperatures .....  | 3.18 |
| 3.13 Subsurface Soil Temperatures at Depths of 0.5, 15, and 36 Inches .....   | 3.26 |
| 3.14 Monthly and Seasonal Heating-Degree Days.....  | 3.27 |
| 3.15 Monthly and Annual Cooling-Degree Days.....  | 3.28 |
| 4.1 Monthly and Annual Precipitation .....  | 4.5  |
| 4.2 Seasonal Precipitation .....  | 4.6  |
| 4.3 Average Number of Days with Precipitation of Specified Amount .....   | 4.7  |
| 4.4 Monthly and Annual Averages and Extremes in Total Time with Precipitation<br>Observed: July 1946 Through June 1971, July 1974 Through December 1999 ..... | 4.7  |
| 4.5 Total Duration of Precipitation by Month and Year .....   | 4.8  |
| 4.6 Monthly and Seasonal Snowfall, Including First and Last Dates of Both Trace and<br>Measurable Snowfalls .....   | 4.11 |
| 4.7 Snowfall - Greatest Amount from a Single Storm .....  | 4.13 |
| 4.8 Miscellaneous Snowfall Statistics, 1946 Through 1999 .....  | 4.14 |
| 4.9 Maximum Precipitation.....  | 4.16 |
| 4.10 Normal and Maximum Daily Precipitation .....   | 4.17 |
| 5.1 Monthly and Annual Prevailing Wind Directions, Average Speeds, and Peak Gusts at<br>50-Foot Level, 1945 Through 1999.....                                 | 5.1  |
| 5.2 Number of Days with Peak Gusts Above or Below Specific Thresholds at 50-Foot<br>Level, 1945 Through 1999 .....  | 5.2  |
| 5.3 Frequency of Monthly and Annual Wind Direction and Speed at 50-Foot Level, 1955<br>Through 1999 .....   | 5.3  |
| 5.4 Joint Frequency Distributions for Hanford Meteorological Monitoring Network<br>Wind Stations at 10-Meter Level, 1982 Through 1999 .....                   | 5.6  |
| 5.5 Joint Frequency Distributions for Hanford Meteorological Monitoring Network<br>Wind Stations at 60-Meter Level, 1986 Through 1999 .....                   | 5.15 |
| 6.1 Average Sky Cover, 1946 Through 1999, and Number of Days Clear, Partly Cloudy,<br>and Cloudy, 1954 Through 1999.....                                      | 6.2  |

---

---

|     |  |     |
|-----|--|-----|
| 6.2 | Monthly and Annual Number of Days with Fog and Dense Fog, 1945 Through 1999 .....              | 6.3 |
| 6.3 | Monthly Averages and Extremes of Psychrometric Data, 1950 Through 1999 .....                   | 6.4 |
| 6.4 | Average and Extreme Solar Radiation Daily Values, 1953 Through 1999 .....                      | 6.4 |
| 6.5 | Average Number of Days of Various Meteorological Phenomena, 1945 Through 1999 .....            | 6.5 |
| 6.6 | Average and Extreme Station and Sea-Level Pressure Data, 1955 Through 1999.....                | 6.7 |
| 7.1 | Return Periods for Annual Maximum and Minimum Temperatures.....                                | 7.1 |
| 7.2 | Precipitation Rates for 1 to 24 Hours Duration and Return Periods from 2 to 1,000 Years .....  | 7.3 |
| 7.3 | Precipitation Amounts for 1 to 24 Hours Duration and Return Periods from 2 to 1,000 Years..... | 7.3 |
| 7.4 | Snowfall Extremes for Return Periods from 2 to 1,000 Years .....                               | 7.4 |
| 7.5 | Peak Wind Gusts for Return Periods from 2 to 10,000 Years.....                                 | 7.6 |



---

## 1.0 Introduction

The U.S. Department of Energy's Hanford Site lies within the semiarid shrub-steppe Pasco Basin of the Columbia Plateau in southeastern Washington state. The Hanford Site occupies an area of ~560 square miles north of the confluence of the Snake and Yakima Rivers with the Columbia River. The Columbia River flows through the northern part of the Hanford Site and, turning south, forms part of the site's eastern boundary. The Yakima River runs along part of the southern boundary and joins the Columbia River below the city of Richland, which bounds the Hanford Site on the southeast. Rattlesnake Mountain, Yakima Ridge, and Umtanum Ridge form the southwestern and western boundaries. The Saddle Mountains form the northern boundary of the Hanford Site.

The Cascade Range, beyond Yakima to the west, greatly influences the climate of the Hanford Site area by means of its rain shadow effect. The regional temperatures, precipitation, and winds are greatly affected by the presence of mountain barriers. The Rocky Mountains and ranges in southern British Columbia are effective in protecting the inland basin from the more severe cold polar air masses moving southward across Canada and winter storms associated with them.

This document presents the calendar year 1999 climatological data summary for the Hanford Meteorology Station and additional climatologies for temperature, wind, precipitation, and other meteorological parameters for the Hanford Meteorology Station and the automated stations of the Hanford Meteorological Monitoring Network. Climatological normal and extreme values for temperature and precipitation are also presented. Currently, 30 monitoring stations are located within and near the U.S. Department of Energy's Hanford Site (Table 1.1, Figure 1.1). A detailed description of each of the monitoring stations, including photographs of the topography surrounding each site, is provided in Glantz and Islam (1988). A description of instrumentation and calibration is provided in PNNL et al. (1997).

Operation of the Hanford Meteorology Station is a function of the Meteorological and Climatological Services Project funded by the U.S. Department of Energy. This project, managed by the Pacific Northwest National Laboratory, is responsible for providing the U.S. Department of Energy and Hanford Site contractors ongoing meteorological and climatological services support, primarily for emergency response activities, Hanford Site work scheduling, and general site safety. Detailed, real-time meteorological data are needed in the event of a release of hazardous material to the atmosphere from any of the Hanford Site facilities. These data can be used to model atmospheric dispersion and to estimate the environmental impact of the release. Meteorological data and weather forecasts are also necessary to ensure that operations and activities on the Hanford Site are conducted safely, particularly where specific weather conditions might affect those operations or activities. The climatological database is also used in environmental studies, environmental impact reports, facility design, and planning operations.

During the period April 1912 through March 1943, cooperative observers for the U.S. Weather Bureau (now the National Weather Service) recorded daily maximum and minimum temperatures and precipitation, including measurements of unmelted snow at the Old Hanford Townsite ~10 miles east-northeast of the present Hanford Meteorology Station. From late 1943 until mid 1944, the U.S. Weather

**Table 1.1. Station Numbers, Names, and Codes for the Hanford Meteorological Monitoring Network**

| Station Number | Station Name                      | Station Code | Station Elevation (ft) | Period of Operation |
|----------------|-----------------------------------|--------------|------------------------|---------------------|
| 1              | Prosser Barricade                 | PROS         | 480                    | 01/82 - Present     |
| 2              | Emergency Operations Center       | EOC          | 1,240                  | 01/82 - Present     |
| 3              | Army Loop Road                    | ARMY         | 565                    | 01/82 - Present     |
| 4              | Rattlesnake Springs               | RSPG         | 680                    | 01/82 - Present     |
| 5              | Edna                              | EDNA         | 410                    | 01/82 - Present     |
| 6              | 200 East                          | 200E         | 680                    | 01/82 - Present     |
| 7              | 200 West                          | 200W         | 650                    | 01/82 - Present     |
| 8B             | Beverly                           | BVLY         | 555                    | 08/91 - Present     |
| 8W             | Wahluke (no longer active)        | WAHL         | 855                    | 01/82 - 07/91       |
| 9              | Fast Flux Test Facility           | FFTF         | 570                    | 01/82 - Present     |
| 10             | Yakima Barricade                  | YAKB         | 795                    | 01/82 - Present     |
| 11             | 300 Area                          | 300A         | 390                    | 01/82 - Present     |
| 12             | Wye Barricade                     | WYEB         | 550                    | 01/82 - Present     |
| 13             | 100-N                             | 100N         | 460                    | 01/82 - Present     |
| 14             | WNP-2                             | WPPS         | 450                    | 01/82 - Present     |
| 15             | Franklin County                   | FRNK         | 875                    | 01/82 - Present     |
| 16             | Gable Mountain                    | GABL         | 1,085                  | 01/82 - Present     |
| 17             | Ringold                           | RING         | 620                    | 01/82 - Present     |
| 18             | Richland Airport                  | RICH         | 390                    | 01/82 - Present     |
| 19P            | Plutonium Finishing Plant-200W    | PPF          | 675                    | 02/94 - Present     |
| 19S            | Sagehill (no longer active)       | SAGE         | 985                    | 03/82 - 01/93       |
| 20             | Rattlesnake Mountain              | RMTN         | 3,560                  | 01/82 - Present     |
| 21             | Hanford Meteorology Station       | HMS          | 733                    | 01/82 - Present     |
| 22             | Pasco Airport                     | PASC         | 410                    | 10/87 - Present     |
| 23             | Gable West                        | GABW         | 490                    | 03/86 - Present     |
| 24             | 100-F                             | 100F         | 410                    | 03/86 - Present     |
| 25             | Vernita Bridge                    | VERN         | 430                    | 02/88 - Present     |
| 26             | Benton City                       | BENT         | 1,055                  | 02/95 - Present     |
| 27             | Tri-City Vocational Skills Center | VSTA         | 505                    | 02/91 - Present     |
| 28             | Roosevelt, WA                     | SURF         | 360                    | 09/94 - Present     |
| 29             | 100-K                             | 100K         | 450                    | 03/96 - Present     |
| 30             | HAMMER                            | HAMR         | 500                    | 01/98 - Present     |

Bureau recorded some meteorological operations in Richland. Then, in 1944 as part of the Manhattan Project, the Hanford Meteorology Station was established. Hourly observations began on December 7, 1944.

The Hanford Meteorology Station and its 410-foot instrument tower are located near the center of the Hanford Site between the 200 West and 200 East Areas (see Figure 1.1). Hourly observations of wind direction, wind speed, and air temperature are made at multiple levels on the 410-foot tower. Throughout this document, wind measurements from the Hanford Meteorology Station are reported from the 50-foot level and temperature measurements are reported from the 3-foot level. A variety of other meteorological

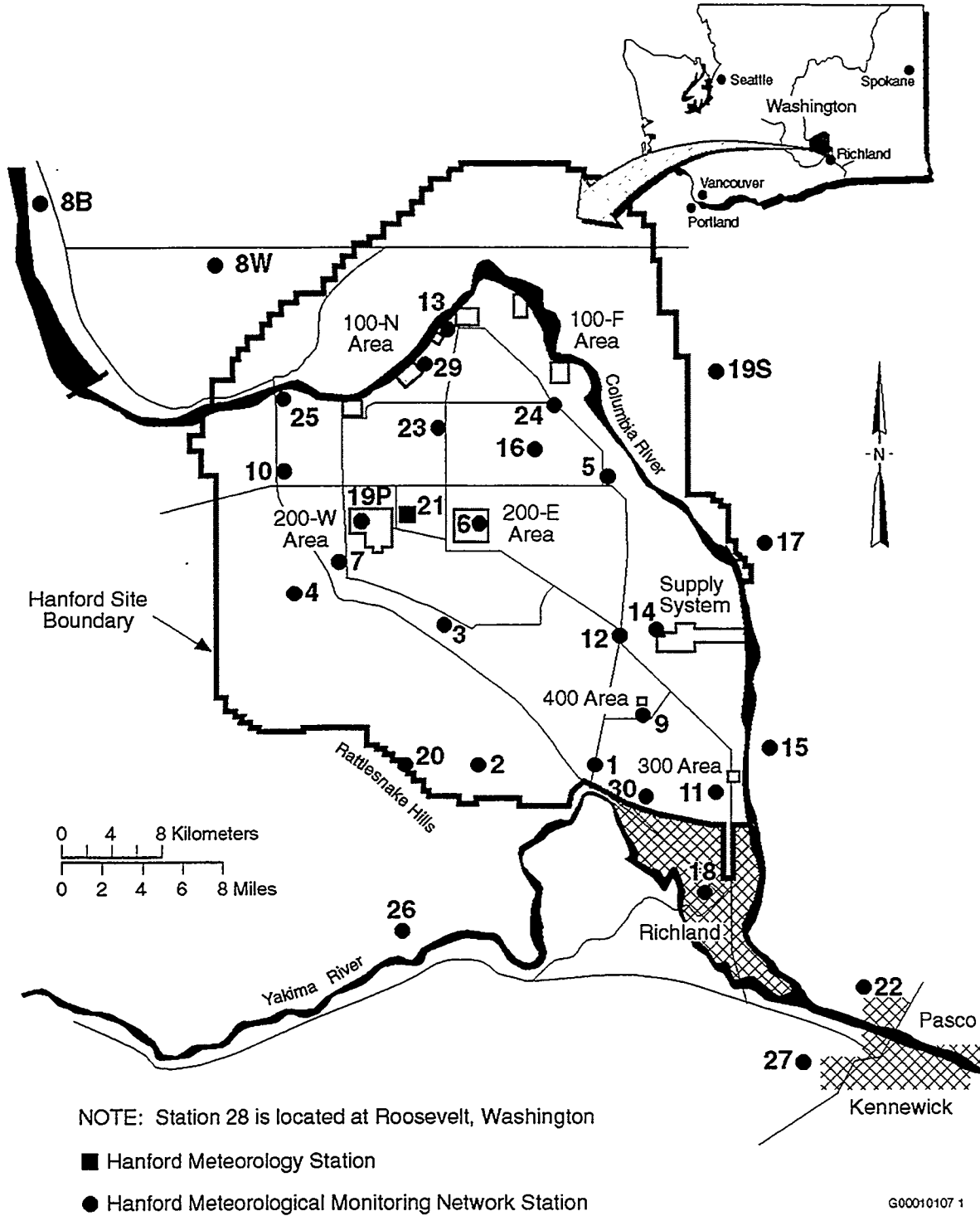


Figure 1.1. Map of the Hanford Site and Surrounding Areas

parameters are also measured or observed, including current weather, dew point temperature, relative humidity, precipitation, atmospheric pressure, cloud cover, visibility, and solar radiation. Several climatological summaries of data collected at the Hanford Meteorology Station, at the Old Hanford Townsite, and Richland monitoring locations were published over the past 30 years (Jenne and Kerns 1959; Stone et al. 1972, 1983; Hoitink and Burk 1994, 1995, 1996, 1997, 1998; Hoitink et al. 1999).

This document is composed of the following information. The 1999 calendar year summary of climatological data for the Hanford Site is contained in Section 2.0. Temperature, precipitation, wind, and miscellaneous climatological statistics are contained in Sections 3.0 through 6.0, respectively. Section 7.0 contains information on extreme value analysis. Section 8.0 lists the references cited in the document, and Section 9.0 provides a bibliography of database, computer code, and other pertinent reports. The appendix gives the station-specific wind roses and joint frequency distributions for 1999.

---

## 2.0 Calendar Year 1999 Summary

This section summarizes climatology for calendar year 1999. More detailed information can be found in Section 3.0 Temperature Climatology, Section 4.0 Precipitation Climatology, and Section 5.0 Wind Climatology.

The 1998-99 winter season (December, January, and February) was much warmer than normal, averaging 37.7°F, 4.1° above normal (33.6°F), and tied the winter of 1997-98 as the sixth warmest winter on record. The warmest was 40.6°F in 1966-67, and the coldest was 24.2°F in 1948-49. The coldest temperature during the winter was -1°F on December 21. Precipitation for the 1998-99 winter season was below normal, totaling 2.03 inches, 83% of normal (2.44 inches). The wettest winter, in 1996-97, received 5.45 inches; while the driest, 1946-47, received only 0.70 inch.

Spring 1999 (March, April, and May) was cooler than normal, averaging 51.7°F, 1.5° below normal (53.2°F). The warmest spring, in 1992, averaged 58.2°F, while the coolest (1955) averaged 48°F. Spring 1999 was the sixth driest on record with precipitation totaling 0.40 inch, 29% of normal (1.40 inches). The wettest spring, in 1995, received 3.28 inches, while the driest (1968) received only 0.09 inch.

The summer of 1999 (June, July, and August) was cooler than normal, averaging 72.5°F, 1.2° below normal (73.7°F). The hottest summer, in 1958, averaged 78.2°F, while the coolest, in 1980, averaged 70.2°F. The highest temperature was 105°F on July 28. Precipitation for the summer season totaled 0.95 inch, 115% of normal (0.83 inch). The wettest summer, in 1950, received 2.99 inches, while the driest, in 1973, received only 0.03 inch.

Autumn 1999 (September, October, and November) was warmer and drier than normal. The average temperature was 54.2°F, 1.3°F above normal (52.9°F). The warmest autumn (1990) averaged 57.1°F, while the coolest (1985) averaged 44.5°F. Precipitation totaled 0.74 inch, 46% of normal (1.60 inches). The wettest autumn (1973) received 4.79 inches, while the driest (1976) received only 0.04 inch.

The atmospheric pressure on Christmas Day reached 30.91 inches of mercury, the highest pressure since 31.12 inches on January 1, 1979 (the highest on record).

The following are some additional statistics for 1999:

| Category  | Number<br>of Days | Normal | Record  |         |
|---|-------------------|--------|---------|---------|
|   |                   |        | Maximum | Minimum |
| Maximum temperatures $\geq 100^{\circ}\text{F}$ | 7                 | 13     | 28      | 1       |
| Maximum temperatures $\geq 90^{\circ}\text{F}$  | 49                | 52     | 79      | 29      |
| Maximum temperatures $\leq 32^{\circ}\text{F}$  | 7                 | 24     | 58      | 2       |
| Minimum temperatures $\geq 70^{\circ}\text{F}$  | 9                 | 7      | 21      | 0       |
| Minimum temperatures $\leq 32^{\circ}\text{F}$  | 95                | 107    | 139     | 77      |
| Minimum temperatures $\leq 0^{\circ}\text{F}$   | 0                 | 3      | 18      | 0       |
| Thunderstorms                                   | 10                | 10     | 23      | 3       |
| Fog (visibility $\leq 6$ mi)                    | 27                | 45     | 76      | 22      |
| Dense fog (visibility $\leq 0.25$ mi)           | 15                | 24     | 42      | 9       |
| Peak wind gusts $\leq 12$ mph                   | 34                | 50     | 87      | 28      |
| Peak wind gusts $\geq 25$ mph                   | 192               | 155    | 192     | 123     |
| Peak wind gusts $\geq 40$ mph                   | 48                | 26     | 57      | 10      |
| Peak wind gusts $\geq 50$ mph                   | 10                | 5      | 18      | 0       |

## 2.1 Temperature

Calendar year 1999 was warmer than normal at the Hanford Meteorology Station. The average temperature was  $54.4^{\circ}\text{F}$ ,  $1.1^{\circ}$  above normal ( $53.3^{\circ}\text{F}$ ). The warmest years on record are 1992 and 1998, which averaged  $56.4^{\circ}\text{F}$ , while the coldest year on record is 1985, which averaged  $49.6^{\circ}\text{F}$ . The hottest temperature of 1999 was  $105^{\circ}\text{F}$  on July 28, while the coldest was  $18^{\circ}\text{F}$  on January 3.

The year was evenly divided with 6 months warmer than normal, and 6 months cooler than normal. Four months were  $3^{\circ}$  or more above normal, with January warmer by  $7^{\circ}$ . January was the fifth warmest on record, November the third warmest, and December the fifth warmest. Only one month (May) was more than  $3^{\circ}$  cooler than normal, and that by  $3.4^{\circ}$ . January 1999 was much warmer than normal, averaging  $38.3^{\circ}\text{F}$ ,  $7^{\circ}$  above normal ( $31.3^{\circ}\text{F}$ ), and was the fifth warmest January on record. The warmest January occurred in 1953 and averaged  $42.5^{\circ}\text{F}$ , while the coldest was  $12.1^{\circ}\text{F}$  in 1950.

January 1999 was much warmer than normal, averaging  $38.3^{\circ}\text{F}$ ,  $7^{\circ}$  above normal ( $31.3^{\circ}\text{F}$ ), and was the fifth warmest January on record. The warmest January occurred in 1953 and averaged  $42.5^{\circ}\text{F}$ , while the coldest was  $12.1^{\circ}\text{F}$  in 1950.

February 1999 was warmer than normal, averaging  $41.7^{\circ}\text{F}$ ,  $3.7^{\circ}$  above normal ( $38^{\circ}\text{F}$ ). The warmest February occurred in 1958 and averaged  $44.5^{\circ}\text{F}$ , while the coldest was  $25.6^{\circ}\text{F}$  in 1956.

March 1999 was slightly warmer than normal, averaging  $46.3^{\circ}\text{F}$ ,  $0.7^{\circ}$  above normal ( $45.6^{\circ}\text{F}$ ). The warmest March occurred in 1992 and averaged  $51.5^{\circ}\text{F}$ , while the coldest was  $39.4^{\circ}\text{F}$  in 1955.

April 1999 was cooler than normal, averaging  $50.9^{\circ}\text{F}$ ,  $1.8^{\circ}$  below normal ( $52.7^{\circ}\text{F}$ ). The warmest April occurred in 1994 and averaged  $58.2^{\circ}\text{F}$ , while the coldest was  $47.5^{\circ}\text{F}$  in 1955.

May 1999 was cooler than normal, averaging 57.9°F, 3.4° below normal (61.3°F). The first three weeks of the month averaged 7.2° below normal, with the first above normal day for the month not occurring until May 22. The warmest May occurred in 1947 and averaged 68.7°F, while the coolest was 56°F in 1984.

June 1999 was cooler than normal, averaging 67.4°F, 2.3° below normal (69.7°F). The warmest June occurred in 1992 and averaged 76.8°F, while the coolest was 63.0°F in 1953.

July 1999 was cooler than normal, averaging 73.8°F, 2.4° below normal (76.2°F). This was the fourth consecutive month with a below normal average temperature following a period (August 1997 through March 1999) when the monthly average temperature was above normal for 19 out of 20 months. The warmest July occurred in 1985 and averaged 82.2°F, while the coolest was 70.5°F in 1993.

August 1999 was slightly warmer than normal, averaging 76.2°F, 1.1° above normal (75.1°F). The warmest August occurred in 1967 and averaged 81.5°F, while the coolest was 69.8°F in 1964.

September 1999 was slightly cooler than normal, averaging 65.0°F, 0.7° below normal (65.7°F). The warmest September occurred in 1990 and averaged 72.4°F, while the coolest was 58.8°F in 1985. For calendar year 1999 there were 49 days with maximum temperatures  $\geq 90^\circ\text{F}$  compared to a normal of 52 days, and 7 days with maximum temperatures  $\geq 100^\circ\text{F}$  compared to a normal of 13 days.

October 1999 was cooler than normal, averaging 51.8°F, 1.1° below normal (52.9°F). The warmest October occurred in 1988 and averaged 59.6°F, while the coolest was 47.9°F in 1984. The first official (measured at the Hanford Meteorology Station) freezing temperature (minimum temperature  $\leq 32^\circ\text{F}$ ) occurred on October 17. The average date for the first freezing temperature is October 20, with the earliest occurring on September 25, 1972, and the latest on November 12, 1962.

November 1999 was the third warmest November on record, averaging 45.8°F, 5.6° above normal (40.2°F). The average temperature for every day after November 5 was normal or above, with the period from November 8 through 17 averaging 11.4° above normal. The maximum temperature of 76°F on November 13 was the warmest temperature ever recorded in November, breaking the record of 75°F recorded just the day before, and also on November 3, 1975. The warmest November occurred in 1990 and averaged 46.5°F, while the coolest was 24.8°F in 1985.

December 1999 was the fifth warmest December on record, averaging 37.7°F, 6.3° above normal (31.4°F). The period from December 11–19 averaged 14.1° above normal. The warmest December occurred in 1957 and averaged 38.5°F, while the coolest was 21.0°F in 1985.

Table 2.1 lists the daily temperature records for 1999 along with the previous record and year of occurrence. Table 2.2 lists the monthly and annual totals for numerous meteorological parameters for 1999. Table 2.3 lists the 1999 monthly and seasonal temperature and precipitation compared to normals and extremes. Tables 2.4, 2.5, and 2.6 list the 1999 monthly and annual average temperature, precipitation, and wind speed, respectively, from the Hanford Meteorological Monitoring Network.

**Table 2.1. 1999 Daily Temperature Records (previous record and year of occurrence in parentheses)**

| Date   | Maximum                        |  | Minimum                     |   |
|--------|--------------------------------|--|-----------------------------|---|
|        | High                           | Low  | High                        | Low   |
| Jan 14 | 62 (60, 1961)                  |  |                             |   |
| Jan 28 |                                |  | 42 (41, 1953)               |   |
| Jan 29 |                                |  | 47 (44, 1992)               |   |
| Feb 6  |                                |  | 44 (37, 1961)               |   |
| Feb 22 |                                |  | 42 <sup>(a)</sup> (42,1958) |   |
| May 7  |                                | 59 (61, 1990)                                |                             |   |
| May 8  |                                | 56 <sup>(a)</sup> (56,1962)                  |                             |   |
| May 9  |                                |  |                             | 34 <sup>(a)</sup> (34,1996 <sup>[b]</sup> ) |
| May 24 | 97 (96, 1962)                  |  |                             |   |
| Jun 2  |                                | 65 <sup>(a)</sup> (65,1980)                  |                             |   |
| Jun 6  |                                |  |                             | 38 (46, 1962)                               |
| Jun 7  |                                |  |                             | 42 (44, 1961)                               |
| Jun 9  |                                |  |                             | 42 (44, 1985)                               |
| Jun 13 |                                |  | 70 (67, 1989)               |   |
| Jun 15 | 102 <sup>(a)</sup> (102, 1961) |  |                             |   |
| Jul 3  |                                |  |                             | 45 (46, 1990)                               |
| Jul 5  |                                |  |                             | 47 <sup>(a)</sup> (47,1980)                 |
| Jul 26 |                                |  |                             | 53 (54, 1948)                               |
| Aug 3  |                                |  | 75 <sup>(a)</sup> (75,1994) |   |
| Aug 30 |                                | 64 <sup>(c)</sup> (68,1951)                  |                             |   |
| Aug 31 |                                | 72 <sup>(a)</sup> (72, 1971)                 |                             | 43 (45, 1965)                               |
| Sep 1  |                                |  |                             | 43 (44, 1980)                               |
| Oct 3  |                                |  |                             | 39 <sup>(a)</sup> (33,1973 <sup>[b]</sup> ) |
| Oct 13 | 81 (79, 1945)                  |  |                             |   |
| Oct 27 |                                | 43 <sup>(a)</sup> (43, 1993 <sup>[b]</sup> ) |                             |   |
| Nov 12 | 75 (65, 1991)                  |  |                             |   |
| Nov 13 | 76 <sup>(d)</sup> (64, 1987)   |  |                             |   |
| Dec 12 | 57 <sup>(a)</sup> (57, 1988)   |  |                             |   |
| Dec 15 |                                |  | 49 (41, 1956)               |   |
| Dec 16 | 56 (56, 1956)                  |  | 44 (43, 1973)               |   |
| Dec 18 | 56 <sup>(a)</sup> (56, 1956)   |  | 42 (38, 1994)               |   |

(a) Ties record.

(b) Most recent of several occurrences.

(c) All-time low maximum for month of August, previous record 67°F on August 20, 1959.

(d) All-time high maximum for month of November, previous record 75°F on November 12, 1999 and November 3, 1975.



Table 2.2. 1999 Climatological Data Summary

| Month | Temperatures, °F |                  |         |                          |          |                   |        |          | Degree Days<br>Base 65, °F |                          |         |                          | Precipitation, inches     |                          |                         |                   |       |                          |                         |                   | Relative<br>Humidity, % |                          |
|-------|------------------|------------------|---------|--------------------------|----------|-------------------|--------|----------|----------------------------|--------------------------|---------|--------------------------|---------------------------|--------------------------|-------------------------|-------------------|-------|--------------------------|-------------------------|-------------------|-------------------------|--------------------------|
|       | Averages         |                  |         |                          | Extremes |                   |        |          |                            |                          |         |                          | Snow, Ice Pellets, inches |                          |                         |                   |       |                          |                         |                   |                         |                          |
|       | Daily<br>Maximum | Daily<br>Minimum | Monthly | Departure <sup>(e)</sup> | Highest  | Date              | Lowest | Date     | Heating                    | Departure <sup>(e)</sup> | Cooling | Departure <sup>(e)</sup> | Total                     | Departure <sup>(e)</sup> | Greatest in<br>24 Hours | Date              | Total | Departure <sup>(e)</sup> | Greatest in<br>24 Hours | Date              | Average                 | Departure <sup>(e)</sup> |
| J     | 46.5             | 30.1             | 38.3    | +7.0                     | 62       | 14                | 18     | 3        | 829                        | -215                     | 0       | 0                        | 0.89                      | +0.10                    | 0.51                    | 22-23             | T     | -3.9                     | T                       | 22 <sup>(e)</sup> | 74.0                    | -2.4                     |
| F     | 50.7             | 32.7             | 41.7    | +3.7                     | 62       | 24                | 20     | 11       | 651                        | -113                     | 0       | 0                        | 0.70                      | +0.08                    | 0.32                    | 27                | T     | -2.0                     | T                       | 18                | 61.5                    | -8.8                     |
| M     | 57.4             | 35.2             | 46.3    | +0.7                     | 75       | 20                | 25     | 2        | 581                        | -21                      | 0       | 0                        | 0.06                      | -0.41                    | 0.02                    | 21 <sup>(e)</sup> | 0     | -0.3                     | 0                       | -                 | 52.8                    | -3.1                     |
| A     | 65.4             | 36.4             | 50.9    | -1.8                     | 82       | 24                | 25     | 10       | 424                        | +52                      | 0       | -3                       | T                         | -0.41                    | T                       | 19 <sup>(e)</sup> | 0     | -T <sup>(b)</sup>        | 0                       | -                 | 43.7                    | -3.5                     |
| M     | 71.8             | 43.9             | 57.9    | -3.4                     | 97       | 24                | 30     | 8        | 265                        | +101                     | 43      | -5                       | 0.34                      | -0.17                    | 0.18                    | 6                 | 0     | 0                        | 0                       | -                 | 41.0                    | -1.7                     |
| J     | 81.4             | 53.4             | 67.4    | -2.3                     | 102      | 15                | 38     | 6        | 62                         | +30                      | 135     | -40                      | 0.31                      | -0.07                    | 0.20                    | 8                 | 0     | 0                        | 0                       | -                 | 39.8                    | +1.0                     |
| J     | 88.9             | 58.6             | 73.8    | -2.4                     | 105      | 28                | 45     | 3        | 8                          | +3                       | 281     | -70                      | 0.07                      | -0.11                    | 0.05                    | 17                | 0     | 0                        | 0                       | -                 | 34.2                    | +0.7                     |
| A     | 90.7             | 61.7             | 76.2    | +1.1                     | 101      | 2                 | 43     | 31       | 17                         | +12                      | 366     | +49                      | 0.57                      | +0.30                    | 0.48                    | 5                 | 0     | 0                        | 0                       | -                 | 40.9                    | +5.1                     |
| S     | 81.4             | 48.6             | 65.0    | -0.7                     | 91       | 22 <sup>(e)</sup> | 36     | 28       | 65                         | -13                      | 66      | -32                      | 0.00                      | -0.31                    | 0.00                    | -                 | 0     | 0                        | 0                       | -                 | 36.3                    | -6.7                     |
| O     | 64.7             | 39.0             | 51.8    | -1.1                     | 81       | 13                | 27     | 27       | 407                        | +30                      | 0       | -3                       | 0.48                      | +0.10                    | 0.36                    | 27                | 0     | -0.1                     | 0                       | -                 | 49.4                    | -5.8                     |
| N     | 54.6             | 36.9             | 45.8    | +5.6                     | 76       | 13                | 26     | 3        | 576                        | -170                     | 0       | 0                        | 0.26                      | -0.65                    | 0.14                    | 5-6               | 0     | -1.8                     | 0                       | -                 | 72.2                    | -1.2                     |
| D     | 44.5             | 31.0             | 37.7    | +6.3                     | 62       | 16                | 20     | 8        | 846                        | -196                     | 0       | 0                        | 0.07                      | -0.96                    | 0.03                    | 31                | 0.6   | -5.1                     | 0.6                     | 31                | 75.4                    | -4.9                     |
| Year  | 66.5             | 42.3             | 54.4    | +1.1                     | 105      | Jul<br>28         | 18     | Jan<br>3 | 4,731                      | -500                     | 891     | -104                     | 3.75                      | -2.51                    | 0.51                    | Jan<br>22-23      | 0.6   | -13.2                    | 0.6                     | Dec<br>31         | 51.8                    | -2.5                     |

Table 2.2. (contd)

| Month | Mean Sky Cover, Tenths |                          | Solar Radiation, Langley's |                          |                      |                  |                   |        | 50-ft Wind         |                          |            |           | Number of Days |               |           |                            |                       |                         |                         |    |   |
|-------|------------------------|--------------------------|----------------------------|--------------------------|----------------------|------------------|-------------------|--------|--------------------|--------------------------|------------|-----------|----------------|---------------|-----------|----------------------------|-----------------------|-------------------------|-------------------------|----|---|
|       | Average                | Departure <sup>(a)</sup> | Average Daily Total        | Departure <sup>(a)</sup> | Greatest Daily Total | Date             | Least Daily Total | Date   | Average Speed, mph | Departure <sup>(a)</sup> | Speed, mph | Direction | Date           | Thunderstorms | Heavy Fog | Precipitation $\geq 1$ in. | Snowfall $\geq 1$ in. | Maximum Temperature, °F | Minimum Temperature, °F |    |   |
| J     | 8.7                    | +0.6                     | 82                         | -27                      | 151                  | 18               | 22                | 5      | 7.7                | +1.2                     | 55         | S         | 29             | 0             | 9         | 3                          | 0                     | 0                       | 3                       | 20 | 0 |
| F     | 7.7                    | +0.1                     | 155                        | -32                      | 319                  | 28               | 53                | 24     | 11.1               | +3.9                     | 65         | SSW       | 6              | 0             | 0         | 2                          | 0                     | 0                       | 0                       | 15 | 0 |
| M     | 7.0                    | +0.2                     | 296                        | -28                      | 465                  | 26               | 109               | 2      | 9.3                | +1.0                     | 52         | SW        | 29             | 0             | 0         | 0                          | 0                     | 0                       | 0                       | 13 | 0 |
| A     | 5.3                    | -1.3                     | 433                        | -19                      | 593                  | 29               | 206               | 18     | 8.8                | -0.2                     | 40         | NW        | 2              | 3             | 0         | 0                          | 0                     | 0                       | 0                       | 7  | 0 |
| M     | 4.2                    | -1.8                     | 547                        | -13                      | 702                  | 26               | 253               | 2      | 10.4               | +1.3                     | 45         | WNW       | 25             | 0             | 0         | 2                          | 0                     | 2                       | 0                       | 2  | 0 |
| J     | 5.2                    | 0.0                      | 586                        | -29                      | 717                  | 26               | 293               | 2      | 9.7                | +0.5                     | 42         | W         | 8              | 4             | 0         | 2                          | 0                     | 5                       | 0                       | 0  | 0 |
| J     | 1.8                    | -1.5                     | 643                        | +11                      | 737                  | 1                | 402               | 17     | 9.4                | +0.6                     | 44         | NW        | 24             | 2             | 0         | 0                          | 0                     | 17                      | 0                       | 0  | 0 |
| A     | 3.8                    | +0.3                     | 483                        | -55                      | 640                  | 1                | 88                | 30     | 8.2                | +0.3                     | 44         | NW        | 29             | 4             | 0         | 1                          | 0                     | 21                      | 0                       | 0  | 0 |
| S     | 1.7                    | -2.3                     | 425                        | +17                      | 511                  | 3 <sup>(c)</sup> | 289               | 23     | 7.7                | +0.3                     | 43         | WSW       | 25             | 0             | 0         | 0                          | 0                     | 4                       | 0                       | 0  | 0 |
| O     | 4.7                    | -1.0                     | 241                        | -18                      | 371                  | 1                | 46                | 26     | 7.7                | +1.2                     | 46         | W         | 31             | 0             | 1         | 1                          | 0                     | 0                       | 0                       | 6  | 0 |
| N     | 7.4                    | -0.4                     | 107                        | -16                      | 227                  | 4                | 23                | 24     | 7.5                | +1.1                     | 41         | SW        | 8              | 0             | 1         | 1                          | 0                     | 0                       | 0                       | 10 | 0 |
| D     | 8.0                    | -0.1                     | 70                         | -16                      | 148                  | 7                | 8                 | 27     | 7.5                | +1.6                     | 62         | WSW       | 18             | 0             | 4         | 0                          | 0                     | 0                       | 4                       | 22 | 0 |
| Year  | 5.5                    | -0.6                     | 339                        | -19                      | 737                  | Jul 1            | 8                 | Dec 27 | 8.8                | +1.1                     | 65         | SSW       | Feb 6          | 10            | 15        | 12                         | 0                     | 49                      | 7                       | 95 | 0 |

(a) Departure columns indicate positive or negative departure of meteorological parameters from 30-year (1961-1990) climatological normals.

(b) Trace of snowfall is normal; no occurrence in April.

(c) Latest date of multiple occurrences.

T = Trace.

Table 2.3. 1999 Monthly and Seasonal Temperature and Precipitation

| Month/<br>Season | Average<br>Temperature,<br>°F | Departure <sup>(a)</sup> | Warmest<br>of Record, |      | Coolest of<br>Record,<br>°F | Year                | Precipitation,<br>in. | Percent<br>of<br>Normal |        | Wettest of<br>Record, in. | Year    | Driest of<br>Record,<br>in. | Year                |
|------------------|-------------------------------|--------------------------|-----------------------|------|-----------------------------|---------------------|-----------------------|-------------------------|--------|---------------------------|---------|-----------------------------|---------------------|
|                  |                               |                          | Normal,<br>°F         | °F   |                             |                     |                       | Normal                  | Normal |                           |         |                             |                     |
| Jan              | 38.3                          | +7.0                     | 31.3                  | 42.5 | 12.1                        | 1953                | 0.89                  | 113                     | 0.79   | 2.47                      | 1970    | 0.08                        | 1977                |
| Feb              | 41.7                          | +3.7                     | 38.0                  | 44.5 | 25.6                        | 1958                | 0.70                  | 113                     | 0.62   | 2.10                      | 1961    | T                           | 1988 <sup>(b)</sup> |
| Mar              | 46.3                          | +0.7                     | 45.6                  | 51.5 | 39.4                        | 1992                | 0.06                  | 13                      | 0.47   | 1.86                      | 1957    | 0.02                        | 1968                |
| Apr              | 50.9                          | -1.8                     | 52.7                  | 58.2 | 47.5                        | 1994                | T                     | 0                       | 0.41   | 1.54                      | 1995    | T                           | 1999 <sup>(b)</sup> |
| May              | 57.9                          | -3.4                     | 61.3                  | 68.7 | 56.0                        | 1947                | 0.34                  | 67                      | 0.51   | 2.03                      | 1972    | T                           | 1992 <sup>(b)</sup> |
| Jun              | 67.4                          | -2.3                     | 69.7                  | 76.8 | 63.0                        | 1992                | 0.31                  | 82                      | 0.38   | 2.92                      | 1950    | T                           | 1986 <sup>(b)</sup> |
| Jul              | 73.8                          | -2.4                     | 76.2                  | 82.2 | 70.5                        | 1985                | 0.07                  | 39                      | 0.18   | 1.76                      | 1993    | T                           | 1980 <sup>(b)</sup> |
| Aug              | 76.2                          | +1.1                     | 75.1                  | 81.5 | 69.8                        | 1967                | 0.57                  | 211                     | 0.27   | 1.36                      | 1977    | 0                           | 1988 <sup>(b)</sup> |
| Sep              | 65.0                          | -0.7                     | 65.7                  | 72.4 | 58.8                        | 1990                | 0.00                  | 0                       | 0.31   | 1.34                      | 1947    | 0                           | 1999 <sup>(b)</sup> |
| Oct              | 51.8                          | -1.1                     | 52.9                  | 59.6 | 47.9                        | 1988                | 0.48                  | 126                     | 0.38   | 2.72                      | 1957    | T                           | 1987 <sup>(b)</sup> |
| Nov              | 45.8                          | +5.6                     | 40.2                  | 46.5 | 24.8                        | 1990                | 0.26                  | 29                      | 0.91   | 2.67                      | 1996    | T                           | 1976                |
| Dec              | 37.7                          | +6.3                     | 31.4                  | 38.5 | 21.0                        | 1957                | 0.07                  | 7                       | 1.03   | 3.69                      | 1996    | 0.07                        | 1999                |
| Winter           | 37.7                          | +4.1                     | 33.6                  | 40.6 | 24.2                        | 1966-67             | 2.03                  | 83                      | 2.44   | 5.45                      | 1996-97 | 0.70                        | 1946-47             |
| Spring           | 51.7                          | -1.5                     | 53.2                  | 58.2 | 48.0                        | 1992                | 0.40                  | 29                      | 1.40   | 3.28                      | 1995    | 0.09                        | 1968                |
| Summer           | 72.5                          | -1.2                     | 73.7                  | 78.2 | 70.2                        | 1958                | 0.95                  | 115                     | 0.83   | 2.99                      | 1950    | 0.03                        | 1973                |
| Autumn           | 54.2                          | +1.3                     | 52.9                  | 57.1 | 44.5                        | 1990                | 0.74                  | 46                      | 1.60   | 4.79                      | 1973    | 0.04                        | 1976                |
| Calendar<br>year | 54.4                          | +1.1                     | 53.3                  | 56.4 | 49.6                        | 1998 <sup>(b)</sup> | 3.75                  | 60                      | 6.26   | 12.31                     | 1995    | 2.99                        | 1976                |

(a) Departure indicates positive or negative departure from 30-year (1961-1990) climatological normals.

(b) Latest of multiple occurrences.

T = Trace.

**Table 2.4. 1999 Monthly and Annual Average Temperatures (°F) from the Hanford Meteorological Monitoring Network**

| Station | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Annual |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| 1 PROS  | 38.3 | 41.8 | 45.5 | 50.7 | 58.0 | 68.0 | 74.3 | 76.5 | 62.6 | 50.7 | 45.6 | 38.4 | 54.3   |
| 2 EOC   | 39.8 | 41.4 | 45.5 | 51.7 | 57.3 | 66.5 | 73.7 | 76.4 | 65.9 | 53.3 | 47.0 | 38.2 | 54.8   |
| 3 ARMY  | 38.1 | 42.5 | 46.0 | 51.7 | 58.8 | 68.3 | 75.2 | 77.4 | 64.5 | 51.8 | 47.3 | 38.8 | 55.2   |
| 4 RSPG  | 39.3 | 42.8 | 45.6 | 51.3 | 58.1 | 67.5 | 74.2 | 76.8 | 63.6 | 51.0 | 45.7 | 38.7 | 54.6   |
| 5 EDNA  | 41.1 | 45.5 | 47.2 | 52.8 | 59.2 | 68.3 | 74.4 | 76.4 | 63.1 | 51.1 | 45.5 | 38.2 | 55.3   |
| 6 200E  | 38.7 | 42.3 | 46.7 | 53.1 | 59.7 | 68.9 | 75.9 | 77.9 | 66.4 | 53.4 | 47.0 | 39.2 | 55.9   |
| 7 200W  | 37.3 | 41.1 | 45.0 | 50.3 | 58.0 | 67.8 | 74.6 | 76.6 | 62.5 | 50.1 | 45.3 | 38.1 | 54.0   |
| 8 BVLY  | 38.6 | 41.5 | 46.4 | 52.7 | 59.0 | 67.7 | 74.0 | 76.0 | 64.3 | 52.4 | 46.7 | 39.0 | 54.9   |
| 9 FFTF  | 39.1 | 42.1 | 45.9 | 51.7 | 58.5 | 67.9 | 74.5 | 76.7 | 64.6 | 52.4 | 46.8 | 38.8 | 55.0   |
| 10 YAKB | 37.8 | 41.1 | 45.9 | 52.1 | 58.6 | 68.0 | 75.0 | 77.2 | 65.8 | 52.5 | 46.2 | 38.3 | 55.0   |
| 11 300A | 39.6 | 42.6 | 45.7 | 51.4 | 58.4 | 67.8 | 73.7 | 75.8 | 63.0 | 51.5 | 47.0 | 39.9 | 54.7   |
| 12 WYEB | 38.3 | 41.9 | 45.7 | 51.9 | 58.7 | 68.2 | 75.0 | 77.0 | 64.4 | 52.1 | 46.0 | 38.5 | 54.9   |
| 13 100N | 37.5 | 40.9 | 45.4 | 51.6 | 58.3 | 67.8 | 73.9 | 75.9 | 64.0 | 52.0 | 45.6 | 38.4 | 54.3   |
| 14 WPPS | 38.3 | 41.8 | 45.2 | 50.7 | 58.3 | 68.4 | 74.9 | 77.0 | 63.4 | 51.7 | 46.1 | 38.7 | 54.6   |
| 15 FRNK | 38.8 | 41.2 | 45.0 | 50.6 | 56.9 | 65.1 | 70.7 | 72.2 | 61.8 | 51.0 | 45.6 | 38.2 | 53.2   |
| 16 GABL | 39.1 | 41.3 | 45.7 | 52.3 | 58.0 | 66.7 | 74.2 | 76.7 | 66.9 | 53.8 | 46.6 | 38.2 | 55.1   |
| 17 RING | 38.2 | 41.5 | 45.6 | 50.3 | 57.4 | 64.9 | 70.7 | 72.8 | 60.8 | 50.3 | 45.3 | 38.5 | 53.0   |
| 18 RICH | 40.8 | 43.4 | 46.5 | 52.3 | 59.0 | 68.0 | 74.0 | 76.5 | 64.0 | 52.7 | 47.5 | 40.2 | 55.5   |
| 19 PFP  | 37.9 | 41.6 | 45.8 | 51.7 | 58.5 | 67.8 | 74.9 | 77.1 | 65.0 | 52.1 | 46.0 | 38.4 | 54.8   |
| 20 RMTN | 33.5 | 31.6 | 36.0 | 42.4 | 47.6 | 56.8 | 64.8 | 68.1 | 59.0 | 47.0 | 41.3 | 30.6 | 46.7   |
| 21 HMS  | 38.3 | 41.7 | 46.3 | 50.9 | 57.9 | 67.4 | 73.8 | 76.2 | 65.0 | 51.8 | 45.8 | 37.7 | 54.4   |
| 22 PASC | 40.2 | 43.4 | 46.4 | 52.2 | 59.5 | 68.6 | 74.3 | 76.8 | 63.3 | 52.0 | 46.8 | 39.9 | 55.4   |
| 23 GABW | 36.7 | 40.7 | 44.8 | 50.5 | 58.0 | 68.0 | 74.4 | 76.1 | 62.5 | 50.4 | 45.0 | 37.5 | 53.8   |
| 24 100F | 37.6 | 41.4 | 45.3 | 51.2 | 58.5 | 68.2 | 74.4 | 76.4 | 63.3 | 51.1 | 45.3 | 38.3 | 54.3   |
| 25 VERN | 38.4 | 41.9 | 46.6 | 53.0 | 59.6 | 68.3 | 74.8 | 77.1 | 65.7 | 53.3 | 47.4 | 39.5 | 55.5   |
| 26 BENT | 38.3 | 40.5 | 44.8 | 51.0 | 56.7 | 66.3 | 72.4 | 74.4 | 63.9 | 51.6 | 45.4 | 37.4 | 53.6   |
| 27 VSTA | 41.6 | 44.0 | 47.0 | 53.0 | 59.4 | 68.2 | 74.4 | 76.5 | 64.4 | 52.9 | 48.1 | 40.5 | 55.9   |
| 28 SURF | 40.6 | 42.2 | 45.1 | 51.5 | 57.3 | 66.3 | 73.4 | 75.9 | 64.1 | 52.2 | 46.6 | 40.3 | 54.6   |
| 29 100K | 37.4 | 41.3 | 45.8 | 51.9 | 58.9 | 68.4 | 74.8 | 76.5 | 64.4 | 52.1 | 45.9 | 38.4 | 54.7   |
| 30 HAMR | 40.8 | 42.8 | 46.2 | 51.8 | 58.7 | 67.7 | 74.0 | 76.7 | 63.8 | 51.9 | 47.8 | 39.6 | 55.4   |

**Table 2.5. 1999 Monthly and Annual Average Precipitation (inches) from the Hanford Meteorological Monitoring Network<sup>(a)</sup>**

| Station | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Annual |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| 1 PROS  | 0.74 | 0.74 | 0.07 | 0.06 | 0.39 | 0.03 | 0.01 | 0.11 | 0.00 | 0.33 | 0.39 | 0.35 | 3.22   |
| 2 EOC   | 1.17 | 1.65 | 0.14 | 0.11 | 0.46 | 0.13 | 0.00 | 0.31 | 0.00 | 0.46 | 0.81 | 0.64 | 5.88   |
| 3 ARMY  | 0.66 | 0.52 | 0.02 | 0.01 | 0.27 | 0.04 | 0.01 | 0.17 | 0.00 | 0.45 | 0.39 | 0.15 | 2.69   |
| 4 RSPG  | 0.58 | 0.51 | 0.09 | 0.21 | 0.22 | 0.08 | 0.11 | 0.12 | 0.02 | 0.41 | 0.40 | 0.23 | 2.98   |
| 6 200E  | 0.77 | 0.52 | 0.03 | 0.01 | 0.42 | 0.06 | 0.03 | 0.34 | 0.00 | 0.36 | 0.18 | 0.02 | 2.74   |
| 7 200W  | 0.59 | 0.35 | 0.07 | 0.02 | 0.24 | 0.48 | 0.10 | 0.08 | 0.00 | 0.44 | 0.34 | 0.16 | 2.87   |
| 8 BVLY  | 1.03 | 0.47 | 0.02 | 0.05 | 0.34 | 0.12 | 0.01 | 0.24 | 0.02 | 0.32 | 0.31 | 0.04 | 2.97   |
| 9 FFTF  | 0.52 | 0.33 | 0.03 | 0.02 | 0.19 | 0.06 | 0.02 | 0.12 | 0.00 | 0.24 | 0.14 | 0.23 | 1.90   |
| 10 YAKB | 0.48 | 0.30 | 0.02 | 0.02 | 0.21 | 0.38 | 0.42 | 0.13 | 0.00 | 0.33 | 0.17 | 0.11 | 2.57   |
| 11 300A | 0.57 | 0.50 | 0.06 | 0.17 | 0.34 | 0.02 | 0.00 | 0.30 | 0.00 | 0.35 | 0.23 | 0.25 | 2.79   |
| 12 WYEB | 0.66 | 0.58 | 0.00 | 0.04 | 0.34 | 0.02 | 0.00 | 0.24 | 0.00 | 0.36 | 0.35 | 0.26 | 2.85   |
| 13 100N | 0.82 | 0.66 | 0.00 | 0.01 | 0.34 | 0.07 | 0.04 | 0.21 | 0.00 | 0.26 | 0.21 | 0.15 | 2.77   |
| 14 WPPS | 0.76 | 0.66 | 0.01 | 0.10 | 0.38 | 0.02 | 0.02 | 0.46 | 0.00 | 0.46 | 0.38 | 0.32 | 3.57   |
| 17 RING | 0.65 | 0.80 | 0.02 | 0.09 | 0.55 | 0.29 | 0.05 | 0.55 | 0.00 | 0.45 | 0.41 | 0.42 | 4.28   |
| 18 RICH | 0.58 | 0.47 | 0.04 | 0.19 | 0.27 | 0.03 | 0.00 | 0.05 | 0.00 | 0.38 | 0.42 | 0.23 | 2.66   |
| 20 RMTN | 0.71 | 0.63 | 0.09 | 0.10 | 0.53 | 0.08 | 0.02 | 0.14 | 0.01 | 0.31 | 0.32 | 0.30 | 3.24   |
| 21 HMS  | 0.89 | 0.70 | 0.06 | 0.00 | 0.34 | 0.31 | 0.07 | 0.57 | 0.00 | 0.48 | 0.26 | 0.07 | 3.75   |
| 22 PASC | 0.63 | 0.65 | 0.12 | 0.20 | 0.44 | 0.01 | 0.19 | 0.20 | 0.00 | 0.44 | 0.35 | 0.24 | 3.47   |
| 24 100F | 0.78 | 0.69 | 0.02 | 0.02 | 0.40 | 0.08 | 0.02 | 0.18 | 0.01 | 0.36 | 0.40 | 0.28 | 3.24   |
| 26 BENT | 0.84 | 0.83 | 0.08 | 0.09 | 0.37 | 0.05 | 0.00 | 0.09 | 0.00 | 0.56 | 0.48 | 0.29 | 3.68   |
| 27 VSTA | 0.60 | 0.54 | 0.04 | 0.08 | 0.22 | 0.00 | 0.14 | 0.13 | 0.00 | 0.44 | 0.24 | 0.22 | 2.65   |
| 28 SURF | 1.41 | 1.12 | 0.22 | 0.02 | 0.45 | 0.00 | 0.00 | 0.36 | 0.00 | 0.58 | 1.21 | 0.45 | 5.82   |
| 29 100K | 0.87 | 0.61 | 0.04 | 0.05 | 0.35 | 0.16 | 0.07 | 0.28 | 0.25 | 0.33 | 0.31 | 0.17 | 3.49   |

(a) Stations 5, 15, 16, 19, 23, and 25 are solar powered; therefore, insufficient power is available to operate the heated tipping-bucket precipitation gauges.

**Table 2.6.** 1999 Monthly and Annual Average Wind Speed (mph) from the Hanford Meteorological Monitoring Network

| Station | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Annual |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| 1 PROS  | 7.3  | 10.7 | 9.1  | 7.6  | 8.6  | 8.8  | 7.7  | 7.1  | 6.1  | 7.0  | 7.2  | 8.1  | 7.9    |
| 2 EOC   | 10.8 | 14.9 | 11.3 | 9.8  | 10.3 | 8.5  | 8.3  | 8.0  | 8.4  | 8.8  | 10.6 | 11.4 | 10.1   |
| 3 ARMY  | 6.4  | 10.8 | 8.3  | 7.5  | 8.6  | 7.8  | 7.6  | 6.3  | 6.3  | 6.2  | 6.4  | 7.5  | 7.5    |
| 4 RSPG  | 7.0  | 10.0 | 8.7  | 8.4  | 9.2  | 7.5  | 7.8  | 6.7  | 8.0  | 7.8  | 6.7  | 7.5  | 7.9    |
| 5 EDNA  | 6.0  | 8.3  | 7.2  | 6.8  | 8.3  | 8.1  | 7.5  | 6.5  | 5.8  | 5.8  | 5.8  | 6.1  | 6.8    |
| 6 200E  | 6.4  | 10.1 | 8.8  | 8.6  | 10.1 | 9.5  | 9.0  | 7.5  | 7.3  | 7.2  | 6.6  | 6.9  | 8.2    |
| 7 200W  | 5.8  | 9.1  | 7.3  | 6.7  | 8.5  | 7.6  | 7.3  | 6.0  | 5.6  | 5.6  | 5.5  | 6.2  | 6.7    |
| 8 BVLY  | 6.0  | 8.5  | 7.5  | 7.7  | 8.3  | 8.7  | 7.9  | 6.5  | 5.8  | 5.5  | 6.2  | 5.5  | 7.0    |
| 9 FFTF  | 7.9  | 11.3 | 9.7  | 8.3  | 9.4  | 9.0  | 7.9  | 7.5  | 6.9  | 7.6  | 7.8  | 8.6  | 8.5    |
| 10 YAKB | 7.0  | 9.9  | 8.9  | 8.6  | 10.3 | 9.6  | 9.4  | 7.6  | 7.7  | 7.3  | 6.9  | 6.9  | 8.3    |
| 11 300A | 7.9  | 10.9 | 9.1  | 7.9  | 8.8  | 8.9  | 8.2  | 7.1  | 6.3  | 6.8  | 7.2  | 8.5  | 8.1    |
| 12 WYEB | 7.4  | 10.1 | 8.4  | 7.7  | 9.0  | 8.4  | 7.8  | 7.0  | 6.6  | 7.2  | 7.1  | 7.6  | 7.8    |
| 13 100N | 5.2  | 7.6  | 6.5  | 7.2  | 8.0  | 8.3  | 7.8  | 5.8  | 5.6  | 5.4  | 5.0  | 5.7  | 6.5    |
| 14 WPPS | 7.2  | 9.8  | 8.3  | 7.1  | 8.4  | 8.0  | 7.4  | 6.8  | 5.7  | 6.3  | 6.8  | 7.5  | 7.4    |
| 15 FRNK | 8.0  | 10.0 | 8.3  | 6.9  | 7.0  | 7.1  | 6.2  | 6.1  | 5.5  | 6.1  | 6.7  | 7.9  | 7.1    |
| 16 GABL | 10.9 | 15.1 | 12.4 | 12.6 | 13.9 | 13.4 | 12.3 | 11.0 | 10.4 | 10.5 | 10.1 | 10.7 | 11.9   |
| 17 RING | 6.5  | 8.6  | 7.7  | 7.0  | 7.7  | 7.0  | 6.0  | 5.5  | 5.7  | 5.7  | 5.5  | 6.8  | 6.6    |
| 18 RICH | 7.0  | 9.5  | 7.9  | 6.8  | 7.9  | 7.6  | 6.5  | 6.1  | 5.1  | 5.4  | 6.2  | 7.4  | 6.9    |
| 19 PFP  | 4.8  | 7.6  | 6.0  | 5.5  | 6.7  | 5.9  | 5.8  | 4.7  | 4.3  | 4.3  | 4.1  | 4.8  | 5.4    |
| 20 RMTN | 21.7 | 27.6 | 20.6 | 20.8 | 19.2 | 16.1 | 14.7 | 14.3 | 16.3 | 17.9 | 21.8 | 24.1 | 19.5   |
| 21 HMS  | 7.7  | 11.1 | 9.3  | 8.8  | 10.4 | 9.7  | 9.4  | 8.2  | 7.7  | 7.7  | 7.5  | 7.5  | 8.8    |
| 22 PASC | 5.9  | 8.2  | 7.0  | 5.8  | 6.7  | 6.8  | 5.4  | 5.7  | 4.2  | 4.7  | 5.2  | 6.4  | 6.0    |
| 23 GABW | 5.6  | 8.5  | 7.2  | 7.2  | 9.0  | 8.7  | 8.2  | 6.7  | 5.9  | 6.2  | 5.6  | 6.0  | 7.1    |
| 24 100F | 5.7  | 8.1  | 6.8  | 6.8  | 8.3  | 8.2  | 7.2  | 6.3  | 5.5  | 5.6  | 5.3  | 5.9  | 6.6    |
| 25 VERN | 6.4  | 9.0  | 8.4  | 8.8  | 10.1 | 10.3 | 9.6  | 7.8  | 7.1  | 7.0  | 6.9  | 6.7  | 8.2    |
| 26 BENT | 7.2  | 8.6  | 7.6  | 8.2  | 7.8  | 6.7  | 6.6  | 5.9  | 6.7  | 6.1  | 5.9  | 7.1  | 7.0    |
| 27 VSTA | 7.0  | 9.3  | 7.8  | 6.5  | 7.6  | 7.6  | 6.0  | 7.4  | 4.6  | 5.4  | 6.1  | 7.5  | 6.9    |
| 28 SURF | 8.7  | 10.0 | 9.8  | 11.3 | 12.1 | 15.4 | 12.2 | 11.5 | 8.2  | 8.2  | 7.1  | 8.0  | 10.1   |
| 29 100K | 5.1  | 7.9  | 6.6  | 7.0  | 8.5  | 8.6  | 7.7  | 6.2  | 5.5  | 5.5  | 5.0  | 5.7  | 6.6    |
| 30 HAMR | 6.9  | 9.8  | 8.4  | 7.5  | 8.2  | 8.1  | 7.2  | 6.8  | 6.0  | 6.4  | 6.6  | 7.5  | 7.4    |

Figure 2.1 depicts the 1999 observed daily maximum and minimum temperatures and the normal maximum, minimum, and mean daily temperatures for the Hanford Meteorology Station.

## **2.2 Precipitation**

1999 was the fourth driest year on record. Precipitation totaled 3.75 inches, 60% of normal (6.26 inches). The wettest year was 1995 with 12.31 inches; the driest was 1976 with only 2.99 inches. Calendar year snowfall totaled 0.6 inch, least on record. The previous low was 0.9 inch in 1958, with an annual normal snowfall of 13.8 inches. The greatest calendar year snowfall was 57.5 inches (1996).

January 1999 had a total of 0.89 inch of precipitation, 113% of normal (0.79 inch). The wettest January, in 1970, received 2.47 inches, while the driest, in 1977, received 0.08 inch. There was only a trace of snowfall recorded in January 1999, compared to a January normal of 3.9 inches. The snowiest January received 23.4 inches (1950), while January 1994 received no snowfall.

Precipitation for February 1999 totaled 0.70 inch, 113% of normal (0.62 inch). The wettest February, in 1961, received 2.10 inches, while the driest, in 1988, received only a trace. There was only a trace of snowfall recorded in February 1999, compared to a February normal of 2.0 inches. The snowiest February received 17.0 inches (1989), while February 1991 received no snowfall.

Precipitation for March 1999 totaled only 0.06 inch, 13% of normal (0.47 inch). The wettest March, in 1957, received 1.86 inches, while the driest, in 1968, received only 0.02 inch. No snowfall was recorded in March 1999, compared to a March normal of 0.3 inch. The snowiest March received 4.2 inches (1951), while numerous March's have received no snowfall.

There was only a trace of precipitation in April 1999, 0% of normal (0.41 inch), tying four prior Aprils (1986, 1977, 1973, and 1956) as the driest on record. The wettest April, in 1995, received 1.54 inches. No snowfall was recorded in April 1999, compared to an April normal of a trace. The snowiest April received 1.0 inch (1982), while numerous Aprils have received no snowfall.

May 1999 had a total of 0.34 inch of precipitation, 67% of normal (0.51 inch). The wettest May, in 1972, received 2.03 inches, while the driest, in 1992 and earlier years, received only a trace.

June 1999 had a total of 0.31 inch of precipitation, 82% of normal (0.38 inch). The wettest June, in 1950, received 2.92 inches, while the driest, in 1986 and earlier years, received only a trace.

Precipitation for July 1999 totaled 0.07 inch, 39% of normal (0.18 inch). The wettest July, in 1993, received 1.76 inches, while the driest, in 1980 and earlier years, received only a trace.

Precipitation for August 1999 totaled 0.57 inch, 211% of normal (0.27 inch). Most of the precipitation (0.48 inch) was received during a thunderstorm on August 5, with 0.40 inch falling in a 35-minute period. The wettest August, in 1977, received 1.36 inches, while the driest, in 1988, received no precipitation.

No precipitation was recorded during September, tying the record for the driest September on record. September 1991 was also totally dry. There have only been 4 months since recordkeeping began at the

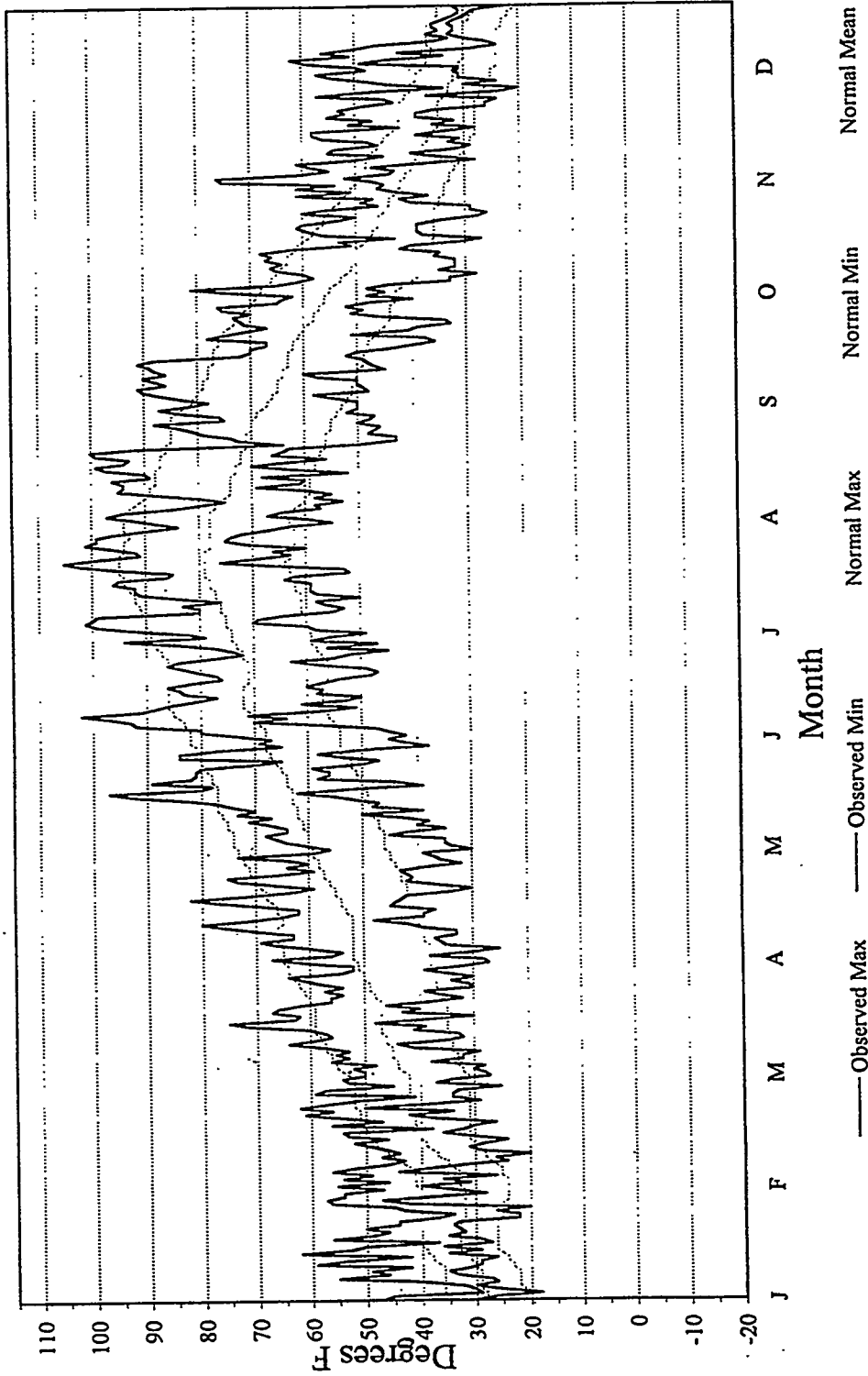


Figure 2.1. 1999 Observed Daily Temperatures from the Hanford Meteorology Station



Hanford Meteorology Station that have received no precipitation—August 1955 and 1988, and September 1991 and 1999. The normal rainfall amount for September is 0.31 inch. The wettest September, in 1947, received 1.34 inches.

Precipitation for October 1999 totaled 0.48 inch, 126% of normal (0.38 inch). The wettest October, in 1957, received 2.72 inches, while the October with the least precipitation (1987 and earlier years) received only a trace.

November 1999 had a total of 0.26 inch of precipitation, 29% of normal (0.91 inch). The wettest November, in 1996, received 2.67 inches, while November 1976 received only a trace. No snowfall was recorded during November 1999, compared to a normal of 1.8 inches. The snowiest November (1985) received 18.3 inches, while many Novembers have been without snow.

December 1999 had a total of 0.07 inch of precipitation, 7% of normal (1.03 inches) and was the driest December on record. The previous driest December was 1976 with 0.11 inch. The wettest December, in 1996, received 3.69 inches. Snowfall for December 1999 totaled 0.6 inch, compared to a normal of 5.7 inches. The snowiest December (1996) received 22.6 inches, while December 1962 received only a trace. Snowfall for the 1999-2000 winter season (through December 1999) is 0.6 inch, compared to a normal through December of 7.6 inches.

## **2.3 Wind**

1999 was the windiest year on record, averaging 8.8 miles per hour (mph), 1.1 mph above normal (7.7 mph). The previous windiest year was 1983, which averaged 8.4 mph. The peak gust for the year was 65 mph on February 6.

The average wind speed for January 1999 was 7.7 mph compared to a January normal of 6.5 mph. The peak wind gust for the month was 55 mph recorded on January 29. The record wind gust for January was 80 mph in 1972. The windiest January averaged 10.3 mph (1972); while the January with the lightest winds (1985) averaged 2.9 mph.

February 1999 was the windiest February on record, and tied April 1972 as the windiest month ever recorded at the Hanford Meteorology Station. The average wind speed for the month was 11.1 mph, compared to a February normal of 7.2 mph. The previous windiest February was 10.8 mph in 1976. The February with the lightest winds was 4.6 mph in 1963. The peak gust for the month was 65 mph on February 6, tying the record gust for February. A 65-mph gust was also recorded in February 1971. There were 10 days in February 1999 with gusts of 40 mph or greater; this tied February 1976 for most wind gusts  $\geq 40$  mph. The most for any month was 11 in January 1990.

March 1999 was windier than normal, with an average wind speed of 9.3 mph, 1.0 mph above normal (8.3 mph). The windiest March on record averaged 10.7 mph (1977), while the March with the lightest winds (1958) averaged 5.9 mph. The peak gust for the month was 52 mph on March 29. The record wind gust for March was 70 mph in 1956.

The average wind speed for April 1999 was nearly normal, with an average speed of 8.8 mph, 0.2 mph below normal (9.0 mph). The windiest April on record averaged 11.1 mph (1972), while the

April with the lightest winds (1989) averaged 7.4 mph. The peak gust for the month was 40 mph on April 2. The record wind gust for April was 73 mph in 1972.

The average wind speed for May 1999 was 10.4 mph, 1.3 mph above normal (9.1 mph). The windiest May on record averaged 10.7 mph (1983), while the May with the lightest winds (1957) averaged 5.8 mph. The peak gust for the month was 45 mph on May 25. The record wind gust for May was 71 mph in 1948.

The average wind speed for June 1999 was 9.7 mph, 0.5 mph above normal (9.2 mph). The windiest June on record averaged 10.7 mph (1983), while the June with the lightest winds (1950) averaged 7.7 mph. The peak gust for the month was 42 mph on June 8. The record wind gust for June was 72 mph in 1957.

The average wind speed for July 1999 was 9.4 mph, 0.6 mph above normal (8.8 mph). The windiest July on record averaged 10.7 mph (1983), while the July with the lightest winds (1955) averaged 6.8 mph. The peak gust for the month was 44 mph on July 24. The record wind gust for July was 69 mph in 1979.

The average wind speed for August 1999 was 8.2 mph, 0.3 mph above normal (7.9 mph). The windiest August on record averaged 9.5 mph (1996), while the August with the lightest winds (1956) averaged 6.0 mph. The peak gust for the month was 44 mph on August 29. The record wind gust for August was 66 mph in 1961.

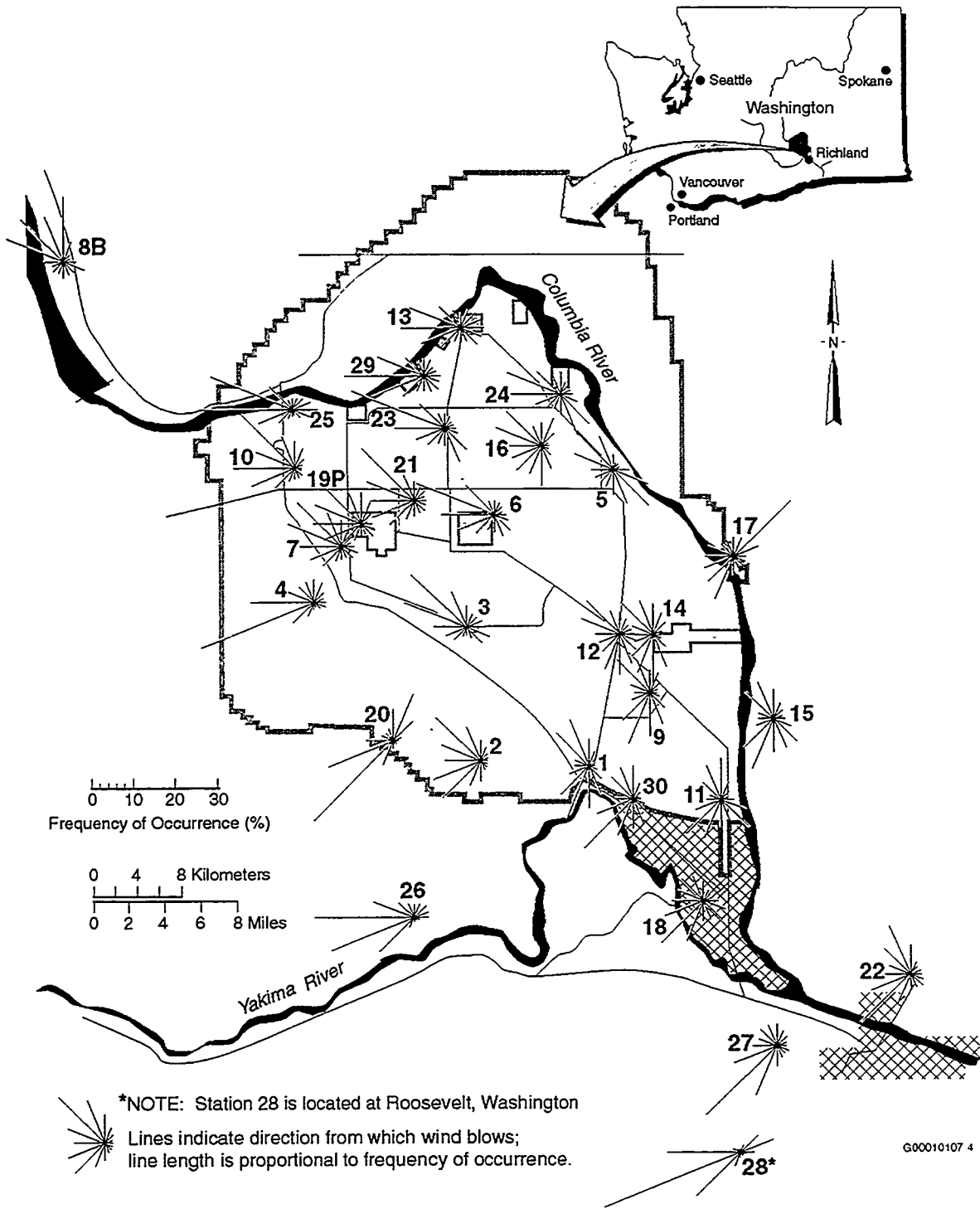
The average wind speed for September 1999 was 7.7 mph, 0.3 mph above normal (7.4 mph). The windiest September on record averaged 9.2 mph (1961), while the September with the lightest winds (1957) averaged 5.4 mph. The peak gust for the month was 42 mph on September 25. The record wind gust for September was 65 mph in 1953.

The average wind speed for October 1999 was 7.7 mph, 1.2 mph above normal (6.5 mph). The windiest October on record averaged 9.1 mph (1946), while the October with the lightest winds (1952) averaged 4.4 mph. The peak gust for the month was 46 mph on October 31. The record wind gust for October was 72 mph in 1997.

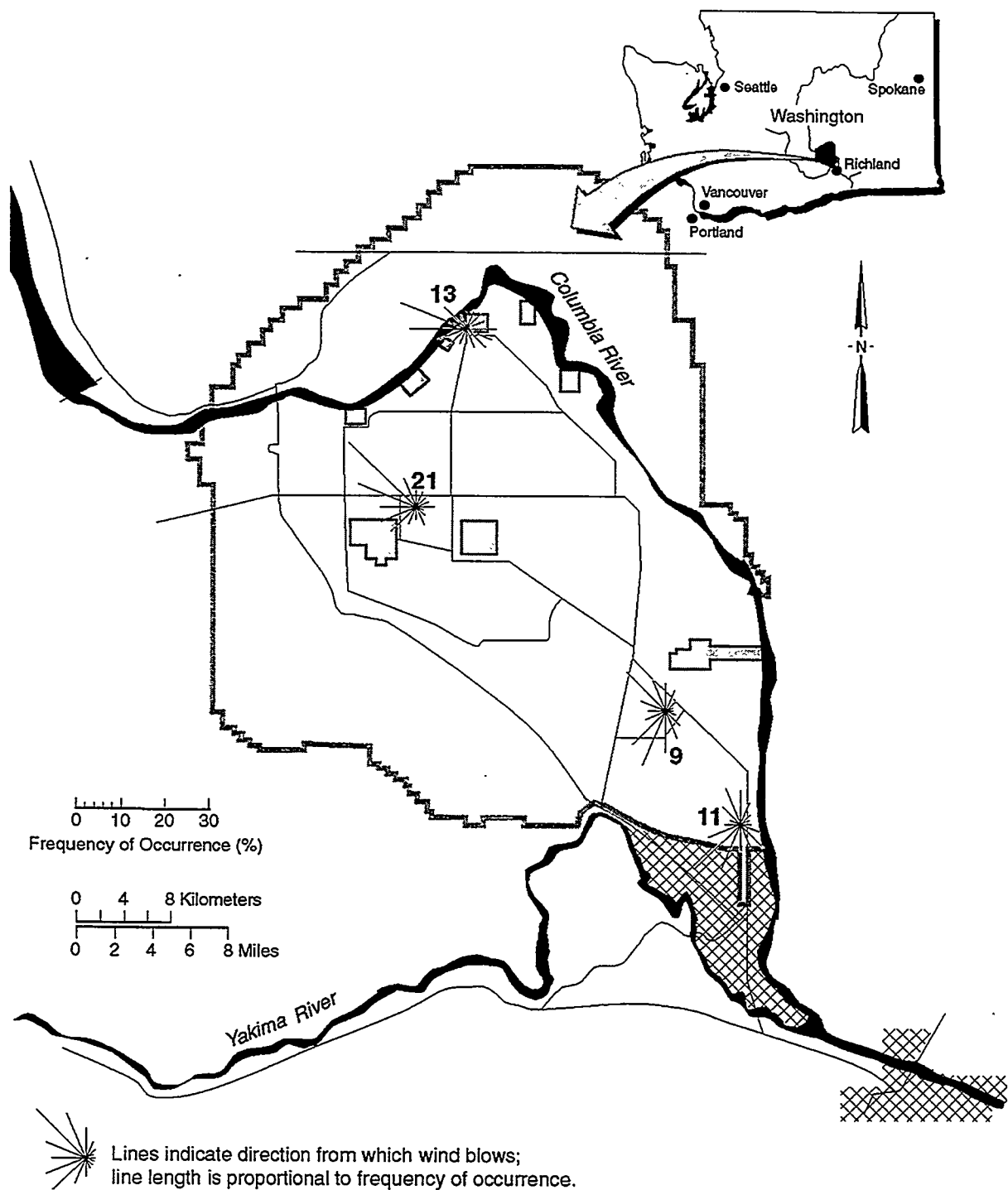
The average wind speed for November 1999 was 7.5 mph, 1.1 mph above normal (6.4 mph). The windiest November on record averaged 10.0 mph (1990), while the November with the lightest winds (1956) averaged 2.9 mph. The peak gust for the month was 41 mph on November 8. The record wind gust for November was 67 mph in 1993.

The average wind speed for December 1999 was 7.5 mph, 1.6 mph above normal (5.9 mph). The windiest December on record averaged 8.3 mph (1968), while the December with the lightest winds (1985) averaged 3.3 mph. The peak gust for the month was 62 mph on December 18. The record wind gust for December was 71 mph in 1955.

Figures 2.2 and 2.3 give a composite of the wind roses (at the 10- and 60-meter levels, respectively) from the Hanford Meteorological Monitoring Network for 1999. The appendix gives the individual 1999 wind roses from the Hanford Meteorological Monitoring Network stations.



**Figure 2.2.** 1999 Hanford Meteorological Monitoring Network Wind Roses at 10-Meter Level  
(see Appendix for station-specific wind rose)



G00010107 2

**Figure 2.3.** 1999 Hanford Meteorological Monitoring Network Wind Roses at 60-Meter Level (see Appendix for station-specific wind rose)

---

## 3.0 Temperature Climatology

### 3.1 Monthly, Seasonal, and Annual Average

Monthly, seasonal, and annual average temperatures, computed from observed daily maximum and minimum temperatures for the period 1945 through 1999, are presented in Tables 3.1 and 3.2. In these tables, the highest and lowest values, representing the warmest and coldest month, season, or year, are noted. Averages are based on the entire period of record, and climatological normal temperatures are based on the period 1961 through 1990.

As indicated in Table 3.1, much wider ranges and variabilities in temperatures are found during the late autumn and winter months (November through February) than during the rest of the year. The range of average monthly temperatures for January is from 12.1°F (1950) to 42.5°F (1953), 30.4°F; for November 21.7°F; February 18.9°F; and December 17.5°F; whereas for the rest of the year, the monthly range is from a low of 10.5°F in April to a high of 13.8°F in June. The coldest month recorded was January 1950 (12.1°F); the hottest month recorded was July 1985 (82.2°F). As shown in Table 3.2, the seasonal range is from 8°F during the summer (June, July, and August) to 16.4°F in winter (December, January, and February). The coldest season was the winter of 1948-1949 (24.2°F); the hottest was the summer of 1958 (78.2°F).

### 3.2 Days with Maximum Temperatures $\geq 100^\circ\text{F}$ , $\geq 90^\circ\text{F}$ , and $\leq 32^\circ\text{F}$

Table 3.3 contains the number of days each year with maximum temperatures in the categories  $\geq 100^\circ\text{F}$ ,  $\geq 90^\circ\text{F}$ , and  $\leq 32^\circ\text{F}$ .

Maximum temperatures  $\geq 100^\circ\text{F}$  occurred as early as May 5 (1966) and as late as September 6 (1955). The annual number of days with maximum temperatures in this category ranged from 1 to 28 (1954 and 1958, respectively). The greatest number of consecutive days with maximum temperatures  $\geq 100^\circ\text{F}$  is 11 and occurred 3 times: July 22 through August 1, 1962; August 10 through 20, 1967; and August 6 through 16, 1981.

One particularly notable period of above normal temperatures occurred July 15 through August 13, 1971. This 30-day period included 27 days with maximum temperatures  $\geq 100^\circ\text{F}$  in 3 separate periods of 9 consecutive days each. The lowest maximum temperature during the 30-day period was 98°F; the highest was 112°F. The average maximum temperature during this period was 104.7°F.

Table 3.4 lists the dates of all occurrences of maximum temperatures  $\geq 104^\circ\text{F}$ .

**Table 3.1. Monthly and Annual Average Temperatures (°F)**

| Year    | Jan                 | Feb                 | Mar                 | Apr                 | May                 | Jun                 | Jul                 | Aug                 | Sep                 | Oct                 | Nov                 | Dec                 | Annual              |
|---------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1945    | 33.9                | 38.6                | 42.1                | 50.3                | 61.7                | 67.5                | 78.0                | 77.5                | 64.6                | 56.4                | 40.6                | 32.7                | 53.7                |
| 1946    | 34.4                | 39.6                | 45.5                | 53.7                | 64.2                | 66.9                | 76.1                | 76.6                | 63.5                | 49.5                | 35.8                | 34.8                | 53.4                |
| 1947    | 27.4                | 40.0                | 49.6                | 56.1                | 68.7 <sup>(a)</sup> | 67.8                | 75.3                | 71.8                | 65.4                | 53.4                | 41.2                | 33.1                | 54.2                |
| 1948    | 32.0                | 31.8                | 42.1                | 49.4                | 58.3                | 72.4                | 72.8                | 71.8                | 64.4                | 51.0                | 40.8                | 26.9                | 51.1                |
| 1949    | 13.9                | 31.8                | 45.2                | 55.5                | 67.0                | 69.3                | 74.9                | 74.8                | 68.3                | 50.2                | 45.2                | 35.1                | 52.6                |
| 1950    | 12.1 <sup>(a)</sup> | 30.7                | 42.3                | 49.9                | 59.0                | 66.5                | 75.4                | 76.4                | 67.5                | 51.1                | 40.7                | 36.2                | 50.6                |
| 1951    | 33.0                | 36.9                | 40.1                | 54.1                | 61.1                | 69.4                | 76.7                | 74.2                | 66.8                | 51.5                | 39.5                | 27.4                | 52.6                |
| 1952    | 25.2                | 36.7                | 44.1                | 55.2                | 62.7                | 67.1                | 77.0                | 74.0                | 69.0                | 59.0                | 34.0                | 34.8                | 53.2                |
| 1953    | 42.5 <sup>(a)</sup> | 41.2                | 46.2                | 51.0                | 58.0                | 63.0 <sup>(a)</sup> | 75.8                | 74.0                | 67.8                | 55.4                | 43.4                | 37.6                | 54.7                |
| 1954    | 28.9                | 39.3                | 41.5                | 51.4                | 62.9                | 65.5                | 73.9                | 71.4                | 65.1                | 51.4                | 46.0                | 34.0                | 52.6                |
| 1955    | 30.0                | 35.3                | 39.4 <sup>(a)</sup> | 47.5 <sup>(a)</sup> | 57.0                | 70.2                | 73.0                | 75.5                | 66.4                | 53.3                | 31.3                | 29.4                | 50.7                |
| 1956    | 31.8                | 25.6 <sup>(a)</sup> | 43.8                | 56.2                | 65.3                | 65.7                | 78.9                | 75.3                | 67.3                | 52.1                | 36.6                | 34.6                | 52.8                |
| 1957    | 16.5                | 34.1                | 44.0                | 55.2                | 65.9                | 70.8                | 74.3                | 72.9                | 69.0                | 50.7                | 40.4                | 38.5 <sup>(a)</sup> | 52.7                |
| 1958    | 37.1                | 44.5 <sup>(a)</sup> | 43.5                | 51.3                | 68.1                | 73.9                | 81.2                | 79.4                | 65.6                | 54.4                | 40.6                | 35.2                | 56.2                |
| 1959    | 32.0                | 35.5                | 45.1                | 54.2                | 57.5                | 68.6                | 77.7                | 71.8                | 62.6                | 53.4                | 36.5                | 33.1                | 52.3                |
| 1960    | 23.3                | 37.4                | 45.1                | 52.6                | 58.5                | 70.1                | 81.8                | 71.4                | 67.7                | 54.5                | 41.2                | 29.0                | 52.7                |
| 1961    | 35.0                | 43.7                | 46.1                | 52.3                | 60.0                | 74.0                | 79.4                | 80.2                | 63.8                | 51.6                | 35.3                | 33.7                | 54.6                |
| 1962    | 29.8                | 36.6                | 42.6                | 55.6                | 56.9                | 68.3                | 76.0                | 71.9                | 67.1                | 52.6                | 43.2                | 36.8                | 53.1                |
| 1963    | 25.4                | 38.3                | 46.4                | 49.8                | 61.7                | 69.4                | 72.4                | 75.7                | 71.1                | 56.0                | 42.8                | 30.2                | 53.3                |
| 1964    | 35.6                | 38.1                | 43.8                | 50.2                | 59.7                | 67.7                | 74.5                | 69.8 <sup>(a)</sup> | 63.0                | 53.3                | 38.2                | 25.5                | 51.6                |
| 1965    | 32.3                | 40.5                | 42.9                | 54.8                | 60.5                | 69.3                | 76.5                | 74.7                | 62.4                | 57.1                | 43.1                | 33.0                | 53.9                |
| 1966    | 34.0                | 39.9                | 45.4                | 54.6                | 63.2                | 66.9                | 73.3                | 75.6                | 68.8                | 53.4                | 43.7                | 38.2                | 54.8                |
| 1967    | 39.8                | 43.7                | 44.3                | 47.6                | 60.5                | 72.5                | 78.6                | 81.5 <sup>(a)</sup> | 71.8                | 55.1                | 41.5                | 33.1                | 55.8                |
| 1968    | 35.7                | 41.8                | 49.0                | 51.3                | 62.4                | 69.8                | 79.7                | 71.5                | 66.8                | 50.3                | 41.7                | 30.6                | 54.2                |
| 1969    | 19.8                | 31.7                | 45.8                | 52.2                | 64.6                | 75.1                | 76.0                | 72.8                | 67.4                | 51.0                | 40.2                | 34.6                | 52.6                |
| 1970    | 30.7                | 40.6                | 45.0                | 49.0                | 61.5                | 73.6                | 78.6                | 76.3                | 61.8                | 50.9                | 39.7                | 30.8                | 53.2                |
| 1971    | 35.8                | 39.1                | 40.7                | 52.0                | 64.0                | 65.3                | 78.7                | 80.5                | 61.5                | 51.7                | 40.4                | 30.6                | 53.4                |
| 1972    | 30.5                | 34.8                | 47.0                | 49.6                | 64.3                | 69.7                | 76.2                | 77.6                | 61.4                | 52.3                | 39.9                | 27.3                | 52.6                |
| 1973    | 29.1                | 38.5                | 47.4                | 53.6                | 63.1                | 68.7                | 78.2                | 73.9                | 65.7                | 52.4                | 38.4                | 38.1                | 53.9                |
| 1974    | 29.4                | 40.9                | 45.2                | 52.9                | 57.9                | 72.6                | 74.5                | 75.5                | 68.0                | 52.5                | 41.6                | 36.2                | 53.9                |
| 1975    | 32.5                | 33.7                | 42.5                | 48.2                | 60.2                | 67.2                | 79.5                | 71.0                | 68.0                | 52.5                | 39.5                | 34.5                | 52.4                |
| 1976    | 32.0                | 37.6                | 41.4                | 50.8                | 60.5                | 65.6                | 75.1                | 70.8                | 69.0                | 52.4                | 40.6                | 30.7                | 52.2                |
| 1977    | 25.2                | 40.5                | 45.4                | 57.3                | 56.9                | 72.6                | 73.7                | 79.2                | 61.5                | 52.0                | 38.9                | 33.8                | 53.1                |
| 1978    | 32.5                | 37.9                | 47.5                | 51.9                | 58.6                | 70.3                | 75.7                | 72.7                | 63.8                | 52.2                | 32.3                | 27.5                | 51.9                |
| 1979    | 13.9                | 34.2                | 46.5                | 52.8                | 64.1                | 70.8                | 77.2                | 74.6                | 69.2                | 56.5                | 34.2                | 36.4                | 52.5                |
| 1980    | 23.7                | 34.6                | 44.5                | 55.2                | 61.4                | 64.7                | 74.7                | 71.2                | 66.0                | 52.6                | 41.0                | 36.6                | 52.2                |
| 1981    | 38.0                | 39.7                | 48.7                | 54.0                | 60.5                | 66.0                | 73.9                | 79.0                | 66.3                | 52.0                | 42.7                | 32.8                | 54.5                |
| 1982    | 29.8                | 38.1                | 45.9                | 49.4                | 60.4                | 73.1                | 74.9                | 75.8                | 65.4                | 51.4                | 36.9                | 32.0                | 52.8                |
| 1983    | 37.5                | 40.9                | 48.5                | 51.1                | 63.8                | 65.4                | 71.3                | 74.4                | 61.7                | 52.6                | 43.6                | 21.2                | 52.7                |
| 1984    | 31.6                | 38.7                | 47.2                | 50.5                | 56.0 <sup>(a)</sup> | 65.7                | 76.1                | 74.0                | 62.1                | 47.9 <sup>(a)</sup> | 39.4                | 23.6                | 51.1                |
| 1985    | 25.0                | 29.9                | 44.0                | 55.5                | 63.2                | 70.2                | 82.2 <sup>(a)</sup> | 70.5                | 58.8 <sup>(a)</sup> | 49.8                | 24.8 <sup>(a)</sup> | 21.0 <sup>(a)</sup> | 49.6 <sup>(a)</sup> |
| 1986    | 34.0                | 39.1                | 48.6                | 50.9                | 62.3                | 73.0                | 70.6                | 79.2                | 62.2                | 54.7                | 42.3                | 32.4                | 54.1                |
| 1987    | 30.7                | 40.1                | 48.3                | 58.0                | 66.2                | 73.4                | 74.3                | 76.6                | 69.9                | 55.5                | 43.6                | 31.5                | 55.7                |
| 1988    | 31.9                | 41.0                | 45.9                | 55.2                | 61.1                | 69.2                | 77.3                | 75.2                | 65.6                | 59.6 <sup>(a)</sup> | 44.2                | 31.8                | 54.8                |
| 1989    | 37.2                | 27.3                | 43.8                | 56.6                | 61.5                | 72.0                | 75.5                | 73.4                | 67.4                | 54.0                | 44.3                | 33.3                | 53.9                |
| 1990    | 40.4                | 37.6                | 48.0                | 57.9                | 60.7                | 70.1                | 80.8                | 76.8                | 72.4 <sup>(a)</sup> | 52.3                | 46.5 <sup>(a)</sup> | 24.1                | 55.6                |
| 1991    | 28.7                | 44.5                | 44.1                | 54.0                | 60.4                | 65.6                | 78.0                | 78.9                | 69.7                | 52.9                | 41.3                | 37.8                | 54.7                |
| 1992    | 37.5                | 42.6                | 51.5 <sup>(a)</sup> | 56.0                | 67.2                | 76.8 <sup>(a)</sup> | 76.6                | 76.9                | 64.5                | 55.7                | 41.2                | 30.0                | 56.4 <sup>(a)</sup> |
| 1993    | 24.8                | 30.8                | 43.2                | 52.5                | 66.5                | 68.4                | 70.5 <sup>(a)</sup> | 73.1                | 66.4                | 55.4                | 34.6                | 35.4                | 51.8                |
| 1994    | 38.6                | 36.0                | 49.2                | 58.2 <sup>(a)</sup> | 64.9                | 69.8                | 81.0                | 76.6                | 70.5                | 54.4                | 39.6                | 35.1                | 56.2                |
| 1995    | 34.2                | 43.1                | 46.1                | 52.6                | 64.5                | 68.1                | 77.1                | 72.0                | 69.9                | 52.1                | 44.1                | 32.6                | 54.7                |
| 1996    | 28.8                | 32.8                | 44.8                | 55.0                | 58.1                | 69.0                | 79.5                | 75.6                | 64.4                | 52.4                | 38.4                | 29.8                | 52.4                |
| 1997    | 33.6                | 40.2                | 47.4                | 51.8                | 65.0                | 68.5                | 75.3                | 78.0                | 66.8                | 53.2                | 43.2                | 34.7                | 54.8                |
| 1998    | 36.2                | 42.2                | 48.4                | 54.4                | 62.4                | 71.0                | 82.0                | 77.9                | 71.0                | 52.4                | 45.6                | 33.0                | 56.4 <sup>(a)</sup> |
| 1999    | 38.3                | 41.7                | 46.3                | 50.9                | 57.9                | 67.4                | 73.8                | 76.2                | 65.0                | 51.8                | 45.8                | 37.7                | 54.4                |
| Average | 30.8                | 37.7                | 45.3                | 52.9                | 61.8                | 69.3                | 76.4                | 75.0                | 66.2                | 53.0                | 40.2                | 32.4                | 53.4                |
| Normal  | 31.3                | 38.0                | 45.6                | 52.7                | 61.3                | 69.7                | 76.2                | 75.1                | 65.7                | 52.9                | 40.2                | 31.4                | 53.3                |

(a) Highest and lowest averages.

Table 3.2. Seasonal Average Temperatures (°F)

| Year    | Winter<br>Dec-Feb   | Spring<br>Mar-May   | Summer<br>Jun-Aug   | Autumn<br>Sep-Nov   |
|---------|---------------------|---------------------|---------------------|---------------------|
| 1945    | --                  | 51.4                | 74.3                | 53.9                |
| 1946    | 35.6                | 54.5                | 73.2                | 49.6                |
| 1947    | 34.1                | 58.1                | 71.6                | 53.3                |
| 1948    | 32.3                | 49.9                | 72.3                | 52.1                |
| 1949    | 24.2 <sup>(a)</sup> | 55.9                | 73.0                | 54.6                |
| 1950    | 26.0                | 50.4                | 72.8                | 53.1                |
| 1951    | 35.4                | 51.8                | 73.4                | 52.6                |
| 1952    | 29.8                | 54.0                | 72.7                | 54.0                |
| 1953    | 39.5                | 51.7                | 70.9                | 55.5                |
| 1954    | 35.3                | 51.9                | 70.3                | 54.2                |
| 1955    | 33.1                | 48.0 <sup>(a)</sup> | 72.9                | 50.3                |
| 1956    | 28.9                | 55.1                | 73.3                | 52.0                |
| 1957    | 28.4                | 55.0                | 72.7                | 53.4                |
| 1958    | 40.0                | 54.3                | 78.2 <sup>(a)</sup> | 53.5                |
| 1959    | 34.2                | 52.3                | 72.7                | 50.8                |
| 1960    | 31.3                | 52.1                | 74.4                | 54.5                |
| 1961    | 35.9                | 52.8                | 77.9                | 50.2                |
| 1962    | 33.4                | 51.7                | 72.1                | 54.3                |
| 1963    | 33.5                | 52.6                | 72.5                | 56.6                |
| 1964    | 34.6                | 51.2                | 70.7                | 51.5                |
| 1965    | 32.8                | 52.7                | 73.5                | 54.2                |
| 1966    | 35.6                | 54.4                | 71.9                | 55.3                |
| 1967    | 40.6 <sup>(a)</sup> | 50.8                | 77.5                | 56.1                |
| 1968    | 36.9                | 54.2                | 73.7                | 52.9                |
| 1969    | 27.4                | 54.2                | 74.6                | 52.9                |
| 1970    | 35.3                | 51.8                | 76.2                | 50.8                |
| 1971    | 35.2                | 52.2                | 74.8                | 51.2                |
| 1972    | 32.0                | 53.6                | 74.5                | 51.2                |
| 1973    | 31.6                | 54.7                | 73.6                | 52.2                |
| 1974    | 36.1                | 52.0                | 74.2                | 54.0                |
| 1975    | 34.1                | 50.3                | 72.6                | 53.3                |
| 1976    | 34.7                | 50.9                | 70.5                | 54.0                |
| 1977    | 32.1                | 53.2                | 75.2                | 50.8                |
| 1978    | 34.7                | 52.7                | 72.9                | 49.4                |
| 1979    | 25.2                | 54.5                | 74.2                | 53.3                |
| 1980    | 31.6                | 53.7                | 70.2 <sup>(a)</sup> | 53.2                |
| 1981    | 38.1                | 54.4                | 73.0                | 53.7                |
| 1982    | 33.6                | 51.9                | 74.6                | 51.2                |
| 1983    | 36.8                | 54.5                | 70.4                | 52.6                |
| 1984    | 30.5                | 51.2                | 71.9                | 49.8                |
| 1985    | 26.2                | 54.2                | 74.3                | 44.5 <sup>(a)</sup> |
| 1986    | 31.4                | 53.9                | 74.3                | 53.1                |
| 1987    | 34.4                | 57.5                | 74.8                | 56.3                |
| 1988    | 34.8                | 54.1                | 73.9                | 56.5                |
| 1989    | 32.1                | 54.0                | 73.6                | 55.2                |
| 1990    | 37.1                | 55.5                | 75.9                | 57.1 <sup>(a)</sup> |
| 1991    | 32.4                | 52.8                | 74.2                | 54.6                |
| 1992    | 39.3                | 58.2 <sup>(a)</sup> | 76.8                | 53.8                |
| 1993    | 28.5                | 54.1                | 70.7                | 52.1                |
| 1994    | 36.7                | 57.4                | 75.8                | 54.8                |
| 1995    | 37.5                | 54.4                | 72.4                | 55.4                |
| 1996    | 31.4                | 52.6                | 74.7                | 51.7                |
| 1997    | 34.5                | 54.7                | 73.9                | 54.4                |
| 1998    | 37.7                | 55.1                | 77.0                | 56.3                |
| 1999    | 37.7                | 51.7                | 72.5                | 54.2                |
| Average | 33.6                | 53.3                | 73.6                | 53.1                |
| Normal  | 33.6                | 53.2                | 73.7                | 52.9                |

(a) Highest and lowest averages.

Table 3.3. Monthly and Seasonal Number of Days with Maximum Temperatures (°F) Above or Below Certain Thresholds

| Year | 100°F or Above |     |     |     |     | 90°F or Above     |     |     |     |     | 32°F or Below |     |     |                   |         |     |     |     |     |     |     |                  |
|------|----------------|-----|-----|-----|-----|-------------------|-----|-----|-----|-----|---------------|-----|-----|-------------------|---------|-----|-----|-----|-----|-----|-----|------------------|
|      | May            | Jun | Jul | Aug | Sep | Total             | Apr | May | Jun | Jul | Aug           | Sep | Oct | Total             | Season  | Oct | Nov | Dec | Jan | Feb | Mar | Total            |
| 1945 | 0              | 0   | 8   | 4   | 0   | 12                | 0   | 1   | 7   | 21  | 21            | 5   | 0   | 55                | 1944-45 | --  | --  | --  | 12  | 1   | 1   | 14               |
| 1946 | 0              | 0   | 7   | 6   | 0   | 13                | 1   | 0   | 4   | 15  | 18            | 0   | 0   | 38                | 1945-46 | 0   | 2   | 9   | 0   | 0   | 0   | 11               |
| 1947 | 1              | 0   | 2   | 0   | 0   | 3                 | 0   | 8   | 4   | 17  | 11            | 2   | 0   | 42                | 1946-47 | 0   | 4   | 4   | 14  | 0   | 0   | 22               |
| 1948 | 0              | 2   | 0   | 0   | 0   | 2                 | 0   | 1   | 9   | 14  | 7             | 7   | 0   | 38                | 1947-48 | 0   | 0   | 6   | 8   | 9   | 0   | 23               |
| 1949 | 0              | 1   | 6   | 2   | 1   | 10                | 0   | 8   | 8   | 15  | 18            | 8   | 0   | 57                | 1948-49 | 0   | 0   | 13  | 28  | 8   | 0   | 49               |
| 1950 | 0              | 0   | 2   | 3   | 2   | 7                 | 0   | 1   | 5   | 20  | 22            | 8   | 0   | 56                | 1949-50 | 0   | 0   | 5   | 24  | 5   | 1   | 35               |
| 1951 | 0              | 0   | 8   | 3   | 0   | 11                | 0   | 1   | 8   | 23  | 19            | 5   | 0   | 56                | 1950-51 | 0   | 0   | 2   | 8   | 2   | 0   | 12               |
| 1952 | 0              | 0   | 9   | 4   | 0   | 13                | 0   | 2   | 5   | 21  | 17            | 12  | 0   | 57                | 1951-52 | 0   | 0   | 16  | 19  | 0   | 0   | 35               |
| 1953 | 0              | 0   | 4   | 4   | 0   | 8                 | 0   | 0   | 0   | 21  | 13            | 11  | 0   | 45                | 1952-53 | 0   | 9   | 6   | 1   | 0   | 0   | 16               |
| 1954 | 0              | 0   | 1   | 0   | 0   | 1 <sup>(a)</sup>  | 0   | 2   | 3   | 20  | 9             | 3   | 0   | 37                | 1953-54 | 0   | 0   | 2   | 12  | 4   | 0   | 18               |
| 1955 | 0              | 2   | 5   | 2   | 2   | 11                | 0   | 0   | 9   | 12  | 19            | 8   | 0   | 48                | 1954-55 | 0   | 0   | 5   | 13  | 2   | 1   | 21               |
| 1956 | 0              | 0   | 10  | 5   | 0   | 15                | 0   | 7   | 2   | 22  | 16            | 7   | 0   | 54                | 1955-56 | 0   | 15  | 16  | 7   | 15  | 0   | 53               |
| 1957 | 0              | 1   | 1   | 0   | 0   | 2                 | 0   | 3   | 8   | 14  | 8             | 6   | 0   | 39                | 1956-57 | 0   | 7   | 10  | 22  | 7   | 0   | 46               |
| 1958 | 1              | 6   | 10  | 11  | 0   | 28 <sup>(a)</sup> | 0   | 8   | 11  | 28  | 25            | 5   | 0   | 77                | 1957-58 | 0   | 0   | 2   | 2   | 0   | 0   | 4                |
| 1959 | 0              | 0   | 8   | 1   | 0   | 9                 | 0   | 1   | 7   | 21  | 12            | 3   | 0   | 44                | 1958-59 | 0   | 3   | 5   | 8   | 2   | 0   | 18               |
| 1960 | 0              | 0   | 16  | 5   | 0   | 21                | 0   | 1   | 12  | 28  | 12            | 5   | 0   | 58                | 1959-60 | 0   | 5   | 7   | 23  | 1   | 2   | 38               |
| 1961 | 0              | 7   | 8   | 10  | 0   | 25                | 0   | 1   | 15  | 26  | 24            | 1   | 0   | 67                | 1960-61 | 0   | 0   | 14  | 10  | 0   | 0   | 24               |
| 1962 | 0              | 0   | 10  | 1   | 0   | 11                | 0   | 0   | 11  | 17  | 10            | 8   | 0   | 46                | 1961-62 | 0   | 0   | 7   | 12  | 2   | 0   | 21               |
| 1963 | 0              | 3   | 0   | 3   | 0   | 6                 | 0   | 4   | 7   | 8   | 18            | 11  | 0   | 48                | 1962-63 | 0   | 0   | 3   | 14  | 3   | 0   | 20               |
| 1964 | 0              | 0   | 6   | 0   | 0   | 6                 | 0   | 0   | 5   | 14  | 10            | 2   | 0   | 31                | 1963-64 | 0   | 1   | 11  | 3   | 0   | 0   | 15               |
| 1965 | 0              | 0   | 6   | 5   | 0   | 11                | 0   | 1   | 7   | 20  | 12            | 1   | 0   | 41                | 1964-65 | 0   | 0   | 14  | 5   | 0   | 0   | 19               |
| 1966 | 1              | 0   | 2   | 4   | 0   | 7                 | 0   | 5   | 2   | 15  | 21            | 7   | 0   | 50                | 1965-66 | 0   | 1   | 8   | 3   | 0   | 0   | 12               |
| 1967 | 0              | 2   | 6   | 15  | 0   | 23                | 0   | 2   | 13  | 25  | 27            | 12  | 0   | 79 <sup>(a)</sup> | 1966-67 | 0   | 0   | 2   | 0   | 0   | 0   | 2 <sup>(a)</sup> |
| 1968 | 0              | 0   | 10  | 3   | 0   | 13                | 1   | 1   | 5   | 22  | 12            | 4   | 0   | 45                | 1967-68 | 0   | 0   | 10  | 4   | 0   | 0   | 14               |
| 1969 | 0              | 3   | 4   | 2   | 0   | 9                 | 0   | 6   | 17  | 20  | 15            | 7   | 0   | 65                | 1968-69 | 0   | 0   | 7   | 20  | 4   | 0   | 31               |
| 1970 | 0              | 9   | 11  | 5   | 0   | 25                | 0   | 2   | 15  | 22  | 19            | 0   | 0   | 58                | 1969-70 | 0   | 3   | 9   | 15  | 0   | 0   | 27               |
| 1971 | 0              | 0   | 16  | 11  | 0   | 27                | 0   | 2   | 2   | 20  | 26            | 2   | 0   | 52                | 1970-71 | 0   | 3   | 11  | 9   | 1   | 0   | 24               |
| 1972 | 0              | 0   | 5   | 10  | 0   | 15                | 0   | 5   | 8   | 21  | 19            | 5   | 0   | 58                | 1971-72 | 1   | 0   | 10  | 9   | 7   | 0   | 27               |
| 1973 | 0              | 2   | 10  | 5   | 0   | 17                | 0   | 6   | 7   | 21  | 18            | 4   | 0   | 56                | 1972-73 | 0   | 0   | 14  | 10  | 0   | 0   | 24               |
| 1974 | 0              | 6   | 5   | 3   | 0   | 14                | 0   | 0   | 18  | 16  | 18            | 6   | 0   | 58                | 1973-74 | 0   | 4   | 1   | 12  | 0   | 0   | 17               |
| 1975 | 0              | 0   | 9   | 0   | 0   | 9                 | 0   | 2   | 4   | 22  | 12            | 8   | 0   | 48                | 1974-75 | 0   | 0   | 0   | 6   | 6   | 0   | 12               |



Table 3.3. (contd)

| Year    | 100°F or Above |     |     |     |     | 90°F or Above |     |     |     |     | 32°F or Below |     |     |                   |           |     |     |     |     |     |     |                   |
|---------|----------------|-----|-----|-----|-----|---------------|-----|-----|-----|-----|---------------|-----|-----|-------------------|-----------|-----|-----|-----|-----|-----|-----|-------------------|
|         | May            | Jun | Jul | Aug | Sep | Total         | Apr | May | Jun | Jul | Aug           | Sep | Oct | Total             | Season    | Oct | Nov | Dec | Jan | Feb | Mar | Total             |
| 1976    | 0              | 1   | 2   | 0   | 1   | 4             | 0   | 1   | 4   | 17  | 9             | 4   | 0   | 35                | 1975-76   | 0   | 3   | 5   | 7   | 0   | 0   | 15                |
| 1977    | 0              | 1   | 2   | 13  | 0   | 16            | 1   | 0   | 13  | 16  | 22            | 0   | 0   | 52                | 1976-77   | 0   | 0   | 12  | 20  | 3   | 0   | 35                |
| 1978    | 0              | 1   | 6   | 6   | 0   | 13            | 0   | 0   | 12  | 17  | 11            | 2   | 0   | 42                | 1977-78   | 0   | 5   | 9   | 6   | 2   | 0   | 22                |
| 1979    | 0              | 2   | 7   | 1   | 0   | 10            | 0   | 1   | 13  | 23  | 20            | 7   | 0   | 64                | 1978-79   | 0   | 7   | 11  | 30  | 4   | 0   | 52                |
| 1980    | 0              | 0   | 3   | 0   | 0   | 3             | 0   | 0   | 0   | 18  | 9             | 2   | 0   | 29 <sup>(a)</sup> | 1979-80   | 0   | 7   | 3   | 16  | 6   | 0   | 32                |
| 1981    | 0              | 0   | 3   | 13  | 0   | 16            | 1   | 0   | 4   | 19  | 22            | 11  | 0   | 57                | 1980-81   | 0   | 1   | 6   | 0   | 2   | 0   | 9                 |
| 1982    | 0              | 2   | 5   | 3   | 0   | 10            | 0   | 0   | 15  | 16  | 17            | 5   | 0   | 53                | 1981-82   | 0   | 0   | 8   | 10  | 2   | 0   | 20                |
| 1983    | 1              | 0   | 1   | 0   | 0   | 2             | 0   | 8   | 2   | 9   | 13            | 0   | 0   | 32                | 1982-83   | 0   | 3   | 10  | 5   | 0   | 0   | 18                |
| 1984    | 0              | 0   | 3   | 3   | 0   | 6             | 0   | 1   | 4   | 21  | 16            | 4   | 0   | 46                | 1983-84   | 0   | 0   | 25  | 12  | 1   | 0   | 38                |
| 1985    | 0              | 1   | 15  | 0   | 0   | 16            | 0   | 3   | 10  | 30  | 7             | 0   | 0   | 50                | 1984-85   | 0   | 2   | 18  | 29  | 9   | 0   | 58 <sup>(a)</sup> |
| 1986    | 3              | 1   | 0   | 6   | 0   | 10            | 0   | 6   | 11  | 9   | 27            | 3   | 0   | 56                | 1985-86   | 0   | 15  | 25  | 5   | 1   | 0   | 46                |
| 1987    | 1              | 5   | 3   | 4   | 1   | 14            | 2   | 6   | 15  | 14  | 19            | 12  | 0   | 68                | 1986-87   | 0   | 0   | 7   | 9   | 0   | 0   | 16                |
| 1988    | 0              | 0   | 8   | 3   | 3   | 14            | 0   | 4   | 11  | 19  | 20            | 7   | 0   | 61                | 1987-88   | 0   | 0   | 16  | 11  | 1   | 0   | 28                |
| 1989    | 0              | 0   | 2   | 2   | 0   | 4             | 0   | 0   | 13  | 20  | 9             | 3   | 0   | 45                | 1988-89   | 0   | 0   | 11  | 2   | 8   | 1   | 22                |
| 1990    | 0              | 0   | 11  | 9   | 0   | 20            | 0   | 1   | 8   | 24  | 15            | 12  | 0   | 60                | 1989-90   | 0   | 2   | 6   | 0   | 1   | 0   | 9                 |
| 1991    | 0              | 0   | 4   | 8   | 0   | 12            | 0   | 0   | 1   | 25  | 23            | 5   | 0   | 54                | 1990-91   | 0   | 0   | 15  | 13  | 0   | 0   | 28                |
| 1992    | 0              | 7   | 5   | 9   | 0   | 21            | 0   | 8   | 16  | 15  | 17            | 3   | 0   | 59                | 1991-92   | 0   | 0   | 3   | 0   | 0   | 0   | 3                 |
| 1993    | 1              | 0   | 0   | 2   | 0   | 3             | 0   | 7   | 6   | 4   | 15            | 11  | 0   | 43                | 1992-93   | 0   | 1   | 11  | 20  | 8   | 2   | 42                |
| 1994    | 0              | 1   | 13  | 7   | 0   | 21            | 0   | 5   | 8   | 25  | 18            | 12  | 0   | 68                | 1993-94   | 0   | 6   | 4   | 1   | 8   | 0   | 19                |
| 1995    | 0              | 0   | 5   | 3   | 1   | 9             | 0   | 4   | 7   | 17  | 11            | 12  | 0   | 51                | 1994-95   | 0   | 0   | 5   | 6   | 2   | 0   | 13                |
| 1996    | 0              | 0   | 13  | 6   | 0   | 19            | 0   | 0   | 8   | 25  | 18            | 5   | 0   | 56                | 1995-96   | 0   | 0   | 8   | 9   | 5   | 0   | 22                |
| 1997    | 0              | 0   | 3   | 7   | 0   | 10            | 0   | 5   | 3   | 18  | 22            | 5   | 0   | 53                | 1996-97   | 0   | 5   | 12  | 8   | 2   | 0   | 27                |
| 1998    | 0              | 0   | 14  | 9   | 3   | 26            | 1   | 3   | 7   | 26  | 24            | 12  | 0   | 73                | 1997-98   | 0   | 0   | 2   | 5   | 0   | 0   | 7                 |
| 1999    | 1              | 4   | 2   | 0   | 0   | 7             | 0   | 2   | 5   | 17  | 21            | 4   | 0   | 40                | 1998-99   | 0   | 0   | 7   | 3   | 0   | 0   | 10                |
| 2000    | --             | --  | --  | --  | --  | --            | --  | --  | --  | --  | --            | --  | --  | --                | 1999-2000 | 0   | 0   | 4   | --  | --  | --  | --                |
| Average | <1             | 1   | 6   | 4   | <1  | 12            | <1  | 3   | 8   | 19  | 16            | 6   | 0   | 52                | Average   | <1  | 2   | 9   | 10  | 3   | <1  | 24                |
| Normal  | <1             | 2   | 6   | 5   | <1  | 13            | <1  | 2   | 9   | 19  | 17            | 5   | 0   | 52                | Normal    | <1  | 2   | 10  | 10  | 2   | <1  | 24                |

(a) Greatest and least seasonal totals.

Table 3.4. Days with Maximum Temperatures  $\geq 104^{\circ}\text{F}$ 

| Temperature,<br>$^{\circ}\text{F}$ | Date(s) of Occurrence  |  |  |  |  |  |  |
|------------------------------------|--|--|--|--|--|--|--|
| 113                                | 08/04/61   |  |  |  |  |  |  |
| 112                                | 07/27/98   | 08/09/71   |  |  |  |  |  |
| 111                                | 07/22/94   | 06/23/92   | 07/31/71   |  |  |  |  |
| 110                                | 08/04/98<br>07/17/60   | 07/12/90   | 07/20/79   | 07/09/75   | 08/08/72   | 07/06/68   | 07/18/60   |
| 109                                | 08/10/96<br>08/07/72   | 07/24/94<br>08/10/71   | 07/23/94<br>08/01/71   | 07/21/94   | 08/14/92   | 07/11/90   | 07/19/79   |
| 108                                | 07/28/98<br>07/27/75<br>07/08/68<br>06/17/61   | 07/26/98<br>07/05/75<br>07/04/68   | 07/26/96<br>08/12/71<br>08/18/67   | 07/15/96<br>08/11/71<br>08/17/67   | 06/24/92<br>07/27/71<br>08/16/67   | 08/05/90<br>07/19/71<br>07/31/65   | 07/18/79<br>07/28/68<br>07/13/61   |
| 107                                | 08/13/92<br>08/08/81<br>08/03/61   | 08/01/92<br>07/17/79<br>07/22/59   | 07/31/92<br>08/18/77<br>07/20/59   | 06/25/92<br>08/08/71<br>07/19/59   | 07/14/87<br>07/30/71<br>07/28/58   | 07/29/82<br>07/28/71<br>07/14/55   | 07/28/82<br>07/05/68   |
| 106                                | 08/14/98<br>08/18/92<br>07/22/80<br>07/15/73<br>06/16/61   | 08/05/98<br>07/18/92<br>08/09/78<br>08/06/72<br>06/22/58   | 08/14/97<br>06/22/92<br>07/23/78<br>07/20/71<br>07/19/56   | 08/04/97<br>09/01/87<br>08/17/77<br>07/04/70<br>07/09/52   | 07/27/96<br>06/30/87<br>08/13/77<br>08/01/65   | 07/14/96<br>07/09/85<br>07/10/75<br>07/12/64   | 08/02/94<br>07/25/84<br>07/29/73<br>07/24/62   |
| 105                                | 07/28/99<br>07/24/96<br>08/09/87<br>08/04/78<br>07/16/70<br>08/19/67<br>07/07/60   | 08/13/98<br>07/19/95<br>07/20/85<br>08/03/78<br>07/08/70<br>08/15/67<br>07/13/55   | 07/22/98<br>07/17/92<br>07/27/82<br>07/04/75<br>07/27/68<br>08/13/67<br>08/04/52   | 08/06/97<br>07/03/91<br>07/26/82<br>07/21/71<br>07/07/68<br>07/03/67<br>07/30/52   | 08/05/97<br>07/22/90<br>08/16/81<br>07/18/71<br>07/03/68<br>08/02/61<br>07/10/52   | 08/25/96<br>07/15/90<br>08/13/81<br>08/23/70<br>08/30/67<br>08/11/60<br>07/20/46   | 07/28/96<br>07/26/88<br>08/12/81<br>07/19/70<br>08/20/67<br>07/19/60<br>08/16/45   |
| 104                                | 08/03/98<br>07/18/95<br>05/31/86<br>08/11/81<br>08/20/77<br>06/22/73<br>07/03/70<br>07/25/62<br>08/25/58<br>07/23/56<br>07/31/49<br>07/21/46 | 07/25/98<br>07/20/94<br>05/30/86<br>08/10/81<br>08/12/77<br>08/28/72<br>06/23/70<br>07/23/62<br>08/24/58<br>07/21/56<br>07/30/49<br>07/11/45 | 07/17/98<br>07/17/94<br>07/29/85<br>08/07/81<br>07/30/74<br>08/09/72<br>06/21/70<br>08/14/61<br>08/11/58<br>07/22/55<br>07/15/49<br>07/10/45 | 08/09/96<br>07/10/90<br>07/21/85<br>07/27/81<br>07/28/74<br>08/13/71<br>08/31/67<br>06/18/61<br>07/17/58<br>08/15/53<br>06/29/48 | 07/25/96<br>07/25/88<br>07/08/85<br>07/04/81<br>08/01/73<br>08/07/71<br>08/11/67<br>08/10/60<br>07/11/58<br>07/23/51<br>08/22/46 | 07/23/96<br>07/21/88<br>07/04/85<br>08/08/78<br>07/27/73<br>07/16/71<br>07/12/67<br>07/16/60<br>08/22/56<br>07/17/51<br>08/21/46 | 07/13/96<br>07/20/88<br>08/07/82<br>07/25/78<br>07/19/73<br>07/09/70<br>07/30/65<br>07/18/59<br>07/24/56<br>08/01/49<br>07/28/46 |

Maximum temperatures  $\geq 90^{\circ}\text{F}$  occur an average of 52 times per year and vary from a low of 29 times in 1980 to a high of 79 times in 1967. The earliest occurrences varied from April 24 (1977) through July 2 (1953), with an average annual date of May 21 (Table 3.5). The latest annual occurrence of maximum temperatures  $\geq 90^{\circ}\text{F}$  varied from August 17 (1983) through September 29 (1993 and earlier years). The average date for the period 1946 through 1999 is September 15. The longest period of consecutive maximum temperatures  $\geq 90^{\circ}\text{F}$  is 32 days from July 13 through August 13, 1971.

The average seasonal number of days with maximum temperatures  $\leq 32^{\circ}\text{F}$  is 24. The earliest seasonal occurrence of a day with a maximum temperature  $\leq 32^{\circ}\text{F}$  was October 30 (1971) and the latest was March 11 (1950). The number of winter days with maximum temperatures  $\leq 32^{\circ}\text{F}$  varied from

**Table 3.5.** Record of Annual First and Last Dates with Maximum Temperatures  $\geq 90^{\circ}\text{F}$  and Minimum Temperatures  $\leq 32^{\circ}\text{F}$ 

| Year    | Maximum Temperature $\geq 90^{\circ}\text{F}$ |                         | Minimum Temperature $\leq 32^{\circ}\text{F}$ |                       | Growing Days <sup>(a)</sup> |
|---------|---|-------------------------|---|-----------------------|-----------------------------|
|         | First in Spring                               | Last in Summer          | Last in Spring                                | First in Autumn       |                             |
| 1945    | May 30  | Sep 14                  | Apr 10  | Oct 18                | 190                         |
| 1946    | Apr 25  | Aug 24                  | Apr 07  | Oct 11                | 186                         |
| 1947    | May 06  | Sep 12                  | Apr 07  | Nov 04                | 210                         |
| 1948    | May 26  | Sep 13                  | May 02  | Oct 17                | 167                         |
| 1949    | May 08  | Sep 27                  | May 03  | Oct 08                | 157                         |
| 1950    | May 26  | Sep 23                  | Apr 27  | Nov 08                | 194                         |
| 1951    | May 22  | Sep 19                  | Apr 21  | Oct 15                | 176                         |
| 1952    | May 24  | Sep 26                  | Apr 29  | Nov 01                | 185                         |
| 1953    | Jul 02 <sup>(b)</sup>                         | Sep 15                  | Apr 15  | Oct 24                | 191                         |
| 1954    | May 17  | Sep 10                  | May 01  | Oct 01                | 152                         |
| 1955    | Jun 06  | Sep 10                  | May 14  | Oct 31                | 169                         |
| 1956    | May 16  | Sep 19                  | Apr 06  | Oct 22                | 198                         |
| 1957    | May 29  | Sep 15                  | Mar 26  | Oct 22                | 209                         |
| 1958    | May 18  | Sep 10                  | Mar 19 <sup>(b)</sup>                         | Oct 21                | 215                         |
| 1959    | May 13  | Sep 13                  | May 05  | Oct 30                | 177                         |
| 1960    | May 10  | Sep 18                  | Apr 21  | Oct 11                | 172                         |
| 1961    | May 25  | Sep 04                  | Apr 19  | Oct 20                | 183                         |
| 1962    | Jun 08  | Sep 26                  | May 04  | Nov 12 <sup>(b)</sup> | 191                         |
| 1963    | May 20  | Sep 29                  | Apr 16  | Oct 25                | 191                         |
| 1964    | Jun 23  | Sep 24                  | Apr 19  | Oct 16                | 179                         |
| 1965    | May 28  | Sep 01                  | May 05  | Oct 16                | 163                         |
| 1966    | May 03  | Sep 22                  | Apr 19  | Oct 14                | 177                         |
| 1967    | May 20  | Sep 28                  | Apr 28  | Oct 26                | 180                         |
| 1968    | Apr 29  | Sep 09                  | Apr 22  | Oct 21                | 181                         |
| 1969    | May 09  | Sep 12                  | Apr 26  | Oct 13                | 169                         |
| 1970    | May 16  | Aug 31                  | May 11  | Oct 07                | 148                         |
| 1971    | May 11  | Sep 10                  | Apr 22  | Oct 16                | 176                         |
| 1972    | May 13  | Sep 16                  | Apr 30  | Sep 25 <sup>(b)</sup> | 147                         |
| 1973    | May 13  | Sep 11                  | Apr 08  | Oct 04                | 178                         |
| 1974    | Jun 10  | Sep 25                  | May 16 <sup>(b)</sup>                         | Oct 06                | 142                         |
| 1975    | May 30  | Sep 15                  | Apr 29  | Oct 23                | 176                         |
| 1976    | May 16  | Sep 29                  | Apr 23  | Oct 19                | 178                         |
| 1977    | Apr 24 <sup>(b)</sup>                         | Aug 22                  | Apr 14  | Oct 27                | 195                         |
| 1978    | Jun 02  | Sep 03                  | Apr 23  | Oct 07                | 166                         |
| 1979    | May 22  | Sep 20                  | Apr 19  | Oct 31                | 194                         |
| 1980    | Jun 01  | Sep 06                  | Apr 11  | Oct 22                | 193                         |
| 1981    | Apr 30  | Sep 18                  | Apr 13  | Oct 14                | 183                         |
| 1982    | Jun 10  | Sep 08                  | Apr 21  | Oct 18                | 179                         |
| 1983    | May 23  | Aug 17 <sup>(b)</sup>   | Apr 16  | Oct 11                | 177                         |
| 1984    | May 29  | Sep 18                  | Apr 13  | Oct 14                | 183                         |
| 1985    | May 18  | Aug 29                  | Apr 21  | Oct 07                | 168                         |
| 1986    | May 25  | Sep 04                  | Apr 30  | Nov 09                | 192                         |
| 1987    | Apr 27  | Sep 23                  | Apr 20  | Oct 16                | 178                         |
| 1988    | May 11  | Sep 14                  | Apr 09  | Oct 27                | 200                         |
| 1989    | Jun 01  | Sep 24                  | Mar 30  | Oct 29                | 212                         |
| 1990    | May 05  | Sep 29                  | Mar 27  | Oct 17                | 203                         |
| 1991    | Jun 10  | Sep 26                  | Apr 08  | Oct 22                | 196                         |
| 1992    | May 04  | Sep 03                  | Apr 08  | Oct 15                | 189                         |
| 1993    | May 10  | Sep 29 <sup>(b,c)</sup> | Apr 06  | Oct 20                | 196                         |
| 1994    | May 07  | Sep 28                  | Mar 26  | Oct 29                | 216                         |
| 1995    | May 28  | Sep 17                  | Apr 15  | Oct 29                | 196                         |
| 1996    | Jun 02  | Sep 15                  | May 08  | Oct 17                | 161                         |
| 1997    | May 12  | Sep 25                  | May 02  | Oct 08                | 158                         |
| 1998    | Apr 30  | Sep 17                  | Apr 13  | Oct 19                | 188                         |
| 1999    | May 23  | Sep 22                  | May 8   | Oct 17                | 163                         |
| Average | May 21  | Sep 15                  | Apr 20  | Oct 19                | 181                         |
| Normal  | May 21  | Sep 14                  | Apr 21  | Oct 18                | 179                         |

(a) Days between last freezing temperature in spring and first freezing temperature in autumn.

(b) Earliest and latest dates.

(c) Also in previous years.

2 to 58 days (winters of 1966-1967 and 1984-1985, respectively). The greatest consecutive number of days with maximum temperatures  $\leq 32^{\circ}\text{F}$  is 29 days, from December 30, 1984, through January 27, 1985. During the period December 27, 1978, through February 4, 1979 (40 days), only 1 maximum temperature greater than  $32^{\circ}\text{F}$  occurred. The average maximum temperature for that period was  $21^{\circ}\text{F}$ .

Table 3.6 lists the monthly and annual maximum temperatures. Only 6 days were recorded when the daily maximum temperature was  $\leq 0^{\circ}\text{F}$ . These were:

| Maximum Date      | Temperature          |
|-------------------|----------------------|
| January 31, 1950  | $-2^{\circ}\text{F}$ |
| February 1, 1950  | $-3^{\circ}\text{F}$ |
| February 2, 1950  | $-3^{\circ}\text{F}$ |
| January 27, 1957  | $0^{\circ}\text{F}$  |
| December 29, 1968 | $-2^{\circ}\text{F}$ |
| December 30, 1968 | $-2^{\circ}\text{F}$ |

### 3.3 Days with Minimum Temperatures $\leq 32^{\circ}\text{F}$ or $\leq 0^{\circ}\text{F}$

The monthly and seasonal number of days with minimum temperatures at or below  $32^{\circ}\text{F}$  or  $0^{\circ}\text{F}$  are listed in Table 3.7.

The seasonal average number of days with minimum temperatures  $\leq 32^{\circ}\text{F}$  is 106; however, the number ranges from 70 to 143 days (winters of 1991-1992 and 1984-1985, respectively). The greatest consecutive number of days with minimum temperatures of  $\leq 32^{\circ}\text{F}$  is 93, from November 9, 1978, through February 9, 1979.

The first autumn temperature  $\leq 32^{\circ}\text{F}$  occurred as early as September 25 (1972) and as late as November 12 (1962). The average date is October 19 (see Table 3.5). The last date in spring for minimum temperatures  $\leq 32^{\circ}\text{F}$  varied from March 19 (1958) to May 16 (1974), with an average date of April 20. The average number of days between last freezing temperature in the spring and first freezing temperature in the autumn is 181 days.

On average, 3 days per winter season have a minimum temperature  $\leq 0^{\circ}\text{F}$ ; however, nearly half of all winters have no minimum temperatures in this category (see Table 3.7). The most of those days in any season was 18 (winter of 1949-1950) and the least of those days was 0 (as recently as the winter of 1997-1998). The greatest number of consecutive days with minimum temperatures  $\leq 0^{\circ}\text{F}$  is 11 days, from January 25 through February 4, 1950. During this same period, 4 consecutive days had minimum temperatures  $\leq -20^{\circ}\text{F}$ . Table 3.8 lists all days with minimum temperatures  $\leq 0^{\circ}\text{F}$ . Table 3.9 lists monthly and annual minimum temperatures.

Table 3.6. Monthly and Annual Maximum Temperatures (°F)

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| 1945 | 61  | 65  | 72  | 76  | 90  | 98  | 104 | 105 | 93  | 84  | 72  | 57  | 105    |
| 1946 | 57  | 60  | 76  | 91  | 89  | 98  | 105 | 104 | 89  | 75  | 64  | 64  | 105    |
| 1947 | 57  | 68  | 76  | 88  | 101 | 97  | 103 | 98  | 94  | 83  | 63  | 55  | 103    |
| 1948 | 60  | 64  | 73  | 76  | 91  | 104 | 98  | 97  | 98  | 78  | 57  | 52  | 104    |
| 1949 | 48  | 56  | 64  | 84  | 98  | 102 | 104 | 104 | 100 | 74  | 65  | 60  | 104    |
| 1950 | 50  | 63  | 64  | 78  | 90  | 99  | 102 | 103 | 102 | 76  | 62  | 55  | 103    |
| 1951 | 55  | 65  | 65  | 82  | 94  | 97  | 104 | 101 | 97  | 79  | 60  | 58  | 104    |
| 1952 | 50  | 55  | 70  | 89  | 92  | 94  | 106 | 105 | 97  | 85  | 62  | 54  | 106    |
| 1953 | 63  | 65  | 69  | 78  | 88  | 86  | 103 | 104 | 97  | 81  | 65  | 59  | 104    |
| 1954 | 59  | 63  | 65  | 83  | 98  | 94  | 100 | 99  | 92  | 73  | 62  | 54  | 100    |
| 1955 | 50  | 58  | 63  | 77  | 86  | 102 | 107 | 101 | 101 | 75  | 66  | 56  | 107    |
| 1956 | 59  | 56  | 64  | 85  | 96  | 95  | 106 | 104 | 94  | 79  | 64  | 59  | 106    |
| 1957 | 48  | 65  | 66  | 89  | 97  | 100 | 102 | 96  | 98  | 73  | 60  | 59  | 102    |
| 1958 | 60  | 63  | 63  | 78  | 101 | 106 | 107 | 104 | 97  | 89  | 67  | 60  | 107    |
| 1959 | 59  | 60  | 65  | 79  | 91  | 97  | 107 | 103 | 92  | 77  | 70  | 64  | 107    |
| 1960 | 55  | 55  | 83  | 82  | 90  | 96  | 110 | 105 | 94  | 82  | 63  | 52  | 110    |
| 1961 | 60  | 64  | 68  | 75  | 94  | 108 | 108 | 113 | 90  | 81  | 58  | 56  | 113    |
| 1962 | 63  | 60  | 70  | 85  | 81  | 98  | 106 | 100 | 97  | 76  | 67  | 56  | 106    |
| 1963 | 56  | 64  | 70  | 72  | 93  | 102 | 96  | 101 | 98  | 83  | 61  | 57  | 102    |
| 1964 | 57  | 60  | 74  | 73  | 88  | 95  | 106 | 97  | 90  | 80  | 60  | 57  | 106    |
| 1965 | 60  | 67  | 71  | 82  | 91  | 96  | 108 | 106 | 91  | 84  | 64  | 56  | 108    |
| 1966 | 56  | 59  | 78  | 81  | 100 | 95  | 100 | 102 | 99  | 82  | 64  | 56  | 102    |
| 1967 | 62  | 67  | 65  | 71  | 92  | 101 | 105 | 108 | 98  | 78  | 65  | 62  | 108    |
| 1968 | 66  | 64  | 68  | 90  | 90  | 99  | 110 | 102 | 97  | 73  | 60  | 59  | 110    |
| 1969 | 44  | 46  | 74  | 80  | 95  | 103 | 101 | 102 | 96  | 74  | 63  | 54  | 103    |
| 1970 | 56  | 60  | 67  | 71  | 92  | 104 | 106 | 105 | 89  | 86  | 63  | 58  | 106    |
| 1971 | 72  | 66  | 65  | 76  | 92  | 99  | 111 | 112 | 91  | 85  | 64  | 50  | 112    |
| 1972 | 59  | 68  | 76  | 78  | 96  | 98  | 103 | 110 | 95  | 83  | 58  | 65  | 110    |
| 1973 | 51  | 61  | 68  | 80  | 98  | 104 | 106 | 104 | 98  | 76  | 62  | 58  | 106    |
| 1974 | 61  | 59  | 69  | 77  | 86  | 103 | 104 | 103 | 92  | 80  | 64  | 60  | 104    |
| 1975 | 56  | 58  | 65  | 75  | 90  | 95  | 110 | 98  | 96  | 82  | 75  | 62  | 110    |
| 1976 | 59  | 59  | 69  | 80  | 90  | 100 | 102 | 98  | 102 | 84  | 71  | 57  | 102    |
| 1977 | 61  | 70  | 73  | 94  | 82  | 100 | 101 | 107 | 87  | 75  | 68  | 64  | 107    |
| 1978 | 51  | 57  | 74  | 76  | 87  | 101 | 106 | 106 | 90  | 81  | 69  | 54  | 106    |
| 1979 | 37  | 62  | 76  | 83  | 94  | 102 | 110 | 101 | 96  | 84  | 59  | 59  | 110    |
| 1980 | 51  | 59  | 68  | 87  | 87  | 88  | 106 | 98  | 95  | 89  | 65  | 69  | 106    |
| 1981 | 55  | 66  | 70  | 91  | 89  | 96  | 104 | 107 | 99  | 83  | 65  | 58  | 107    |
| 1982 | 57  | 68  | 71  | 81  | 88  | 102 | 107 | 104 | 94  | 75  | 63  | 62  | 107    |
| 1983 | 61  | 62  | 64  | 77  | 103 | 92  | 100 | 99  | 87  | 78  | 67  | 46  | 103    |
| 1984 | 60  | 62  | 67  | 79  | 94  | 96  | 106 | 103 | 92  | 81  | 61  | 52  | 106    |
| 1985 | 36  | 60  | 68  | 82  | 95  | 102 | 106 | 97  | 86  | 74  | 66  | 39  | 106    |
| 1986 | 57  | 72  | 74  | 84  | 104 | 103 | 99  | 103 | 95  | 84  | 63  | 52  | 104    |
| 1987 | 55  | 60  | 70  | 93  | 102 | 106 | 107 | 105 | 106 | 87  | 66  | 59  | 107    |
| 1988 | 54  | 71  | 71  | 83  | 94  | 99  | 105 | 102 | 102 | 88  | 69  | 57  | 105    |
| 1989 | 67  | 53  | 67  | 80  | 88  | 97  | 101 | 103 | 94  | 80  | 73  | 58  | 103    |
| 1990 | 60  | 64  | 76  | 81  | 94  | 96  | 110 | 108 | 98  | 80  | 68  | 57  | 110    |
| 1991 | 59  | 66  | 69  | 82  | 83  | 93  | 105 | 103 | 95  | 88  | 65  | 59  | 105    |
| 1992 | 60  | 62  | 78  | 85  | 98  | 111 | 107 | 109 | 91  | 87  | 62  | 53  | 111    |
| 1993 | 56  | 52  | 66  | 73  | 100 | 98  | 96  | 100 | 98  | 86  | 65  | 67  | 100    |
| 1994 | 61  | 63  | 79  | 88  | 95  | 101 | 111 | 106 | 94  | 84  | 62  | 64  | 111    |
| 1995 | 67  | 68  | 69  | 80  | 95  | 98  | 105 | 102 | 101 | 74  | 69  | 57  | 105    |
| 1996 | 58  | 63  | 68  | 82  | 86  | 98  | 108 | 109 | 94  | 86  | 66  | 52  | 109    |
| 1997 | 57  | 64  | 76  | 75  | 94  | 98  | 101 | 106 | 95  | 77  | 63  | 52  | 106    |
| 1998 | 57  | 58  | 72  | 92  | 93  | 99  | 112 | 110 | 103 | 84  | 67  | 60  | 112    |
| 1999 | 62  | 62  | 75  | 82  | 97  | 102 | 105 | 101 | 91  | 81  | 76  | 62  | 105    |

**Table 3.7. Monthly and Seasonal Number of Days with Minimum Temperatures (°F) Below Certain Thresholds**

| Season    | Minimum Temperature ≤32°F |     |     |     |     |     |     |     |     |                    | Minimum Temperature ≤0°F |     |     |     |                    |
|-----------|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|--------------------|--------------------------|-----|-----|-----|--------------------|
|           | Sep                       | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Total              | Nov                      | Dec | Jan | Feb | Total              |
| 1944-1945 | --                        | --  | --  | --  | 27  | 18  | 12  | 6   | 0   | 63                 | --                       | --  | 0   | 0   | 0                  |
| 1945-1946 | 0                         | 5   | 14  | 25  | 27  | 20  | 10  | 2   | 0   | 103                | 0                        | 0   | 0   | 0   | 0                  |
| 1946-1947 | 0                         | 8   | 23  | 24  | 27  | 19  | 6   | 1   | 0   | 108                | 0                        | 0   | 1   | 0   | 1                  |
| 1947-1948 | 0                         | 0   | 11  | 26  | 25  | 24  | 21  | 7   | 1   | 115                | 0                        | 0   | 0   | 0   | 0                  |
| 1948-1949 | 0                         | 8   | 15  | 30  | 31  | 25  | 11  | 4   | 1   | 125                | 0                        | 2   | 9   | 0   | 11                 |
| 1949-1950 | 0                         | 10  | 4   | 25  | 30  | 22  | 18  | 4   | 0   | 113                | 0                        | 0   | 14  | 4   | 18 <sup>(a)</sup>  |
| 1950-1951 | 0                         | 0   | 13  | 19  | 26  | 25  | 21  | 2   | 0   | 106                | 0                        | 0   | 0   | 0   | 0                  |
| 1951-1952 | 0                         | 6   | 19  | 26  | 31  | 24  | 20  | 6   | 0   | 132                | 0                        | 0   | 0   | 0   | 0                  |
| 1952-1953 | 0                         | 0   | 25  | 19  | 9   | 15  | 12  | 4   | 0   | 84                 | 0                        | 0   | 0   | 0   | 0                  |
| 1953-1954 | 0                         | 1   | 14  | 22  | 23  | 16  | 19  | 4   | 1   | 100                | 0                        | 0   | 2   | 0   | 2                  |
| 1954-1955 | 0                         | 6   | 6   | 26  | 30  | 25  | 22  | 10  | 1   | 126                | 0                        | 0   | 0   | 0   | 0                  |
| 1955-1956 | 0                         | 1   | 22  | 28  | 25  | 26  | 14  | 2   | 0   | 118                | 1                        | 0   | 2   | 3   | 6                  |
| 1956-1957 | 0                         | 3   | 18  | 21  | 31  | 23  | 11  | 0   | 0   | 107                | 0                        | 0   | 12  | 1   | 13                 |
| 1957-1958 | 0                         | 2   | 17  | 16  | 19  | 5   | 16  | 0   | 0   | 75                 | 0                        | 0   | 0   | 0   | 0                  |
| 1958-1959 | 0                         | 4   | 14  | 24  | 25  | 24  | 14  | 2   | 1   | 108                | 0                        | 0   | 2   | 0   | 2                  |
| 1959-1960 | 0                         | 2   | 24  | 26  | 31  | 21  | 10  | 4   | 0   | 118                | 0                        | 0   | 1   | 0   | 1                  |
| 1960-1961 | 0                         | 4   | 15  | 29  | 23  | 10  | 7   | 5   | 0   | 93                 | 0                        | 0   | 0   | 0   | 0                  |
| 1961-1962 | 0                         | 7   | 28  | 26  | 27  | 17  | 19  | 0   | 1   | 125                | 0                        | 0   | 1   | 0   | 1                  |
| 1962-1963 | 0                         | 0   | 13  | 17  | 27  | 17  | 11  | 2   | 0   | 87                 | 0                        | 0   | 2   | 0   | 2                  |
| 1963-1964 | 0                         | 5   | 8   | 31  | 26  | 26  | 16  | 4   | 0   | 116                | 0                        | 0   | 0   | 0   | 0                  |
| 1964-1965 | 0                         | 5   | 13  | 29  | 25  | 18  | 19  | 1   | 1   | 111                | 0                        | 2   | 0   | 0   | 2                  |
| 1965-1966 | 0                         | 1   | 8   | 25  | 26  | 22  | 13  | 3   | 0   | 98                 | 0                        | 0   | 0   | 0   | 0                  |
| 1966-1967 | 0                         | 3   | 11  | 18  | 20  | 17  | 18  | 9   | 0   | 96                 | 0                        | 0   | 0   | 0   | 0                  |
| 1967-1968 | 0                         | 1   | 17  | 25  | 23  | 13  | 6   | 5   | 0   | 90                 | 0                        | 0   | 0   | 0   | 0                  |
| 1968-1969 | 0                         | 4   | 8   | 24  | 30  | 25  | 15  | 1   | 0   | 107                | 0                        | 4   | 5   | 1   | 10                 |
| 1969-1970 | 0                         | 5   | 19  | 21  | 28  | 13  | 16  | 7   | 1   | 110                | 0                        | 0   | 0   | 0   | 0                  |
| 1970-1971 | 0                         | 8   | 14  | 28  | 24  | 19  | 20  | 7   | 0   | 120                | 0                        | 0   | 0   | 0   | 0                  |
| 1971-1972 | 0                         | 9   | 18  | 27  | 25  | 23  | 13  | 6   | 0   | 121                | 0                        | 0   | 3   | 1   | 4                  |
| 1972-1973 | 3                         | 6   | 13  | 23  | 30  | 23  | 10  | 4   | 0   | 112                | 0                        | 7   | 1   | 0   | 8                  |
| 1973-1974 | 0                         | 4   | 14  | 16  | 19  | 15  | 12  | 0   | 1   | 81                 | 0                        | 0   | 8   | 0   | 8                  |
| 1974-1975 | 0                         | 4   | 12  | 26  | 29  | 24  | 17  | 7   | 0   | 119                | 0                        | 0   | 0   | 0   | 0                  |
| 1975-1976 | 0                         | 2   | 23  | 28  | 30  | 22  | 19  | 6   | 0   | 130                | 0                        | 0   | 0   | 0   | 0                  |
| 1976-1977 | 0                         | 8   | 17  | 30  | 30  | 19  | 14  | 1   | 0   | 119                | 0                        | 0   | 0   | 0   | 0                  |
| 1977-1978 | 0                         | 3   | 18  | 25  | 22  | 17  | 11  | 4   | 0   | 100                | 0                        | 1   | 2   | 0   | 3                  |
| 1978-1979 | 0                         | 7   | 26  | 31  | 31  | 21  | 13  | 2   | 0   | 131                | 0                        | 3   | 8   | 2   | 13                 |
| 1979-1980 | 0                         | 1   | 23  | 22  | 31  | 22  | 13  | 3   | 0   | 115                | 0                        | 0   | 1   | 0   | 1                  |
| 1980-1981 | 0                         | 4   | 16  | 16  | 17  | 17  | 11  | 6   | 0   | 87                 | 0                        | 0   | 0   | 0   | 0                  |
| 1981-1982 | 0                         | 5   | 13  | 23  | 27  | 17  | 12  | 12  | 0   | 109                | 0                        | 0   | 2   | 0   | 2                  |
| 1982-1983 | 0                         | 4   | 21  | 26  | 20  | 13  | 4   | 9   | 0   | 97                 | 0                        | 0   | 0   | 0   | 0                  |
| 1983-1984 | 0                         | 3   | 11  | 31  | 26  | 17  | 5   | 2   | 0   | 95                 | 0                        | 4   | 0   | 0   | 4                  |
| 1984-1985 | 0                         | 14  | 20  | 31  | 31  | 25  | 20  | 2   | 0   | 143 <sup>(a)</sup> | 0                        | 4   | 0   | 3   | 7                  |
| 1985-1986 | 0                         | 7   | 23  | 31  | 23  | 17  | 8   | 4   | 0   | 113                | 5                        | 1   | 0   | 0   | 6                  |
| 1986-1987 | 0                         | 0   | 11  | 29  | 25  | 17  | 9   | 2   | 0   | 93                 | 0                        | 0   | 0   | 0   | 0                  |
| 1987-1988 | 0                         | 3   | 11  | 25  | 29  | 22  | 13  | 2   | 0   | 105                | 0                        | 0   | 0   | 0   | 0                  |
| 1988-1989 | 0                         | 1   | 12  | 23  | 24  | 25  | 11  | 0   | 0   | 96                 | 0                        | 0   | 0   | 4   | 4                  |
| 1989-1990 | 0                         | 2   | 11  | 25  | 18  | 20  | 11  | 0   | 0   | 87                 | 0                        | 0   | 0   | 0   | 0                  |
| 1990-1991 | 0                         | 2   | 11  | 27  | 27  | 14  | 14  | 2   | 0   | 97                 | 0                        | 8   | 0   | 0   | 8                  |
| 1991-1992 | 0                         | 6   | 8   | 18  | 22  | 11  | 3   | 2   | 0   | 70 <sup>(a)</sup>  | 0                        | 0   | 0   | 0   | 0                  |
| 1992-1993 | 0                         | 1   | 9   | 29  | 27  | 23  | 10  | 1   | 0   | 100                | 0                        | 0   | 2   | 0   | 2                  |
| 1993-1994 | 0                         | 5   | 26  | 22  | 21  | 21  | 12  | 0   | 0   | 107                | 1                        | 0   | 0   | 0   | 1                  |
| 1994-1995 | 0                         | 2   | 20  | 24  | 20  | 11  | 13  | 2   | 0   | 92                 | 0                        | 0   | 0   | 0   | 0                  |
| 1995-1996 | 0                         | 3   | 12  | 25  | 28  | 22  | 13  | 5   | 1   | 109                | 0                        | 0   | 2   | 3   | 5                  |
| 1996-1997 | 0                         | 7   | 19  | 26  | 24  | 18  | 10  | 7   | 1   | 112                | 0                        | 1   | 0   | 0   | 1                  |
| 1997-1998 | 0                         | 4   | 12  | 25  | 21  | 14  | 9   | 3   | 0   | 88                 | 0                        | 0   | 0   | 0   | 0 <sup>(a,b)</sup> |
| 1998-1999 | 0                         | 5   | 10  | 23  | 20  | 15  | 13  | 7   | 2   | 95                 | 0                        | 1   | 0   | 0   | 1                  |
| Average   | <1                        | 4   | 15  | 24  | 26  | 19  | 13  | 4   | <1  | 106                | <1                       | 1   | 1   | <1  | 3                  |
| Normal    | <1                        | 4   | 15  | 25  | 26  | 19  | 13  | 4   | <1  | 107                | <1                       | 1   | 1   | <1  | 3                  |

(a) Greatest and least seasonal totals.  
 (b) Most recent of numerous occurrences.

**Table 3.8. Days with Minimum Temperatures  $\leq 0^{\circ}\text{F}$**

| Temperature<br>( $^{\circ}\text{F}$ ) | Date(s) of Occurrence            |                                  |                                  |                                  |                                  |                      |
|---------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------|
| -23                                   | 02/03/50                         | 02/01/50                         |                                  |                                  |                                  |                      |
| -22                                   | 01/26/57                         |                                  |                                  |                                  |                                  |                      |
| -21                                   | 01/27/57                         | 02/02/50                         | 01/31/50                         |                                  |                                  |                      |
| -18                                   | 02/01/96                         | 01/31/96                         | 01/29/50                         |                                  |                                  |                      |
| -15                                   | 02/03/96                         |                                  |                                  |                                  |                                  |                      |
| -14                                   | 02/02/96                         | 12/30/68                         | 01/29/57                         | 01/28/57                         |                                  |                      |
| -13                                   | 11/23/85                         | 12/22/83                         | 01/09/74                         | 12/16/64                         | 01/30/50                         |                      |
| -12                                   | 12/22/90                         | 11/24/85                         | 02/01/79                         | 12/17/64                         | 01/25/57                         |                      |
| -11                                   | 01/30/96                         | 01/01/79                         | 01/17/50                         | 01/14/50                         | 01/25/49                         |                      |
| -10                                   | 12/29/90<br>02/02/56             | 12/21/90<br>02/01/56             | 02/02/79                         | 12/30/78                         | 01/06/74                         | 12/29/68             |
| -9                                    | 12/23/83                         | 01/06/79                         | 12/31/78                         | 01/02/78                         | 01/08/74                         |                      |
| -8                                    | 12/01/85<br>01/16/50             | 01/06/82                         | 01/07/74                         | 12/10/72                         | 01/23/69                         | 01/30/57             |
| -7                                    | 01/07/79                         | 01/31/56                         | 01/28/50                         | 01/05/50                         |                                  |                      |
| -6                                    | 12/28/96<br>01/29/69<br>01/11/49 | 11/22/85<br>01/28/69             | 01/31/79<br>01/18/57             | 01/05/74<br>01/20/54             | 12/13/72<br>01/04/50             | 12/08/72<br>01/24/49 |
| -5                                    | 02/05/89<br>01/15/50             | 02/04/85                         | 01/01/78                         | 1/10/74                          | 12/12/72                         | 12/09/72             |
| -4                                    | 01/13/93<br>01/11/74<br>01/12/49 | 12/23/90<br>12/11/72             | 02/04/89<br>01/28/72             | 12/19/84<br>01/12/63             | 12/21/83<br>01/28/49             | 01/27/79<br>01/13/49 |
| -3                                    | 02/06/89<br>12/29/78<br>01/11/63 | 11/25/85<br>12/31/77<br>01/17/57 | 02/03/85<br>01/31/69             | 12/18/84<br>01/30/69             | 01/10/80<br>12/31/68             | 01/08/79<br>12/28/68 |
| -2                                    | 12/31/90<br>01/04/74<br>01/10/49 | 12/30/90<br>12/14/72<br>12/27/48 | 12/20/90<br>01/22/62             | 12/21/84<br>01/31/57             | 12/20/84<br>01/19/57             | 01/05/79<br>01/20/49 |
| -1                                    | 12/21/98<br>02/01/69<br>01/30/56 | 11/24/93<br>01/18/60<br>11/14/55 | 11/26/85<br>01/04/59<br>02/04/50 | 01/08/73<br>02/02/57<br>01/25/50 | 02/03/72<br>01/16/57<br>01/13/50 | 01/26/72<br>02/03/56 |
| 0                                     | 01/11/93<br>01/28/79<br>01/26/50 | 12/24/90<br>01/27/72<br>01/04/49 | 02/02/89<br>01/03/59<br>12/26/48 | 02/06/85<br>01/24/57<br>01/15/47 | 12/27/83<br>01/21/54             | 01/07/82<br>01/27/50 |

Table 3.9. Monthly and Annual Minimum Temperatures (°F)

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| 1945 | 21  | 14  | 10  | 28  | 38  | 46  | 53  | 47  | 35  | 26  | 16  | 13  | 10     |
| 1946 | 18  | 18  | 25  | 30  | 33  | 44  | 50  | 49  | 35  | 21  | 16  | 6   | 6      |
| 1947 | 0   | 11  | 23  | 32  | 42  | 45  | 53  | 50  | 40  | 34  | 22  | 16  | 0      |
| 1948 | 14  | 1   | 13  | 28  | 32  | 51  | 49  | 47  | 34  | 22  | 20  | -2  | -2     |
| 1949 | -11 | 3   | 27  | 30  | 31  | 42  | 49  | 47  | 38  | 23  | 28  | 10  | -11    |
| 1950 | -21 | -23 | 20  | 27  | 38  | 44  | 49  | 51  | 38  | 34  | 21  | 22  | -23    |
| 1951 | 6   | 18  | 22  | 26  | 37  | 41  | 51  | 47  | 39  | 27  | 23  | 4   | 4      |
| 1952 | 5   | 16  | 24  | 27  | 37  | 42  | 49  | 46  | 42  | 34  | 7   | 17  | 5      |
| 1953 | 24  | 20  | 23  | 27  | 36  | 40  | 52  | 51  | 37  | 30  | 24  | 20  | 20     |
| 1954 | -6  | 17  | 18  | 26  | 28  | 41  | 45  | 48  | 36  | 26  | 23  | 14  | -6     |
| 1955 | 18  | 15  | 6   | 26  | 31  | 42  | 43  | 48  | 37  | 32  | -1  | 9   | -1     |
| 1956 | -7  | -10 | 15  | 28  | 38  | 40  | 54  | 49  | 39  | 31  | 15  | 2   | -10    |
| 1957 | -22 | -1  | 28  | 34  | 48  | 48  | 51  | 52  | 36  | 32  | 20  | 23  | -22    |
| 1958 | 16  | 29  | 23  | 34  | 38  | 47  | 49  | 53  | 34  | 30  | 9   | 21  | 9      |
| 1959 | -1  | 19  | 25  | 30  | 30  | 41  | 49  | 49  | 41  | 26  | 6   | 14  | -1     |
| 1960 | -1  | 10  | 13  | 30  | 33  | 46  | 52  | 41  | 40  | 30  | 22  | 14  | -1     |
| 1961 | 16  | 27  | 25  | 31  | 38  | 44  | 50  | 56  | 36  | 26  | 10  | 3   | 3      |
| 1962 | -2  | 7   | 15  | 33  | 31  | 37  | 42  | 49  | 40  | 34  | 16  | 16  | -2     |
| 1963 | -4  | 8   | 22  | 28  | 36  | 45  | 49  | 49  | 45  | 23  | 17  | 7   | -4     |
| 1964 | 15  | 19  | 15  | 30  | 35  | 45  | 50  | 44  | 39  | 30  | 20  | -13 | -13    |
| 1965 | 10  | 18  | 14  | 32  | 32  | 48  | 50  | 42  | 33  | 30  | 26  | 10  | 10     |
| 1966 | 17  | 19  | 19  | 26  | 37  | 38  | 48  | 50  | 43  | 29  | 22  | 22  | 17     |
| 1967 | 23  | 20  | 20  | 27  | 34  | 47  | 52  | 56  | 43  | 30  | 17  | 6   | 6      |
| 1968 | 10  | 15  | 25  | 23  | 33  | 42  | 51  | 47  | 39  | 30  | 23  | -14 | -14    |
| 1969 | -8  | -1  | 22  | 31  | 38  | 52  | 53  | 45  | 41  | 29  | 19  | 19  | -8     |
| 1970 | 8   | 21  | 24  | 26  | 30  | 46  | 50  | 52  | 34  | 23  | 11  | 8   | 8      |
| 1971 | 8   | 15  | 15  | 27  | 36  | 44  | 44  | 51  | 38  | 13  | 21  | 5   | 5      |
| 1972 | -4  | -1  | 24  | 26  | 36  | 45  | 50  | 49  | 30  | 20  | 24  | -8  | -8     |
| 1973 | -1  | 21  | 26  | 27  | 34  | 45  | 46  | 46  | 43  | 31  | 16  | 14  | -1     |
| 1974 | -13 | 23  | 21  | 33  | 32  | 41  | 48  | 48  | 40  | 29  | 24  | 17  | -13    |
| 1975 | 14  | 10  | 19  | 21  | 33  | 38  | 53  | 46  | 44  | 26  | 15  | 14  | 10     |
| 1976 | 16  | 10  | 11  | 25  | 35  | 37  | 47  | 44  | 42  | 28  | 13  | 12  | 10     |
| 1977 | 4   | 21  | 24  | 31  | 34  | 39  | 49  | 48  | 36  | 28  | 9   | -3  | -3     |
| 1978 | -9  | 17  | 25  | 30  | 37  | 44  | 50  | 47  | 41  | 21  | 7   | -10 | -10    |
| 1979 | -11 | -12 | 20  | 29  | 38  | 45  | 39  | 53  | 42  | 32  | 13  | 19  | -12    |
| 1980 | -3  | 19  | 25  | 28  | 38  | 40  | 47  | 42  | 41  | 30  | 18  | 9   | -3     |
| 1981 | 23  | 8   | 24  | 24  | 35  | 40  | 45  | 48  | 34  | 27  | 19  | 8   | 8      |
| 1982 | -8  | 9   | 24  | 24  | 33  | 47  | 45  | 51  | 41  | 26  | 18  | 13  | -8     |
| 1983 | 12  | 15  | 29  | 27  | 37  | 40  | 49  | 50  | 35  | 29  | 22  | -13 | -13    |
| 1984 | 10  | 24  | 25  | 30  | 33  | 37  | 51  | 47  | 36  | 12  | 25  | -4  | -4     |
| 1985 | 5   | -5  | 21  | 26  | 33  | 44  | 56  | 46  | 33  | 26  | -13 | -8  | -13    |
| 1986 | 12  | 15  | 29  | 28  | 37  | 43  | 48  | 54  | 38  | 33  | 16  | 18  | 12     |
| 1987 | 9   | 18  | 24  | 30  | 38  | 43  | 49  | 51  | 41  | 31  | 17  | 9   | 9      |
| 1988 | 14  | 9   | 24  | 31  | 35  | 42  | 47  | 52  | 38  | 32  | 28  | 8   | 8      |
| 1989 | 15  | -5  | 14  | 35  | 39  | 46  | 49  | 52  | 44  | 27  | 21  | 19  | -5     |
| 1990 | 22  | 9   | 24  | 37  | 39  | 47  | 46  | 52  | 48  | 31  | 28  | -12 | -12    |
| 1991 | 5   | 26  | 22  | 31  | 38  | 44  | 55  | 47  | 42  | 23  | 23  | 20  | 5      |
| 1992 | 19  | 22  | 32  | 27  | 37  | 49  | 54  | 43  | 40  | 30  | 17  | 12  | 12     |
| 1993 | -4  | 3   | 17  | 32  | 35  | 46  | 50  | 43  | 37  | 29  | -1  | 21  | -4     |
| 1994 | 20  | 5   | 19  | 35  | 36  | 44  | 50  | 53  | 47  | 30  | 19  | 8   | 5      |
| 1995 | 8   | 8   | 21  | 28  | 39  | 47  | 52  | 45  | 42  | 16  | 17  | 16  | 8      |
| 1996 | -18 | -18 | 18  | 30  | 29  | 45  | 49  | 48  | 34  | 34  | 17  | -6  | -18    |
| 1997 | 8   | 20  | 28  | 25  | 30  | 46  | 49  | 52  | 44  | 29  | 23  | 19  | 8      |
| 1998 | 7   | 22  | 23  | 29  | 39  | 47  | 58  | 50  | 43  | 25  | 27  | -1  | -1     |
| 1999 | 18  | 20  | 25  | 25  | 30  | 38  | 45  | 43  | 36  | 27  | 26  | 20  | 18     |



### 3.4 Monthly Extremes of Daily Maximum and Minimum Temperatures

Monthly extremes of daily maximum and minimum temperatures are presented in Table 3.10. Note that ranges are comparable in the winter and in the summer. February temperatures ranged from 72°F to -23°F, a range of 95°F. July temperatures ranged from 112°F to 39°F, a range of 83°F.

### 3.5 Daily Temperature Distributions

Daily temperatures are generally described relative to a long-term average temperature or to record high or low temperatures. For example, the daily maximum temperature may be described as above average or near the record high for the day. However, this type of description does not provide information about whether the temperature is in the range of temperatures that is typical for the day. Figure 3.1 shows an example of a new way of displaying climatological temperature information that places temperatures in better context. The figure shows the record low and high daily maximum temperatures for November 12 at the Hanford Meteorology Station based on climatological records from 1947 through 1999. Between the record low and high temperatures, the figure has a bar that shows the range of daily maximum temperatures that have occurred 70 percent of the time. This range can be interpreted as the range of typical daily maximum temperatures for the date. On this bar is a solid square that indicates the median daily maximum temperature. The median temperature is the daily maximum temperature that is exceeded 50 percent of the time. For temperatures at the Hanford Meteorology Station, the median temperature is generally very close to the long-term average temperature. The following information can be drawn from the figure:

- The median (as well as the average) daily maximum temperature is about 52°F.
- The record high temperature for the date is 75°F.
- The record low maximum temperature is 20°F.
- About 70 percent of the time (14 out of 20 years), the daily maximum temperature will be between 42°F and 60°F.
- About 15 percent of the time (3 out of 20 years), the daily maximum temperature will be above 60°F.
- About 35 percent of the time (7 out of 20 years), the daily maximum temperature will be between 52°F and 60°F.
- About 35 percent of the time (7 out of 20 years), the daily maximum temperature will be between 42°F and 52°F.
- About 15 percent of the time (3 out of 20 years), the daily maximum temperature will be below 42°F.

This method of presenting climatological data is appropriate for daily minimum temperatures and other meteorological parameters as well.

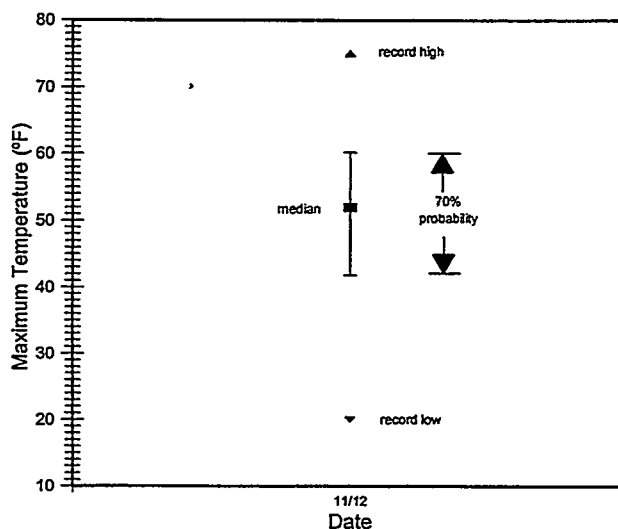


Figure 3.1. Graphical Presentation of Daily Maximum Temperatures

Figures 3.2 and 3.3 show the climatological statistics of the daily maximum and daily minimum temperatures, respectively, for the Hanford Meteorology Station. The statistics are for days taken at approximately weekly intervals.

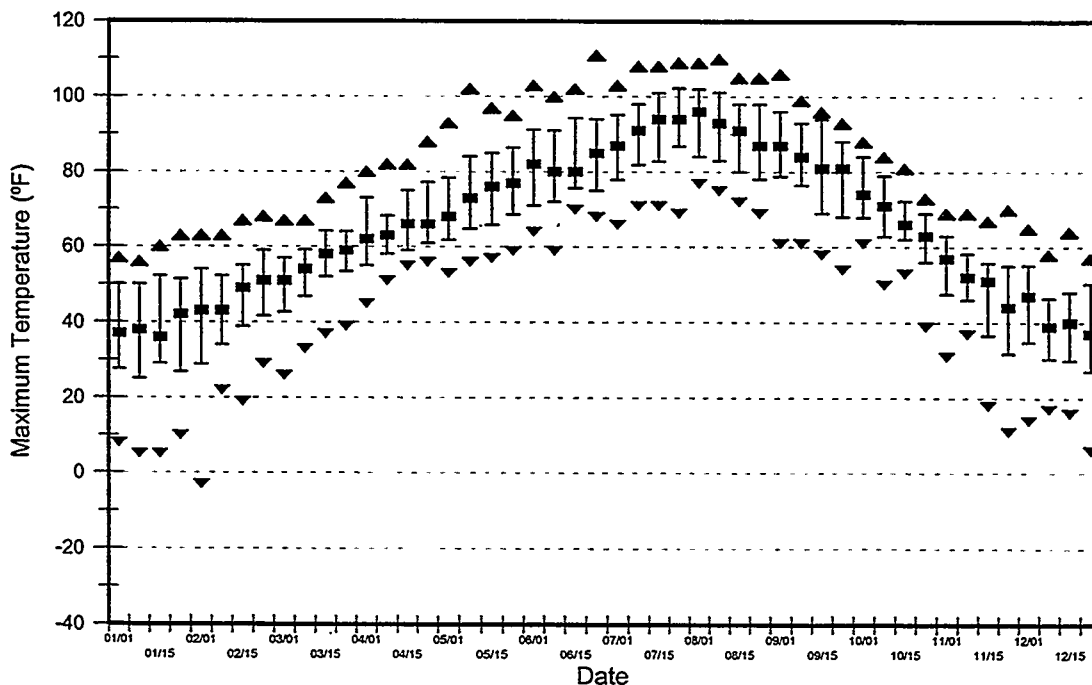
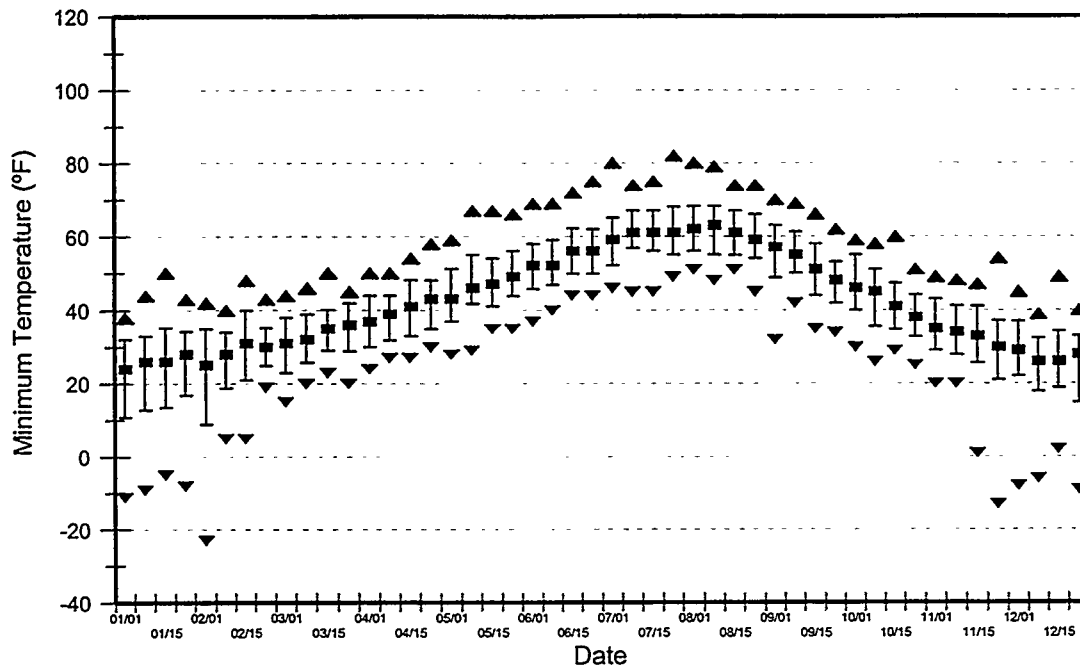


Figure 3.2. Climatological Statistics of Daily Maximum Temperatures at the Hanford Meteorology Station



**Figure 3.3.** Climatological Statistics of Daily Minimum Temperatures at the Hanford Meteorology Station

### 3.6 Average Daily Temperature Range

Table 3.11 represents the average daily temperature range by month and year for the period 1945 through 1999. This statistic is compiled by determining each daily temperature range (the difference between the maximum and minimum temperature), totaling for every day of the month, and dividing by the number of days in the month. As can be seen from the table, the average daily temperature ranges for July and August ( $>30^{\circ}\text{F}$ ) are more than double the ranges for December and January ( $<15^{\circ}\text{F}$ ). The lowest average daily temperature range was  $8^{\circ}\text{F}$  in December 1985; the greatest was  $34.5^{\circ}\text{F}$  in August 1967. The greatest range for any single day was  $48^{\circ}\text{F}$  on August 14, 1995 (high of  $93^{\circ}\text{F}$ , low of  $45^{\circ}\text{F}$ ) and also on May 11, 1946 (high of  $86^{\circ}\text{F}$ , low of  $38^{\circ}\text{F}$ ). The least range for any single day was  $1^{\circ}\text{F}$  as recently as December 6, 1997 (high of  $30^{\circ}\text{F}$ , low of  $29^{\circ}\text{F}$ ).

### 3.7 Normal and Extreme Daily Temperatures

Table 3.12 lists the normal and extreme daily maximum and minimum temperatures. Climatological normals are computed every 10 years and are based on a 30-year period, ending with the first year of each new decade. The current normal period is 1961 through 1990; the next will be 1971 through 2000. The normal temperatures in Table 3.12 are computed using a 7-day running mean, centered about each day.

Four possible temperature extremes are presented for each day, a record high and low maximum and a record high and low minimum. These daily records, plus the year of occurrence for the period 1945 through 1999, are also indicated in Table 3.12.

**Table 3.10. Monthly Normal Temperature (°F) and Monthly Extremes of Maximum and Minimum Temperatures (°F)**

| Month  | Normal (1961-1990) |         |      | Daily Extreme |     |     |        |         |     |        |      |         |         |     |      |        |
|--------|--------------------|---------|------|---------------|-----|-----|--------|---------|-----|--------|------|---------|---------|-----|------|--------|
|        | Maximum            | Minimum | Mean | Maximum       |     |     |        | Minimum |     |        |      | Minimum |         |     |      |        |
|        | High               | Low     | Day  | High          | Low | Day | Year   | High    | Low | Day    | Year | High    | Low     | Day | Year |        |
| Jan    | 38.4               | 24.0    | 31.3 | 72            | 31  | 31  | 1971   | -2      | 31  | 1950   | 53   | 30      | 1971    | -22 | 26   | 1957   |
| Feb    | 47.3               | 28.8    | 38.0 | 72            | 25  | 1   | 1986   | -3      | 1   | 1950   | 60   | 24      | 1986    | -23 | 3    | 1950   |
|        |                    |         |      | 72            | 24  |     | 1986   |         |     |        |      |         |         | -23 | 1    | 1950   |
| Mar    | 57.3               | 33.9    | 45.6 | 83            | 25  | 3   | 1960   | 24      | 3   | 1960   | 50   | 15      | 1992    | 6   | 5    | 1955   |
|        |                    |         |      |               |     |     |        |         |     |        | 50   | 5       | 1987    |     |      |        |
|        |                    |         |      |               |     |     |        |         |     |        | 50   | 3       | 1987    |     |      |        |
| Apr    | 66.0               | 39.6    | 52.7 | 94            | 24  | 7   | 1977   | 41      | 7   | 1945   | 64   | 28      | 1987    | 21  | 5    | 1975   |
| May    | 75.2               | 47.4    | 61.3 | 104           | 31  | 11  | 1986   | 51      | 11  | 1967   | 71   | 29      | 1986    | 28  | 1    | 1954   |
|        |                    |         |      | 104           | 30  |     | 1986   |         |     |        |      |         |         |     |      |        |
| Jun    | 83.9               | 55.3    | 69.7 | 111           | 23  | 3   | 1992   | 55      | 3   | 1966   | 80   | 24      | 1992    | 37  | 3    | 1962   |
|        |                    |         |      |               |     |     |        |         |     |        |      |         |         | 37  | 2    | 1976   |
|        |                    |         |      |               |     |     |        |         |     |        |      |         |         | 37  | 1    | 1984   |
| Jul    | 91.4               | 60.9    | 76.2 | 112           | 27  | 2   | 1998   | 59      | 2   | 1966   | 82   | 23      | 1994    | 39  | 2    | 1979   |
| Aug    | 90.2               | 59.9    | 75.1 | 113           | 4   | 31  | 1961   | 64      | 31  | 1999   | 81   | 4       | 1961    | 41  | 22   | 1960   |
| Sep    | 80.1               | 51.2    | 65.7 | 106           | 1   | 22  | 1987   | 52      | 22  | 1984   | 72   | 7       | 1955    | 30  | 27   | 1972   |
|        |                    |         |      |               |     |     |        |         |     |        |      |         |         | 30  | 25   | 1972   |
| Oct    | 65.7               | 40.3    | 52.9 | 89            | 4   | 30  | 1980   | 32      | 30  | 1971   | 60   | 25      | 1945    | 12  | 31   | 1984   |
|        |                    |         |      | 89            | 3   |     | 1958   |         |     |        | 60   | 15      | 1988    |     |      |        |
|        |                    |         |      |               |     |     |        |         |     |        | 60   | 2       | 1988    |     |      |        |
| Nov    | 48.7               | 31.9    | 40.2 | 76            | 13  | 24  | 1999   | 6       | 24  | 1985   | 60   | 9       | 1989    | -13 | 23   | 1985   |
| Dec    | 38.1               | 24.7    | 31.4 | 69            | 26  | 30  | 1980   | -2      | 30  | 1968   | 56   | 2       | 1975    | -14 | 30   | 1968   |
|        |                    |         |      |               |     | 29  | 1968   |         |     |        |      |         |         |     |      |        |
| Annual |                    |         | 53.3 | 113           |     |     | 8/4/61 | -3      |     | 2/1/50 | 82   |         | 7/23/94 | -23 |      | 2/3/50 |
|        |                    |         |      |               |     |     |        |         |     |        |      |         |         |     |      | 2/1/50 |

Table 3.11. Average Daily Temperature (°F) Range

| Year    | Jan                 | Feb                 | Mar                 | Apr                 | May                 | Jun                 | Jul                 | Aug                 | Sep                 | Oct                 | Nov                 | Dec                 | Annual              |
|---------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1945    | 10.5                | 17.4                | 19.5                | 25.1                | 25.0                | 26.1                | 31.0                | 29.7                | 26.9                | 27.4                | 16.3                | 11.4                | 22.2                |
| 1946    | 17.3                | 21.0                | 21.8                | 26.1                | 29.6                | 25.6                | 30.4                | 29.4                | 26.8                | 23.6                | 17.7                | 15.8                | 23.8                |
| 1947    | 18.4                | 22.2                | 25.5                | 27.7                | 29.6                | 25.3 <sup>(a)</sup> | 29.3                | 28.8                | 27.3                | 18.1 <sup>(a)</sup> | 15.4                | 11.1                | 23.2                |
| 1948    | 15.0                | 17.2                | 23.0                | 23.2                | 22.6 <sup>(a)</sup> | 26.4                | 29.1                | 28.0                | 28.7                | 26.5                | 17.8                | 15.9                | 22.8                |
| 1949    | 18.8 <sup>(a)</sup> | 19.3                | 20.6                | 30.5                | 28.2                | 30.2                | 30.5                | 30.4                | 27.2                | 26.6                | 16.8                | 16.7                | 24.6                |
| 1950    | 16.0                | 15.6                | 20.0                | 25.3                | 29.6                | 25.7                | 32.3                | 31.6                | 32.4                | 18.2                | 14.7                | 9.7                 | 22.6                |
| 1951    | 13.7                | 18.4                | 20.8                | 30.3                | 30.2                | 28.9                | 33.8 <sup>(a)</sup> | 31.5                | 30.9                | 23.3                | 17.4                | 13.7                | 24.4                |
| 1952    | 12.6                | 17.0                | 22.8                | 30.3                | 28.1                | 27.3                | 32.6                | 32.2                | 32.8                | 29.0                | 16.0                | 9.4                 | 24.2                |
| 1953    | 15.6                | 19.8                | 24.4                | 24.0                | 27.9                | 26.4                | 32.8                | 29.1                | 32.5                | 27.8                | 20.3                | 17.7 <sup>(a)</sup> | 24.9                |
| 1954    | 14.3                | 13.8                | 23.7                | 26.3                | 28.1                | 26.8                | 31.4                | 27.6                | 26.2                | 24.5                | 15.8                | 13.2                | 22.6                |
| 1955    | 9.2 <sup>(a)</sup>  | 18.9                | 21.8                | 24.9                | 25.3                | 29.4                | 27.9                | 31.7                | 27.5                | 22.7                | 16.1                | 12.3                | 22.3                |
| 1956    | 12.9                | 15.0                | 20.9                | 28.0                | 26.6                | 26.9                | 30.8                | 28.8                | 30.6                | 22.1                | 13.9                | 13.4                | 22.5                |
| 1957    | 15.2                | 18.3                | 18.4 <sup>(a)</sup> | 24.7                | 24.8                | 27.7                | 28.7                | 27.0                | 29.8                | 18.4                | 19.1                | 14.7                | 22.2                |
| 1958    | 13.3                | 15.0                | 22.0                | 23.9                | 29.6                | 27.3                | 30.5                | 33.1                | 27.0                | 27.8                | 17.8                | 10.2                | 23.1                |
| 1959    | 14.1                | 16.2                | 24.3                | 26.9                | 26.5                | 27.1                | 31.1                | 29.9                | 23.8                | 24.4                | 21.9                | 13.4                | 23.3                |
| 1960    | 14.6                | 19.3                | 23.2                | 25.7                | 26.5                | 31.2                | 32.8                | 28.1                | 28.3                | 25.7                | 18.7                | 10.9                | 23.8                |
| 1961    | 12.5                | 17.2                | 20.0                | 25.3                | 25.5                | 31.5                | 30.6                | 30.9                | 26.9                | 25.4                | 20.4                | 15.0                | 23.4                |
| 1962    | 18.1                | 17.4                | 22.0                | 28.9                | 23.2                | 29.9                | 30.2                | 28.3                | 29.9                | 21.4                | 17.3                | 11.4                | 23.2                |
| 1963    | 17.2                | 16.8                | 23.3                | 21.4 <sup>(a)</sup> | 28.1                | 26.6                | 27.8                | 30.7                | 29.8                | 24.5                | 16.9                | 9.5                 | 22.7                |
| 1964    | 16.0                | 24.1 <sup>(a)</sup> | 23.7                | 27.1                | 27.9                | 26.4                | 31.2                | 29.4                | 29.7                | 26.4                | 12.2 <sup>(a)</sup> | 14.8                | 24.1                |
| 1965    | 12.3                | 20.3                | 25.6                | 26.4                | 28.3                | 28.1                | 31.1                | 27.7                | 29.8                | 27.4                | 14.2                | 15.7                | 23.9                |
| 1966    | 14.3                | 19.3                | 24.4                | 28.2                | 30.7                | 27.3                | 28.7                | 29.1                | 28.4                | 25.7                | 18.1                | 13.4                | 24.0                |
| 1967    | 17.6                | 24.0                | 24.6                | 24.4                | 27.7                | 28.7                | 32.0                | 34.5 <sup>(a)</sup> | 31.7                | 25.5                | 19.9                | 15.7                | 25.5 <sup>(a)</sup> |
| 1968    | 17.2                | 20.4                | 23.5                | 27.5                | 27.5                | 27.3                | 31.2                | 26.2 <sup>(a)</sup> | 28.2                | 22.8                | 14.2                | 13.9                | 23.3                |
| 1969    | 12.2                | 14.1                | 25.5                | 24.5                | 29.2                | 27.7                | 31.3                | 33.3                | 27.6                | 25.0                | 17.4                | 9.2                 | 23.1                |
| 1970    | 12.0                | 16.4                | 23.8                | 25.3                | 29.2                | 29.3                | 31.7                | 33.1                | 27.2                | 26.5                | 17.8                | 15.4                | 24.0                |
| 1971    | 18.4                | 21.1                | 22.8                | 26.8                | 27.7                | 26.9                | 32.0                | 32.3                | 27.8                | 25.8                | 17.8                | 14.8                | 24.5                |
| 1972    | 17.3                | 18.3                | 25.2                | 26.8                | 27.2                | 26.9                | 30.1                | 30.6                | 30.5                | 27.5                | 13.1                | 17.2                | 24.2                |
| 1973    | 15.7                | 16.6                | 24.6                | 29.6                | 31.1                | 29.7                | 32.1                | 32.7                | 27.0                | 22.2                | 12.6                | 12.5                | 23.9                |
| 1974    | 17.8                | 18.8                | 23.2                | 23.4                | 27.3                | 32.7 <sup>(a)</sup> | 29.8                | 31.9                | 32.2                | 28.3                | 16.3                | 16.5                | 24.8                |
| 1975    | 15.0                | 17.0                | 21.2                | 24.8                | 29.5                | 28.2                | 30.3                | 28.7                | 32.2                | 22.0                | 20.9                | 14.8                | 23.7                |
| 1976    | 15.2                | 21.0                | 25.3                | 26.0                | 30.6                | 28.8                | 30.5                | 28.0                | 30.5                | 27.5                | 20.3                | 16.6                | 25.0                |
| 1977    | 10.8                | 20.7                | 23.4                | 30.6 <sup>(a)</sup> | 26.0                | 30.2                | 30.5                | 29.1                | 23.8                | 26.6                | 19.1                | 15.1                | 23.8                |
| 1978    | 11.4                | 15.2                | 23.0                | 23.8                | 27.7                | 31.3                | 31.0                | 29.0                | 25.8                | 30.3 <sup>(a)</sup> | 18.2                | 16.8                | 23.6                |
| 1979    | 15.5                | 18.7                | 26.0                | 26.5                | 29.4                | 31.1                | 32.9                | 32.0                | 31.1                | 25.6                | 13.0                | 12.9                | 24.6                |
| 1980    | 13.2                | 10.5 <sup>(a)</sup> | 22.1                | 27.1                | 25.8                | 25.8                | 31.3                | 29.9                | 27.3                | 24.6                | 15.3                | 11.4                | 22.0 <sup>(a)</sup> |
| 1981    | 9.9                 | 17.5                | 25.9                | 27.4                | 27.1                | 28.3                | 31.7                | 32.9                | 30.8                | 26.0                | 20.0                | 14.2                | 24.3                |
| 1982    | 16.0                | 21.4                | 24.4                | 28.2                | 29.9                | 28.0                | 30.6                | 29.5                | 27.1                | 24.9                | 16.6                | 13.0                | 24.1                |
| 1983    | 15.5                | 17.3                | 20.7                | 27.9                | 28.4                | 27.9                | 26.3                | 28.4                | 27.5                | 24.7                | 15.5                | 11.0                | 22.6                |
| 1984    | 13.5                | 15.2                | 21.6                | 23.9                | 26.3                | 26.1                | 32.3                | 32.0                | 26.6                | 25.5                | 14.0                | 15.7                | 22.7                |
| 1985    | 6.8                 | 20.4                | 25.4                | 28.7                | 29.2                | 29.4                | 32.0                | 29.9                | 24.3                | 25.4                | 15.8                | 8.0 <sup>(a)</sup>  | 22.9                |
| 1986    | 12.5                | 17.1                | 22.1                | 26.4                | 26.6                | 29.1                | 28.6                | 31.0                | 23.5 <sup>(a)</sup> | 26.8                | 15.1                | 8.4                 | 22.3                |
| 1987    | 11.9                | 19.0                | 22.4                | 28.2                | 28.9                | 31.2                | 28.1                | 30.1                | 33.0                | 28.9                | 19.8                | 12.0                | 24.5                |
| 1988    | 13.4                | 23.8                | 25.1                | 25.3                | 27.4                | 26.3                | 30.0                | 32.1                | 31.2                | 26.2                | 16.9                | 11.4                | 24.1                |
| 1989    | 16.5                | 17.3                | 20.2                | 26.2                | 26.0                | 28.5                | 31.1                | 27.3                | 31.1                | 24.0                | 16.0                | 9.4                 | 22.8                |
| 1990    | 15.7                | 20.5                | 26.5                | 27.1                | 24.4                | 26.8                | 28.8                | 27.3                | 32.2                | 23.6                | 18.4                | 16.0                | 23.9                |
| 1991    | 16.0                | 21.4                | 22.7                | 26.0                | 25.1                | 25.6                | 30.2                | 29.6                | 31.1                | 26.4                | 13.1                | 13.5                | 23.4                |
| 1992    | 12.5                | 15.2                | 25.9                | 24.6                | 31.9 <sup>(a)</sup> | 28.5                | 28.0                | 31.6                | 28.1                | 24.4                | 13.6                | 14.5                | 23.2                |
| 1993    | 12.8                | 15.1                | 18.6                | 23.7                | 29.1                | 27.1                | 25.5 <sup>(a)</sup> | 29.5                | 33.5 <sup>(a)</sup> | 28.6                | 23.9 <sup>(a)</sup> | 10.5                | 23.2                |
| 1994    | 15.7                | 17.2                | 28.4 <sup>(a)</sup> | 26.0                | 26.5                | 29.4                | 33.0                | 31.2                | 31.2                | 25.4                | 17.2                | 13.6                | 24.6                |
| 1995    | 13.2                | 20.1                | 23.7                | 25.2                | 28.0                | 26.3                | 29.9                | 30.6                | 30.2                | 24.3                | 19.5                | 11.7                | 23.6                |
| 1996    | 14.0                | 21.2                | 22.9                | 26.0                | 26.6                | 31.0                | 33.7                | 34.1                | 30.8                | 23.9                | 17.0                | 13.1                | 24.5                |
| 1997    | 15.6                | 18.8                | 22.1                | 25.7                | 28.1                | 27.3                | 31.2                | 31.2                | 26.7                | 24.3                | 17.6                | 14.2                | 23.6                |
| 1998    | 15.9                | 19.0                | 23.7                | 28.5                | 27.5                | 29.2                | 30.5                | 33.2                | 31.9                | 26.6                | 16.2                | 17.7                | 25.0                |
| 1999    | 16.4                | 18.0                | 22.2                | 28.9                | 28.0                | 28.0                | 30.2                | 29.0                | 32.9                | 25.7                | 17.7                | 13.5                | 24.2                |
| Average | 14.4                | 18.3                | 23.1                | 26.3                | 27.7                | 28.1                | 30.6                | 30.3                | 29.0                | 25.1                | 17.0                | 13.4                | 23.6                |
| Normal  | 14.4                | 18.6                | 23.5                | 26.5                | 27.8                | 28.5                | 30.5                | 30.3                | 28.8                | 25.6                | 16.8                | 13.4                | 23.7                |

(a) Greatest and least values.

**Table 3.12. Normal and Extreme Daily Maximum and Minimum Temperatures (°F)**

| Day      | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |                   |         |                   |     |                   |
|----------|--------------------|---------|------|---------------------|-------------------|-----|-------------------|---------|-------------------|-----|-------------------|
|          | Maximum            | Minimum | Mean | Maximum             |                   |     |                   | Minimum |                   |     |                   |
|          |                    |         |      | High                | Year              | Low | Year              | High    | Year              | Low | Year              |
| January  |                    |         |      |                     |                   |     |                   |         |                   |     |                   |
| 1        | 35                 | 21      | 28   | 57                  | 98 <sup>(a)</sup> | 8   | 69                | 38      | 81 <sup>(a)</sup> | -11 | 79                |
| 2        | 35                 | 21      | 28   | 57                  | 97                | 15  | 69                | 42      | 63                | -9  | 78                |
| 3        | 36                 | 21      | 28   | 63                  | 89                | 12  | 50                | 41      | 81                | 0   | 59                |
| 4        | 36                 | 21      | 29   | 60                  | 94 <sup>(a)</sup> | 13  | 59                | 39      | 54                | -6  | 50                |
| 5        | 36                 | 22      | 29   | 59                  | 90 <sup>(a)</sup> | 12  | 50                | 39      | 81                | -7  | 50                |
| 6        | 36                 | 22      | 29   | 59                  | 90 <sup>(a)</sup> | 10  | 82                | 42      | 98                | -10 | 74                |
| 7        | 36                 | 22      | 29   | 63                  | 62                | 9   | 79                | 45      | 90                | -8  | 74                |
| 8        | 36                 | 22      | 29   | 56                  | 83 <sup>(a)</sup> | 5   | 74                | 44      | 53                | -9  | 74                |
| 9        | 36                 | 22      | 29   | 60                  | 90 <sup>(a)</sup> | 5   | 74                | 41      | 90                | -13 | 74                |
| 10       | 36                 | 23      | 30   | 61                  | 83                | 10  | 74                | 40      | 83                | -5  | 74                |
| 11       | 37                 | 23      | 30   | 60                  | 83 <sup>(a)</sup> | 13  | 63                | 37      | 90                | -6  | 49                |
| 12       | 38                 | 24      | 31   | 59                  | 53                | 15  | 63                | 47      | 53                | -4  | 63 <sup>(a)</sup> |
| 13       | 38                 | 24      | 31   | 61                  | 94                | 10  | 50                | 42      | 66                | -4  | 93 <sup>(a)</sup> |
| 14       | 39                 | 25      | 32   | 62                  | 99                | 7   | 50                | 48      | 61                | -11 | 50                |
| 15       | 39                 | 26      | 33   | 60                  | 74 <sup>(a)</sup> | 5   | 50                | 50      | 74                | -5  | 50                |
| 16       | 40                 | 26      | 33   | 61                  | 74                | 8   | 50                | 48      | 89                | -8  | 50                |
| 17       | 40                 | 26      | 33   | 57                  | 98                | 5   | 50                | 40      | 89                | -11 | 50                |
| 18       | 40                 | 26      | 33   | 62                  | 89                | 10  | 50                | 38      | 89                | -6  | 57                |
| 19       | 40                 | 26      | 33   | 63                  | 68                | 13  | 50                | 47      | 68                | -2  | 57                |
| 20       | 40                 | 26      | 33   | 66                  | 68                | 11  | 54                | 47      | 72                | -6  | 54                |
| 21       | 40                 | 26      | 33   | 65                  | 68                | 14  | 54                | 42      | 72                | 0   | 54                |
| 22       | 40                 | 26      | 33   | 56                  | 90                | 16  | 69                | 43      | 81                | -2  | 62                |
| 23       | 40                 | 26      | 32   | 63                  | 53                | 10  | 69                | 43      | 81                | -8  | 69                |
| 24       | 40                 | 25      | 32   | 59                  | 84 <sup>(a)</sup> | 13  | 57                | 43      | 58                | -6  | 49                |
| 25       | 40                 | 25      | 32   | 59                  | 92 <sup>(a)</sup> | 6   | 50                | 41      | 74 <sup>(a)</sup> | -12 | 57                |
| 26       | 40                 | 25      | 32   | 61                  | 71                | 2   | 57                | 46      | 62                | -22 | 57                |
| 27       | 40                 | 25      | 32   | 60                  | 84 <sup>(a)</sup> | 0   | 57                | 36      | 95 <sup>(a)</sup> | -21 | 57                |
| 28       | 40                 | 25      | 32   | 61                  | 67                | 6   | 57                | 42      | 99                | -14 | 57                |
| 29       | 40                 | 24      | 32   | 62                  | 67                | 3   | 50                | 47      | 99                | -18 | 50                |
| 30       | 40                 | 24      | 32   | 67                  | 89 <sup>(a)</sup> | 11  | 57                | 53      | 71                | -13 | 50                |
| 31       | 40                 | 24      | 32   | 72                  | 71                | -2  | 50                | 45      | 53                | -21 | 50                |
| February |                    |         |      |                     |                   |     |                   |         |                   |     |                   |
| 1        | 40                 | 24      | 32   | 63                  | 71                | -3  | 50                | 42      | 92                | -23 | 50                |
| 2        | 41                 | 24      | 33   | 61                  | 91 <sup>(a)</sup> | 0   | 50                | 42      | 68                | -21 | 50                |
| 3        | 41                 | 24      | 33   | 60                  | 67 <sup>(a)</sup> | 1   | 50                | 46      | 91                | -23 | 50                |
| 4        | 41                 | 24      | 33   | 65                  | 67                | 11  | 85                | 43      | 68                | -5  | 85                |
| 5        | 41                 | 25      | 33   | 61                  | 65                | 23  | 85                | 39      | 61                | -5  | 89                |
| 6        | 42                 | 25      | 33   | 61                  | 67                | 19  | 85                | 44      | 99                | -3  | 89                |
| 7        | 42                 | 25      | 34   | 65                  | 45                | 20  | 48                | 41      | 55                | 2   | 89                |
| 8        | 43                 | 26      | 35   | 63                  | 96                | 22  | 56                | 45      | 45                | 5   | 94 <sup>(a)</sup> |
| 9        | 44                 | 27      | 35   | 65                  | 51                | 23  | 56                | 39      | 61 <sup>(a)</sup> | 4   | 85                |
| 10       | 45                 | 28      | 37   | 65                  | 77                | 30  | 56 <sup>(a)</sup> | 50      | 51                | 7   | 85                |
| 11       | 46                 | 28      | 37   | 66                  | 88                | 27  | 54                | 39      | 93 <sup>(a)</sup> | 9   | 48                |
| 12       | 47                 | 29      | 38   | 70                  | 77                | 24  | 49                | 40      | 77                | 6   | 48                |
| 13       | 48                 | 30      | 39   | 66                  | 71                | 25  | 49                | 42      | 47                | 3   | 49                |
| 14       | 48                 | 30      | 39   | 62                  | 97 <sup>(a)</sup> | 22  | 80                | 54      | 82                | 8   | 95                |
| 15       | 49                 | 31      | 40   | 67                  | 82                | 19  | 56                | 48      | 81                | 5   | 56                |
| 16       | 49                 | 31      | 40   | 69                  | 77                | 20  | 56                | 48      | 81                | 4   | 56                |
| 17       | 49                 | 31      | 40   | 67                  | 77 <sup>(a)</sup> | 22  | 56                | 48      | 48                | 9   | 56                |
| 18       | 50                 | 31      | 40   | 66                  | 81                | 24  | 56                | 46      | 81                | 9   | 90                |
| 19       | 50                 | 31      | 41   | 68                  | 95                | 28  | 56                | 56      | 95                | 14  | 90 <sup>(a)</sup> |

Table 3.12. (contd)

| Day   | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |                   |         |                   |     |                   |
|-------|--------------------|---------|------|---------------------|-------------------|-----|-------------------|---------|-------------------|-----|-------------------|
|       | Maximum            | Minimum | Mean | Maximum             |                   |     |                   | Minimum |                   |     |                   |
|       |                    |         |      | High                | Year              | Low | Year              | High    | Year              | Low | Year              |
| 20    | 50                 | 31      | 41   | 68                  | 82                | 32  | 57 <sup>(a)</sup> | 51      | 61                | 15  | 86                |
| 21    | 51                 | 31      | 41   | 71                  | 88                | 29  | 57                | 45      | 95                | 13  | 57                |
| 22    | 51                 | 31      | 41   | 62                  | 95 <sup>(a)</sup> | 29  | 57                | 42      | 99 <sup>(a)</sup> | 11  | 93                |
| 23    | 51                 | 31      | 41   | 68                  | 47                | 34  | 93 <sup>(a)</sup> | 43      | 83 <sup>(a)</sup> | 19  | 93                |
| 24    | 52                 | 31      | 41   | 72                  | 86                | 32  | 62                | 60      | 86                | 11  | 93 <sup>(a)</sup> |
| 25    | 52                 | 31      | 42   | 72                  | 86                | 28  | 93                | 49      | 86                | 4   | 93                |
| 26    | 52                 | 31      | 42   | 65                  | 57 <sup>(a)</sup> | 28  | 93 <sup>(a)</sup> | 46      | 92                | 10  | 93                |
| 27    | 52                 | 31      | 42   | 68                  | 72                | 26  | 93                | 44      | 92                | 7   | 62                |
| 28    | 52                 | 31      | 42   | 67                  | 67                | 25  | 93                | 48      | 72                | 3   | 93                |
| 29    | 52                 | 31      | 42   | 63                  | 88 <sup>(a)</sup> | 40  | 60                | 43      | 92                | 12  | 60                |
| March |                    |         |      |                     |                   |     |                   |         |                   |     |                   |
| 1     | 52                 | 31      | 42   | 67                  | 94                | 26  | 93                | 44      | 94                | 15  | 71 <sup>(a)</sup> |
| 2     | 52                 | 31      | 42   | 66                  | 68                | 26  | 60                | 46      | 87                | 14  | 60                |
| 3     | 52                 | 31      | 42   | 70                  | 94                | 24  | 60                | 50      | 87                | 14  | 89                |
| 4     | 52                 | 31      | 42   | 63                  | 53                | 26  | 55                | 46      | 87                | 7   | 55                |
| 5     | 53                 | 31      | 42   | 68                  | 72                | 31  | 45                | 50      | 87                | 6   | 55                |
| 6     | 54                 | 32      | 43   | 65                  | 67 <sup>(a)</sup> | 33  | 57                | 43      | 79                | 18  | 60                |
| 7     | 55                 | 32      | 44   | 66                  | 53                | 41  | 45                | 42      | 86 <sup>(a)</sup> | 21  | 74 <sup>(a)</sup> |
| 8     | 55                 | 33      | 44   | 67                  | 53                | 33  | 51                | 46      | 83                | 20  | 76                |
| 9     | 56                 | 33      | 44   | 69                  | 53                | 40  | 51                | 47      | 83                | 22  | 94 <sup>(a)</sup> |
| 10    | 56                 | 33      | 45   | 69                  | 72                | 40  | 48                | 45      | 87 <sup>(a)</sup> | 13  | 48                |
| 11    | 56                 | 33      | 45   | 67                  | 95 <sup>(a)</sup> | 32  | 50                | 44      | 95                | 21  | 50                |
| 12    | 57                 | 34      | 45   | 68                  | 98 <sup>(a)</sup> | 37  | 51                | 48      | 87                | 15  | 56                |
| 13    | 57                 | 34      | 45   | 72                  | 98                | 38  | 51                | 44      | 98 <sup>(a)</sup> | 22  | 69 <sup>(a)</sup> |
| 14    | 57                 | 34      | 46   | 72                  | 92                | 40  | 49                | 45      | 61                | 23  | 53                |
| 15    | 58                 | 34      | 46   | 73                  | 94                | 37  | 49                | 50      | 92                | 23  | 76                |
| 16    | 58                 | 34      | 46   | 76                  | 72                | 43  | 89                | 47      | 94                | 23  | 55                |
| 17    | 59                 | 35      | 47   | 76                  | 72                | 38  | 65                | 48      | 69                | 17  | 65                |
| 18    | 59                 | 35      | 47   | 76                  | 47                | 41  | 65                | 47      | 90                | 14  | 65                |
| 19    | 59                 | 35      | 47   | 76                  | 47                | 48  | 65 <sup>(a)</sup> | 53      | 97                | 16  | 65                |
| 20    | 59                 | 35      | 47   | 76                  | 47                | 49  | 50                | 49      | 88                | 22  | 74                |
| 21    | 59                 | 35      | 47   | 74                  | 60                | 41  | 75                | 46      | 98 <sup>(a)</sup> | 26  | 82 <sup>(a)</sup> |
| 22    | 59                 | 35      | 47   | 74                  | 78 <sup>(a)</sup> | 47  | 71                | 47      | 78                | 19  | 94                |
| 23    | 59                 | 35      | 47   | 77                  | 60                | 39  | 64                | 45      | 98 <sup>(a)</sup> | 20  | 48                |
| 24    | 59                 | 35      | 47   | 78                  | 60                | 38  | 55                | 45      | 60 <sup>(a)</sup> | 15  | 64                |
| 25    | 59                 | 35      | 47   | 83                  | 60                | 35  | 55                | 48      | 52                | 21  | 96                |
| 26    | 60                 | 35      | 47   | 76                  | 46                | 38  | 65                | 49      | 92 <sup>(a)</sup> | 21  | 85                |
| 27    | 60                 | 35      | 48   | 77                  | 94                | 47  | 79                | 46      | 89                | 24  | 75                |
| 28    | 61                 | 36      | 48   | 79                  | 94                | 42  | 54                | 49      | 78                | 19  | 75                |
| 29    | 61                 | 36      | 49   | 78                  | 94 <sup>(a)</sup> | 49  | 54                | 48      | 94 <sup>(a)</sup> | 18  | 54                |
| 30    | 62                 | 37      | 49   | 75                  | 92                | 52  | 67                | 47      | 92 <sup>(a)</sup> | 20  | 54                |
| 31    | 62                 | 37      | 49   | 78                  | 92                | 45  | 96                | 47      | 61                | 28  | 53                |
| April |                    |         |      |                     |                   |     |                   |         |                   |     |                   |
| 1     | 63                 | 37      | 50   | 80                  | 90                | 45  | 76                | 50      | 59                | 24  | 82                |
| 2     | 63                 | 37      | 50   | 83                  | 92                | 48  | 82                | 50      | 87                | 25  | 76                |
| 3     | 64                 | 37      | 50   | 76                  | 77                | 50  | 63 <sup>(a)</sup> | 48      | 77                | 23  | 75                |
| 4     | 64                 | 38      | 51   | 82                  | 60                | 45  | 75                | 56      | 91                | 27  | 50                |
| 5     | 64                 | 38      | 51   | 78                  | 77 <sup>(a)</sup> | 51  | 75                | 54      | 60                | 21  | 75                |
| 6     | 65                 | 38      | 51   | 82                  | 77                | 50  | 82                | 51      | 62                | 25  | 97                |
| 7     | 65                 | 38      | 52   | 85                  | 77                | 41  | 45                | 53      | 60                | 26  | 54                |
| 8     | 65                 | 38      | 52   | 82                  | 96                | 51  | 53                | 50      | 96                | 27  | 92 <sup>(a)</sup> |
| 9     | 65                 | 38      | 52   | 80                  | 85                | 48  | 92                | 57      | 96                | 29  | 75 <sup>(a)</sup> |
| 10    | 65                 | 38      | 52   | 85                  | 68                | 52  | 45                | 50      | 96                | 24  | 81                |

Table 3.12. (contd)

| Day | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |                   |         |                   |     |                   |
|-----|--------------------|---------|------|---------------------|-------------------|-----|-------------------|---------|-------------------|-----|-------------------|
|     | Maximum            | Minimum | Mean | Maximum             |                   |     |                   | Minimum |                   |     |                   |
|     |                    |         |      | High                | Year              | Low | Year              | High    | Year              | Low | Year              |
| 11  | 65                 | 38      | 52   | 79                  | 88                | 52  | 83                | 51      | 56 <sup>(a)</sup> | 27  | 83                |
| 12  | 66                 | 39      | 52   | 83                  | 88                | 47  | 95                | 48      | 82 <sup>(a)</sup> | 26  | 97                |
| 13  | 66                 | 39      | 52   | 88                  | 47                | 54  | 55                | 59      | 88                | 23  | 68                |
| 14  | 66                 | 39      | 52   | 85                  | 62 <sup>(a)</sup> | 47  | 75                | 55      | 85                | 29  | 83                |
| 15  | 66                 | 39      | 52   | 82                  | 88                | 55  | 75 <sup>(a)</sup> | 54      | 87                | 27  | 55                |
| 16  | 66                 | 39      | 52   | 83                  | 54                | 53  | 63                | 54      | 92                | 28  | 82                |
| 17  | 65                 | 40      | 52   | 88                  | 94                | 48  | 63                | 52      | 90                | 26  | 55                |
| 18  | 65                 | 40      | 52   | 88                  | 94                | 51  | 67                | 60      | 94                | 29  | 68                |
| 19  | 65                 | 40      | 52   | 78                  | 56                | 50  | 51                | 56      | 94                | 27  | 66                |
| 20  | 66                 | 40      | 53   | 84                  | 56                | 45  | 67                | 53      | 90 <sup>(a)</sup> | 28  | 82                |
| 21  | 66                 | 40      | 53   | 85                  | 56                | 52  | 67                | 60      | 56                | 26  | 85 <sup>(a)</sup> |
| 22  | 66                 | 41      | 54   | 81                  | 82 <sup>(a)</sup> | 53  | 88                | 55      | 98                | 28  | 72                |
| 23  | 67                 | 41      | 54   | 88                  | 81 <sup>(a)</sup> | 56  | 79 <sup>(a)</sup> | 58      | 77                | 30  | 78                |
| 24  | 68                 | 41      | 54   | 94                  | 77                | 53  | 75                | 56      | 52                | 28  | 86 <sup>(a)</sup> |
| 25  | 68                 | 42      | 55   | 91                  | 46                | 56  | 58                | 59      | 52                | 31  | 55                |
| 26  | 68                 | 42      | 55   | 85                  | 92                | 53  | 48                | 57      | 78                | 28  | 48                |
| 27  | 69                 | 42      | 55   | 90                  | 87                | 50  | 90                | 57      | 92                | 27  | 70                |
| 28  | 69                 | 42      | 56   | 93                  | 87                | 54  | 95                | 64      | 87                | 27  | 67                |
| 29  | 70                 | 43      | 56   | 90                  | 68                | 47  | 67                | 60      | 87                | 29  | 52                |
| 30  | 70                 | 43      | 57   | 92                  | 98                | 56  | 67 <sup>(a)</sup> | 60      | 98                | 29  | 86                |

May

|    |    |    |    |     |                   |    |                   |    |                   |    |                   |
|----|----|----|----|-----|-------------------|----|-------------------|----|-------------------|----|-------------------|
| 1  | 71 | 43 | 57 | 93  | 98                | 53 | 69                | 59 | 98 <sup>(a)</sup> | 28 | 54                |
| 2  | 71 | 43 | 57 | 89  | 98 <sup>(a)</sup> | 56 | 88                | 60 | 71                | 30 | 97                |
| 3  | 71 | 44 | 58 | 91  | 66                | 58 | 93                | 60 | 71                | 31 | 49                |
| 4  | 72 | 44 | 58 | 94  | 66                | 56 | 63                | 57 | 46                | 31 | 62                |
| 5  | 72 | 45 | 58 | 100 | 66                | 52 | 61                | 65 | 66                | 30 | 59                |
| 6  | 73 | 45 | 59 | 98  | 92                | 56 | 86                | 62 | 87                | 34 | 77                |
| 7  | 73 | 45 | 59 | 99  | 87                | 59 | 99                | 66 | 92                | 33 | 84                |
| 8  | 73 | 46 | 59 | 102 | 87                | 56 | 99 <sup>(a)</sup> | 67 | 94 <sup>(a)</sup> | 29 | 96                |
| 9  | 74 | 46 | 60 | 97  | 87                | 56 | 48                | 66 | 49                | 34 | 99 <sup>(a)</sup> |
| 10 | 74 | 46 | 60 | 96  | 49                | 53 | 67                | 66 | 49                | 34 | 70                |
| 11 | 74 | 46 | 60 | 98  | 49                | 51 | 67                | 68 | 49                | 30 | 70                |
| 12 | 74 | 46 | 60 | 100 | 93                | 57 | 70                | 66 | 93                | 34 | 85                |
| 13 | 74 | 46 | 60 | 94  | 97                | 57 | 55                | 66 | 97                | 34 | 85                |
| 14 | 75 | 47 | 61 | 98  | 73                | 56 | 55                | 61 | 73 <sup>(a)</sup> | 31 | 55                |
| 15 | 75 | 47 | 61 | 97  | 73                | 57 | 59                | 67 | 97                | 35 | 74                |
| 16 | 75 | 47 | 61 | 95  | 73                | 54 | 55                | 60 | 73                | 32 | 74                |
| 17 | 76 | 48 | 62 | 96  | 73                | 61 | 74                | 59 | 85                | 38 | 88 <sup>(a)</sup> |
| 18 | 76 | 48 | 62 | 98  | 54                | 62 | 74                | 67 | 56                | 36 | 72                |
| 19 | 77 | 48 | 62 | 92  | 93                | 56 | 62                | 70 | 56                | 33 | 75                |
| 20 | 77 | 48 | 62 | 93  | 47                | 58 | 60                | 59 | 56                | 36 | 71                |
| 21 | 77 | 49 | 63 | 94  | 58                | 62 | 60 <sup>(a)</sup> | 59 | 58                | 37 | 74 <sup>(a)</sup> |
| 22 | 77 | 49 | 63 | 98  | 58                | 63 | 64                | 64 | 58                | 33 | 60                |
| 23 | 77 | 49 | 63 | 95  | 85 <sup>(a)</sup> | 59 | 62                | 66 | 58                | 35 | 64                |
| 24 | 77 | 49 | 63 | 97  | 99                | 54 | 62                | 63 | 81                | 35 | 75                |
| 25 | 77 | 50 | 63 | 98  | 92 <sup>(a)</sup> | 61 | 98                | 65 | 83                | 38 | 91 <sup>(a)</sup> |
| 26 | 77 | 50 | 64 | 101 | 58 <sup>(a)</sup> | 54 | 80                | 69 | 47                | 38 | 78                |
| 27 | 78 | 50 | 64 | 93  | 83                | 62 | 89                | 69 | 58                | 37 | 73                |
| 28 | 78 | 50 | 64 | 99  | 83                | 61 | 89                | 63 | 72 <sup>(a)</sup> | 38 | 79 <sup>(a)</sup> |
| 29 | 78 | 51 | 64 | 103 | 83                | 68 | 98 <sup>(a)</sup> | 71 | 86                | 35 | 76                |
| 30 | 79 | 51 | 65 | 104 | 86                | 62 | 76 <sup>(a)</sup> | 68 | 86                | 41 | 55 <sup>(a)</sup> |
| 31 | 79 | 52 | 65 | 104 | 86                | 54 | 71                | 69 | 86                | 40 | 96 <sup>(a)</sup> |

June

|   |    |    |    |     |    |    |                   |    |                   |    |    |
|---|----|----|----|-----|----|----|-------------------|----|-------------------|----|----|
| 1 | 80 | 52 | 66 | 103 | 86 | 64 | 76                | 69 | 86                | 37 | 84 |
| 2 | 80 | 52 | 66 | 99  | 70 | 65 | 99 <sup>(a)</sup> | 69 | 89 <sup>(a)</sup> | 37 | 76 |



Table 3.12. (contd)

| Day | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |      |         |                   |     |                   |
|-----|--------------------|---------|------|---------------------|-------------------|-----|------|---------|-------------------|-----|-------------------|
|     | Maximum            | Minimum | Mean | Maximum             |                   |     |      | Minimum |                   |     |                   |
|     |                    |         |      | High                | Year              | Low | Year | High    | Year              | Low | Year              |
| 3   | 81                 | 53      | 67   | 103                 | 70                | 55  | 66   | 68      | 86 <sup>(a)</sup> | 37  | 62                |
| 4   | 81                 | 54      | 67   | 103                 | 69                | 60  | 74   | 66      | 86 <sup>(a)</sup> | 40  | 80 <sup>(a)</sup> |
| 5   | 81                 | 54      | 68   | 101                 | 78                | 60  | 88   | 73      | 69                | 43  | 76 <sup>(a)</sup> |
| 6   | 81                 | 54      | 68   | 102                 | 70 <sup>(a)</sup> | 57  | 95   | 68      | 77                | 38  | 99                |
| 7   | 82                 | 54      | 68   | 100                 | 77                | 56  | 50   | 69      | 77                | 42  | 99                |
| 8   | 82                 | 54      | 68   | 100                 | 48                | 59  | 64   | 69      | 69                | 40  | 53                |
| 9   | 82                 | 54      | 68   | 98                  | 55                | 68  | 59   | 68      | 69 <sup>(a)</sup> | 42  | 99                |
| 10  | 82                 | 54      | 68   | 98                  | 55                | 69  | 72   | 68      | 79                | 41  | 59                |
| 11  | 82                 | 54      | 68   | 100                 | 55                | 64  | 61   | 70      | 55                | 40  | 56                |
| 12  | 83                 | 55      | 69   | 98                  | 74                | 68  | 54   | 67      | 87 <sup>(a)</sup> | 42  | 68                |
| 13  | 83                 | 55      | 69   | 99                  | 74                | 59  | 80   | 70      | 99                | 42  | 52                |
| 14  | 84                 | 56      | 70   | 103                 | 74                | 65  | 95   | 68      | 87                | 44  | 78 <sup>(a)</sup> |
| 15  | 85                 | 56      | 70   | 102                 | 99 <sup>(a)</sup> | 70  | 65   | 72      | 63                | 44  | 54                |
| 16  | 85                 | 57      | 71   | 106                 | 61                | 62  | 49   | 70      | 63                | 41  | 54                |
| 17  | 86                 | 57      | 72   | 108                 | 61                | 70  | 73   | 75      | 61                | 40  | 81                |
| 18  | 86                 | 57      | 72   | 104                 | 61                | 69  | 64   | 75      | 58                | 41  | 54                |
| 19  | 86                 | 57      | 72   | 102                 | 85                | 63  | 95   | 73      | 58                | 43  | 86                |
| 20  | 86                 | 57      | 72   | 102                 | 82                | 63  | 91   | 73      | 59                | 42  | 53                |
| 21  | 86                 | 57      | 72   | 104                 | 70                | 62  | 84   | 73      | 58                | 45  | 56                |
| 22  | 86                 | 57      | 72   | 106                 | 92 <sup>(a)</sup> | 71  | 93   | 74      | 92                | 46  | 97 <sup>(a)</sup> |
| 23  | 86                 | 57      | 72   | 111                 | 92                | 68  | 72   | 75      | 58                | 44  | 52                |
| 24  | 86                 | 57      | 71   | 108                 | 92                | 66  | 72   | 80      | 92                | 40  | 83                |
| 25  | 86                 | 56      | 71   | 107                 | 92                | 70  | 46   | 79      | 92                | 42  | 76                |
| 26  | 86                 | 56      | 71   | 103                 | 87                | 70  | 75   | 74      | 70                | 41  | 76 <sup>(a)</sup> |
| 27  | 86                 | 56      | 71   | 102                 | 92                | 68  | 47   | 75      | 87                | 45  | 64 <sup>(a)</sup> |
| 28  | 86                 | 56      | 71   | 102                 | 87 <sup>(a)</sup> | 64  | 46   | 68      | 87                | 38  | 75                |
| 29  | 86                 | 56      | 71   | 104                 | 48                | 65  | 52   | 74      | 87                | 46  | 71 <sup>(a)</sup> |
| 30  | 86                 | 56      | 71   | 106                 | 87                | 71  | 55   | 71      | 87                | 42  | 49                |

July

|    |    |    |    |     |                   |    |                   |    |                   |    |                   |
|----|----|----|----|-----|-------------------|----|-------------------|----|-------------------|----|-------------------|
| 1  | 86 | 57 | 72 | 103 | 87                | 66 | 66                | 75 | 87                | 46 | 73 <sup>(a)</sup> |
| 2  | 87 | 57 | 72 | 103 | 96                | 59 | 66                | 70 | 45                | 39 | 79                |
| 3  | 87 | 58 | 72 | 105 | 91 <sup>(a)</sup> | 71 | 66                | 70 | 67                | 45 | 99                |
| 4  | 88 | 58 | 73 | 108 | 68                | 71 | 86                | 75 | 70                | 48 | 66                |
| 5  | 88 | 59 | 73 | 108 | 75                | 66 | 51                | 76 | 75                | 47 | 99 <sup>(a)</sup> |
| 6  | 89 | 59 | 74 | 110 | 68                | 71 | 55                | 76 | 68                | 44 | 71                |
| 7  | 89 | 59 | 74 | 105 | 68 <sup>(a)</sup> | 75 | 81                | 73 | 68                | 45 | 71                |
| 8  | 89 | 59 | 74 | 108 | 68                | 71 | 72                | 74 | 85                | 45 | 81                |
| 9  | 89 | 60 | 74 | 110 | 75                | 76 | 55                | 78 | 75                | 50 | 72 <sup>(a)</sup> |
| 10 | 90 | 60 | 75 | 106 | 75                | 67 | 74                | 79 | 75                | 49 | 97 <sup>(a)</sup> |
| 11 | 90 | 60 | 75 | 109 | 90                | 76 | 74                | 78 | 75                | 46 | 81                |
| 12 | 90 | 60 | 75 | 110 | 90                | 75 | 88                | 75 | 90                | 50 | 74                |
| 13 | 90 | 60 | 75 | 108 | 61                | 77 | 93 <sup>(a)</sup> | 73 | 90 <sup>(a)</sup> | 49 | 76                |
| 14 | 90 | 61 | 76 | 107 | 87 <sup>(a)</sup> | 77 | 83                | 78 | 61                | 50 | 83                |
| 15 | 91 | 61 | 76 | 108 | 96                | 71 | 82                | 76 | 55                | 45 | 82                |
| 16 | 91 | 61 | 76 | 105 | 70                | 68 | 86                | 74 | 90                | 48 | 74                |
| 17 | 92 | 61 | 76 | 110 | 60                | 73 | 93                | 77 | 58                | 48 | 86                |
| 18 | 92 | 61 | 77 | 110 | 60                | 76 | 96                | 79 | 60                | 49 | 96 <sup>(a)</sup> |
| 19 | 92 | 61 | 77 | 109 | 79                | 72 | 49                | 77 | 79                | 51 | 77                |
| 20 | 93 | 62 | 77 | 110 | 79                | 75 | 65 <sup>(a)</sup> | 75 | 95                | 53 | 68 <sup>(a)</sup> |
| 21 | 93 | 62 | 78 | 109 | 94                | 68 | 65                | 77 | 88                | 49 | 49                |
| 22 | 94 | 62 | 78 | 111 | 94                | 74 | 92                | 75 | 94 <sup>(a)</sup> | 47 | 82                |
| 23 | 94 | 63 | 78 | 109 | 94                | 69 | 92                | 82 | 94                | 49 | 63                |
| 24 | 94 | 63 | 79 | 109 | 94                | 78 | 63                | 75 | 62                | 52 | 52 <sup>(a)</sup> |
| 25 | 95 | 63 | 79 | 106 | 84                | 73 | 90                | 77 | 62                | 51 | 49 <sup>(a)</sup> |
| 26 | 95 | 63 | 79 | 108 | 98 <sup>(a)</sup> | 66 | 55                | 76 | 88                | 53 | 99                |
| 27 | 95 | 64 | 79 | 112 | 98                | 74 | 48                | 74 | 98 <sup>(a)</sup> | 52 | 86                |
| 28 | 95 | 64 | 79 | 108 | 98 <sup>(a)</sup> | 77 | 50 <sup>(a)</sup> | 81 | 98                | 49 | 59                |

Table 3.12. (contd)

| Day       | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |                   |         |                   |     |                   |
|-----------|--------------------|---------|------|---------------------|-------------------|-----|-------------------|---------|-------------------|-----|-------------------|
|           | Maximum            | Minimum | Mean | Maximum             |                   |     |                   | Minimum |                   |     |                   |
|           |                    |         |      | High                | Year              | Low | Year              | High    | Year              | Low | Year              |
| 29        | 95                 | 63      | 79   | 107                 | 82                | 80  | 93 <sup>(a)</sup> | 78      | 82                | 52  | 50                |
| 30        | 95                 | 63      | 79   | 107                 | 71                | 78  | 75                | 74      | 90                | 49  | 50                |
| 31        | 94                 | 63      | 79   | 111                 | 71                | 75  | 85                | 74      | 71 <sup>(a)</sup> | 52  | 95                |
| August    |                    |         |      |                     |                   |     |                   |         |                   |     |                   |
| 1         | 94                 | 63      | 78   | 109                 | 71                | 77  | 76 <sup>(a)</sup> | 80      | 49                | 51  | 87                |
| 2         | 94                 | 62      | 78   | 106                 | 94                | 75  | 56                | 75      | 77 <sup>(a)</sup> | 46  | 64                |
| 3         | 94                 | 62      | 78   | 107                 | 61                | 77  | 62                | 75      | 99 <sup>(a)</sup> | 52  | 59                |
| 4         | 93                 | 62      | 78   | 113                 | 61                | 78  | 64 <sup>(a)</sup> | 81      | 61                | 48  | 54                |
| 5         | 93                 | 62      | 78   | 108                 | 90                | 80  | 96 <sup>(a)</sup> | 72      | 91                | 45  | 69                |
| 6         | 94                 | 62      | 78   | 106                 | 72                | 77  | 46                | 77      | 90                | 51  | 47                |
| 7         | 94                 | 63      | 78   | 109                 | 72                | 70  | 62                | 75      | 45                | 49  | 46                |
| 8         | 94                 | 63      | 78   | 110                 | 72                | 75  | 62                | 79      | 82 <sup>(a)</sup> | 48  | 49                |
| 9         | 94                 | 63      | 78   | 112                 | 71                | 78  | 47                | 78      | 90                | 51  | 95 <sup>(a)</sup> |
| 10        | 94                 | 63      | 78   | 109                 | 96 <sup>(a)</sup> | 76  | 85                | 77      | 71                | 52  | 47                |
| 11        | 93                 | 63      | 78   | 108                 | 71                | 79  | 83                | 73      | 58                | 50  | 85                |
| 12        | 93                 | 62      | 77   | 108                 | 71                | 77  | 95                | 77      | 92                | 52  | 57                |
| 13        | 92                 | 61      | 77   | 107                 | 92                | 74  | 68                | 79      | 92                | 47  | 95                |
| 14        | 91                 | 60      | 76   | 109                 | 92                | 70  | 68                | 78      | 92 <sup>(a)</sup> | 45  | 95                |
| 15        | 90                 | 60      | 75   | 105                 | 67                | 72  | 60                | 74      | 92                | 51  | 74                |
| 16        | 89                 | 59      | 74   | 108                 | 67                | 68  | 93                | 76      | 45                | 48  | 76                |
| 17        | 89                 | 59      | 74   | 108                 | 67                | 76  | 95                | 68      | 91                | 47  | 76                |
| 18        | 89                 | 59      | 74   | 108                 | 67                | 71  | 80                | 71      | 97                | 47  | 76                |
| 19        | 88                 | 59      | 74   | 105                 | 67                | 70  | 68                | 76      | 91                | 46  | 80 <sup>(a)</sup> |
| 20        | 88                 | 59      | 74   | 105                 | 67                | 67  | 59                | 77      | 82                | 49  | 52                |
| 21        | 88                 | 59      | 74   | 104                 | 46                | 70  | 60                | 75      | 46                | 47  | 85 <sup>(a)</sup> |
| 22        | 88                 | 59      | 73   | 104                 | 56 <sup>(a)</sup> | 70  | 92                | 76      | 61 <sup>(a)</sup> | 41  | 60                |
| 23        | 88                 | 58      | 73   | 105                 | 70                | 69  | 92                | 76      | 46                | 45  | 92                |
| 24        | 87                 | 58      | 73   | 104                 | 58                | 70  | 68                | 71      | 66                | 43  | 92                |
| 25        | 87                 | 58      | 72   | 105                 | 96                | 72  | 77                | 70      | 46                | 43  | 93                |
| 26        | 87                 | 58      | 72   | 100                 | 84                | 68  | 56                | 70      | 96                | 44  | 93 <sup>(a)</sup> |
| 27        | 87                 | 57      | 72   | 101                 | 72                | 73  | 68                | 71      | 67                | 47  | 78 <sup>(a)</sup> |
| 28        | 86                 | 57      | 72   | 104                 | 72                | 70  | 51                | 74      | 86                | 42  | 80                |
| 29        | 86                 | 56      | 71   | 102                 | 67                | 72  | 51                | 73      | 67                | 42  | 65                |
| 30        | 86                 | 56      | 71   | 105                 | 67                | 64  | 99                | 71      | 67                | 44  | 64                |
| 31        | 85                 | 56      | 71   | 104                 | 67                | 72  | 99 <sup>(a)</sup> | 73      | 67                | 43  | 99                |
| September |                    |         |      |                     |                   |     |                   |         |                   |     |                   |
| 1         | 85                 | 56      | 71   | 106                 | 87                | 61  | 71                | 70      | 87                | 43  | 99                |
| 2         | 85                 | 56      | 71   | 102                 | 98 <sup>(a)</sup> | 70  | 71                | 70      | 49                | 47  | 75 <sup>(a)</sup> |
| 3         | 85                 | 55      | 70   | 102                 | 98                | 71  | 97                | 71      | 95                | 44  | 80 <sup>(a)</sup> |
| 4         | 85                 | 55      | 70   | 102                 | 88                | 68  | 59                | 68      | 55                | 44  | 80                |
| 5         | 85                 | 55      | 70   | 100                 | 55                | 72  | 60                | 68      | 63                | 43  | 69                |
| 6         | 85                 | 55      | 70   | 101                 | 55                | 69  | 46                | 65      | 57 <sup>(a)</sup> | 41  | 96                |
| 7         | 85                 | 54      | 69   | 97                  | 58                | 60  | 78                | 72      | 55                | 42  | 92 <sup>(a)</sup> |
| 8         | 84                 | 54      | 69   | 99                  | 81                | 61  | 85                | 69      | 63                | 42  | 76 <sup>(a)</sup> |
| 9         | 83                 | 53      | 68   | 98                  | 81 <sup>(a)</sup> | 66  | 85                | 68      | 69                | 40  | 62                |
| 10        | 82                 | 53      | 67   | 97                  | 93                | 68  | 85                | 65      | 63                | 43  | 82 <sup>(a)</sup> |
| 11        | 81                 | 52      | 67   | 98                  | 90 <sup>(a)</sup> | 62  | 85                | 66      | 69                | 41  | 88                |
| 12        | 81                 | 52      | 66   | 96                  | 69                | 62  | 70                | 67      | 53                | 38  | 49                |
| 13        | 80                 | 51      | 66   | 98                  | 48                | 59  | 80                | 62      | 60 <sup>(a)</sup> | 40  | 74                |
| 14        | 80                 | 51      | 65   | 94                  | 98 <sup>(a)</sup> | 62  | 92                | 61      | 90 <sup>(a)</sup> | 38  | 70                |
| 15        | 79                 | 51      | 65   | 96                  | 79 <sup>(a)</sup> | 58  | 59                | 61      | 45                | 35  | 70                |
| 16        | 79                 | 51      | 65   | 96                  | 81 <sup>(a)</sup> | 61  | 46                | 65      | 79                | 35  | 65                |
| 17        | 79                 | 51      | 65   | 97                  | 81                | 59  | 86                | 62      | 51                | 33  | 65                |
| 18        | 78                 | 50      | 64   | 98                  | 81                | 57  | 83                | 61      | 79                | 34  | 65                |
| 19        | 78                 | 50      | 64   | 96                  | 67                | 62  | 83                | 67      | 56                | 36  | 57                |

Table 3.12. (contd)

| Day | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |                   |         |      |     |                   |
|-----|--------------------|---------|------|---------------------|-------------------|-----|-------------------|---------|------|-----|-------------------|
|     | Maximum            | Minimum | Mean | Maximum             |                   |     |                   | Minimum |      |     |                   |
|     |                    |         |      | High                | Year              | Low | Year              | High    | Year | Low | Year              |
| 20  | 78                 | 50      | 64   | 94                  | 94                | 66  | 72 <sup>(a)</sup> | 67      | 94   | 37  | 83                |
| 21  | 78                 | 49      | 63   | 98                  | 67                | 66  | 45                | 65      | 62   | 38  | 93 <sup>(a)</sup> |
| 22  | 77                 | 49      | 63   | 93                  | 66                | 52  | 84                | 68      | 66   | 36  | 81 <sup>(a)</sup> |
| 23  | 77                 | 49      | 63   | 93                  | 87                | 54  | 77                | 62      | 92   | 34  | 81                |
| 24  | 77                 | 49      | 63   | 94                  | 52                | 60  | 72                | 60      | 50   | 34  | 72 <sup>(a)</sup> |
| 25  | 77                 | 48      | 63   | 97                  | 52                | 56  | 77                | 66      | 49   | 30  | 72                |
| 26  | 77                 | 48      | 62   | 93                  | 52                | 57  | 48                | 61      | 79   | 32  | 72                |
| 27  | 76                 | 48      | 62   | 92                  | 63 <sup>(a)</sup> | 58  | 77                | 60      | 49   | 30  | 72                |
| 28  | 76                 | 48      | 62   | 92                  | 67                | 58  | 77                | 62      | 76   | 33  | 85                |
| 29  | 76                 | 47      | 61   | 92                  | 96 <sup>(a)</sup> | 57  | 77                | 61      | 89   | 34  | 85 <sup>(a)</sup> |
| 30  | 75                 | 46      | 61   | 88                  | 93 <sup>(a)</sup> | 63  | 54 <sup>(a)</sup> | 64      | 93   | 35  | 85                |

October

|    |    |    |    |    |                   |    |                   |    |                   |    |                   |
|----|----|----|----|----|-------------------|----|-------------------|----|-------------------|----|-------------------|
| 1  | 75 | 46 | 60 | 88 | 91 <sup>(a)</sup> | 61 | 59                | 59 | 92                | 30 | 54                |
| 2  | 74 | 45 | 60 | 86 | 93 <sup>(a)</sup> | 56 | 67                | 60 | 88                | 32 | 54                |
| 3  | 73 | 45 | 59 | 89 | 58                | 55 | 50                | 58 | 88 <sup>(a)</sup> | 33 | 99 <sup>(a)</sup> |
| 4  | 73 | 44 | 58 | 89 | 80                | 55 | 50                | 57 | 88                | 32 | 73                |
| 5  | 72 | 44 | 58 | 87 | 58                | 52 | 57                | 52 | 88 <sup>(a)</sup> | 34 | 82 <sup>(a)</sup> |
| 6  | 72 | 44 | 58 | 85 | 80                | 53 | 57 <sup>(a)</sup> | 57 | 60                | 30 | 74                |
| 7  | 71 | 44 | 57 | 86 | 80                | 48 | 57                | 57 | 88                | 29 | 74                |
| 8  | 70 | 44 | 57 | 84 | 65                | 50 | 97                | 58 | 87                | 26 | 85                |
| 9  | 70 | 43 | 56 | 84 | 45                | 52 | 58                | 56 | 96                | 26 | 85                |
| 10 | 69 | 43 | 56 | 86 | 96                | 50 | 62                | 55 | 96                | 33 | 59                |
| 11 | 69 | 43 | 56 | 84 | 52                | 52 | 68 <sup>(a)</sup> | 55 | 63                | 30 | 60                |
| 12 | 68 | 43 | 55 | 84 | 45                | 54 | 66                | 56 | 52                | 34 | 85 <sup>(a)</sup> |
| 13 | 68 | 42 | 55 | 81 | 99                | 57 | 69                | 55 | 88                | 31 | 69                |
| 14 | 67 | 41 | 54 | 78 | 45                | 58 | 90 <sup>(a)</sup> | 59 | 88                | 24 | 69                |
| 15 | 66 | 40 | 53 | 81 | 63                | 53 | 92                | 60 | 88                | 29 | 70                |
| 16 | 66 | 39 | 53 | 79 | 63                | 54 | 92 <sup>(a)</sup> | 56 | 95                | 26 | 46                |
| 17 | 65 | 39 | 52 | 77 | 97                | 45 | 96                | 49 | 55                | 26 | 96                |
| 18 | 65 | 38 | 51 | 76 | 73                | 47 | 49                | 50 | 52                | 27 | 49                |
| 19 | 64 | 38 | 51 | 78 | 92 <sup>(a)</sup> | 50 | 45                | 52 | 92                | 27 | 69 <sup>(a)</sup> |
| 20 | 63 | 38 | 50 | 74 | 78                | 45 | 47                | 54 | 73                | 23 | 49                |
| 21 | 63 | 38 | 50 | 73 | 91 <sup>(a)</sup> | 45 | 96                | 54 | 63                | 20 | 84                |
| 22 | 63 | 38 | 50 | 74 | 59                | 46 | 50                | 51 | 52                | 20 | 84                |
| 23 | 62 | 38 | 50 | 73 | 66 <sup>(a)</sup> | 39 | 84                | 51 | 60                | 25 | 84                |
| 24 | 61 | 38 | 50 | 75 | 77 <sup>(a)</sup> | 49 | 57                | 49 | 46                | 26 | 75                |
| 25 | 61 | 37 | 49 | 75 | 55 <sup>(a)</sup> | 49 | 57                | 60 | 45                | 26 | 78                |
| 26 | 60 | 37 | 48 | 69 | 92                | 49 | 46                | 52 | 94                | 21 | 78                |
| 27 | 59 | 36 | 48 | 74 | 85                | 43 | 99 <sup>(a)</sup> | 54 | 81                | 23 | 70                |
| 28 | 58 | 36 | 47 | 68 | 65 <sup>(a)</sup> | 35 | 91                | 52 | 49                | 18 | 71                |
| 29 | 58 | 36 | 47 | 70 | 53                | 42 | 91 <sup>(a)</sup> | 50 | 97                | 13 | 71                |
| 30 | 57 | 36 | 46 | 75 | 67                | 32 | 71                | 50 | 97                | 20 | 72                |
| 31 | 56 | 36 | 46 | 75 | 67                | 34 | 84                | 54 | 67                | 12 | 84                |

November

|    |    |    |    |    |    |    |    |    |                   |    |                   |
|----|----|----|----|----|----|----|----|----|-------------------|----|-------------------|
| 1  | 56 | 36 | 46 | 69 | 88 | 31 | 84 | 49 | 87                | 20 | 95                |
| 2  | 56 | 36 | 46 | 70 | 45 | 38 | 91 | 51 | 85                | 17 | 95                |
| 3  | 55 | 36 | 45 | 75 | 75 | 36 | 73 | 53 | 83                | 17 | 95                |
| 4  | 55 | 36 | 45 | 71 | 75 | 32 | 73 | 46 | 89 <sup>(a)</sup> | 16 | 73                |
| 5  | 54 | 35 | 44 | 63 | 89 | 31 | 73 | 48 | 88                | 20 | 73 <sup>(a)</sup> |
| 6  | 53 | 35 | 44 | 64 | 58 | 32 | 73 | 49 | 89                | 19 | 73                |
| 7  | 53 | 35 | 44 | 69 | 78 | 34 | 45 | 48 | 97 <sup>(a)</sup> | 19 | 93 <sup>(a)</sup> |
| 8  | 52 | 34 | 43 | 69 | 95 | 34 | 45 | 48 | 89                | 16 | 45                |
| 9  | 51 | 34 | 43 | 73 | 89 | 30 | 45 | 60 | 89                | 18 | 86                |
| 10 | 51 | 34 | 42 | 73 | 89 | 32 | 45 | 56 | 89                | 16 | 86                |
| 11 | 50 | 34 | 42 | 66 | 89 | 32 | 85 | 48 | 89                | 14 | 78                |

Table 3.12. (contd)

| Day | Normal (1961-1990) |         |      | Extreme (1945-1999) |                   |     |      |         |                   |     |      |
|-----|--------------------|---------|------|---------------------|-------------------|-----|------|---------|-------------------|-----|------|
|     | Maximum            | Minimum | Mean | Maximum             |                   |     |      | Minimum |                   |     |      |
|     |                    |         |      | High                | Year              | Low | Year | High    | Year              | Low | Year |
| 12  | 50                 | 33      | 42   | 75                  | 99                | 20  | 55   | 52      | 49                | 6   | 55   |
| 13  | 49                 | 33      | 41   | 76                  | 99                | 14  | 55   | 56      | 98                | 6   | 59   |
| 14  | 49                 | 33      | 41   | 65                  | 95                | 19  | 55   | 47      | 98 <sup>(a)</sup> | -1  | 55   |
| 15  | 49                 | 32      | 40   | 67                  | 98                | 18  | 55   | 47      | 98                | 1   | 55   |
| 16  | 48                 | 32      | 40   | 65                  | 76                | 18  | 55   | 49      | 54                | 7   | 59   |
| 17  | 48                 | 31      | 40   | 71                  | 76                | 22  | 55   | 46      | 83 <sup>(a)</sup> | 10  | 61   |
| 18  | 48                 | 31      | 39   | 64                  | 46                | 25  | 55   | 47      | 54                | 11  | 55   |
| 19  | 47                 | 31      | 39   | 67                  | 62                | 22  | 85   | 44      | 54                | 14  | 85   |
| 20  | 47                 | 30      | 38   | 65                  | 58                | 24  | 85   | 47      | 74                | 3   | 85   |
| 21  | 46                 | 30      | 38   | 63                  | 58                | 17  | 85   | 46      | 65                | 3   | 85   |
| 22  | 46                 | 29      | 38   | 65                  | 67 <sup>(a)</sup> | 17  | 85   | 53      | 90                | -6  | 85   |
| 23  | 45                 | 29      | 37   | 70                  | 59                | 11  | 85   | 54      | 90                | -13 | 85   |
| 24  | 45                 | 29      | 37   | 67                  | 95 <sup>(a)</sup> | 6   | 85   | 57      | 90                | -12 | 85   |
| 25  | 44                 | 28      | 36   | 67                  | 98                | 11  | 85   | 50      | 98                | -3  | 85   |
| 26  | 43                 | 28      | 36   | 65                  | 49                | 15  | 85   | 45      | 49                | -1  | 85   |
| 27  | 43                 | 28      | 35   | 63                  | 49                | 12  | 85   | 46      | 49                | 8   | 85   |
| 28  | 43                 | 28      | 35   | 64                  | 95                | 11  | 85   | 43      | 73                | 7   | 85   |
| 29  | 42                 | 28      | 35   | 62                  | 95                | 14  | 85   | 57      | 95                | 8   | 85   |
| 30  | 42                 | 28      | 35   | 62                  | 95 <sup>(a)</sup> | 15  | 85   | 46      | 94                | 6   | 85   |

December

|    |    |    |    |    |                   |    |                   |    |                   |     |                   |
|----|----|----|----|----|-------------------|----|-------------------|----|-------------------|-----|-------------------|
| 1  | 42 | 28 | 35 | 65 | 72                | 14 | 85                | 45 | 81                | -8  | 85                |
| 2  | 42 | 28 | 35 | 64 | 77                | 20 | 85                | 56 | 75                | 8   | 85                |
| 3  | 42 | 28 | 35 | 62 | 82 <sup>(a)</sup> | 27 | 85 <sup>(a)</sup> | 54 | 75                | 8   | 85                |
| 4  | 42 | 28 | 35 | 60 | 75 <sup>(a)</sup> | 23 | 72                | 41 | 52                | 1   | 72                |
| 5  | 41 | 28 | 34 | 58 | 91 <sup>(a)</sup> | 21 | 72                | 41 | 87                | 7   | 72                |
| 6  | 41 | 27 | 34 | 59 | 87                | 16 | 56                | 43 | 87                | 8   | 56                |
| 7  | 40 | 27 | 33 | 58 | 73 <sup>(a)</sup> | 18 | 56                | 40 | 52                | 2   | 56                |
| 8  | 40 | 26 | 33 | 58 | 89                | 17 | 72                | 48 | 46                | -6  | 72                |
| 9  | 40 | 26 | 33 | 59 | 87 <sup>(a)</sup> | 13 | 72                | 44 | 56                | -5  | 72                |
| 10 | 39 | 25 | 32 | 67 | 93                | 13 | 72                | 48 | 46                | -8  | 72                |
| 11 | 39 | 25 | 32 | 59 | 91 <sup>(a)</sup> | 11 | 72                | 45 | 46                | -4  | 72                |
| 12 | 39 | 25 | 32 | 57 | 99 <sup>(a)</sup> | 22 | 72                | 42 | 77 <sup>(a)</sup> | -5  | 72                |
| 13 | 38 | 25 | 31 | 59 | 46                | 13 | 72                | 42 | 46                | -6  | 72                |
| 14 | 38 | 24 | 31 | 57 | 79 <sup>(a)</sup> | 15 | 72                | 48 | 79                | -2  | 72                |
| 15 | 37 | 24 | 31 | 64 | 59                | 16 | 72                | 49 | 99                | 2   | 72                |
| 16 | 37 | 24 | 30 | 62 | 99                | 4  | 64                | 44 | 99                | -13 | 64                |
| 17 | 37 | 24 | 30 | 57 | 98 <sup>(a)</sup> | 5  | 64                | 41 | 62                | -12 | 64                |
| 18 | 36 | 24 | 30 | 56 | 99 <sup>(a)</sup> | 13 | 64                | 42 | 99                | -3  | 84                |
| 19 | 36 | 24 | 30 | 59 | 94                | 17 | 84                | 41 | 94                | -4  | 84                |
| 20 | 37 | 24 | 30 | 64 | 94                | 11 | 84                | 47 | 94                | -2  | 90 <sup>(a)</sup> |
| 21 | 37 | 24 | 30 | 61 | 72                | 11 | 90                | 43 | 73                | -10 | 90                |
| 22 | 37 | 24 | 30 | 59 | 80                | 7  | 90                | 42 | 72                | -13 | 83                |
| 23 | 37 | 24 | 30 | 57 | 63                | 6  | 83                | 40 | 72                | -9  | 83                |
| 24 | 37 | 24 | 30 | 55 | 61 <sup>(a)</sup> | 15 | 90 <sup>(a)</sup> | 39 | 80 <sup>(a)</sup> | 0   | 90                |
| 25 | 37 | 23 | 30 | 65 | 80                | 16 | 90                | 41 | 72                | 1   | 90                |
| 26 | 36 | 23 | 30 | 69 | 80                | 20 | 90 <sup>(a)</sup> | 53 | 80                | 0   | 48                |
| 27 | 36 | 23 | 29 | 62 | 80 <sup>(a)</sup> | 19 | 48                | 40 | 94 <sup>(a)</sup> | -2  | 48                |
| 28 | 35 | 22 | 29 | 59 | 98                | 11 | 96                | 46 | 98                | -6  | 96                |
| 29 | 35 | 22 | 28 | 60 | 98 <sup>(a)</sup> | -2 | 68                | 41 | 98                | -10 | 90 <sup>(a)</sup> |
| 30 | 35 | 21 | 28 | 54 | 70                | -2 | 68                | 39 | 88 <sup>(a)</sup> | -14 | 68                |
| 31 | 35 | 21 | 28 | 56 | 62                | 4  | 68                | 44 | 80                | -9  | 78                |

(a) Latest of several occurrences.

### 3.8 Subsurface Soil Temperatures

Hourly subsurface soil temperature data at depths of ~0.5 inch, 15 inches, and 36 inches are available for the period from 1955 through 1999. The subsurface soil temperature sensors are installed in the natural soil of the area with the vegetation cover removed. The soil is sandy and mixed with large gravel.

Monthly averages and extremes of monthly averages are presented in Table 3.13. The absolute hourly extremes are also indicated in that table.

### 3.9 Heating- and Cooling-Degree Days

Data about heating- and cooling-degree days are generally used by the utility industry and those involved in building design to assess heating and cooling energy requirements. A temperature of 65°F is generally used as the basis for this calculation. To determine whether a day has either heating-degree days (HDDs) or cooling-degree days (CDDs), 65 is subtracted from the daily average temperature (computed by adding the daily maximum and minimum temperatures and dividing by two). If the difference is positive, the day has cooling-degree days. If the difference is negative, the day has heating-degree days.

| Example Calculations      |              |               |
|---------------------------|--------------|---------------|
|                           | Summer Day   | Winter Day    |
| Daily high temperature    | 90           | 42            |
| Daily low temperature     | 60           | 20            |
| Daily average temperature | 75 (150÷2)   | 31 (62÷2)     |
| Threshold temperature     | -65          | -65           |
| Difference                | 10 (10 CDDs) | -34 (34 HDDs) |

Tables 3.14 and 3.15 provide monthly HDD and CDD data, respectively, for the period 1945 through 1999. The HDDs are traditionally totaled for the 12-month period July through June of the following year.

**Table 3.13. Subsurface Soil Temperatures (°F) at Depths of 0.5, 15, and 36 Inches**

| Month  | 0.5-in. Depth   |                         |                        | 15-in. Depth |                         |                        | 36-in. Depth |                         |                        |      |      |      |      |      |      |      |      |         |
|--------|-----------------|-------------------------|------------------------|--------------|-------------------------|------------------------|--------------|-------------------------|------------------------|------|------|------|------|------|------|------|------|---------|
|        | Monthly Average | Highest Monthly Average | Lowest Monthly Average | Year         | Highest Monthly Average | Lowest Monthly Average | Year         | Highest Monthly Average | Lowest Monthly Average | Year |      |      |      |      |      |      |      |         |
| Jan    | 32.6            | 36.1                    | 42.5                   | 1967         | 19.2                    | 1979                   | 1979         | 42.7                    | 25.5                   | 1981 | 1981 | 48.7 | 36.3 | 1975 | 1975 | 48.7 | 36.3 | 1979    |
| Feb    | 38.3            | 38.8                    | 41.9                   | 1958         | 28.6                    | 1989                   | 1989         | 44.9                    | 29.6                   | 1967 | 1967 | 46.9 | 33.5 | 1967 | 1967 | 46.9 | 33.5 | 1957    |
| Mar    | 48.2            | 46.3                    | 46.0                   | 1992         | 42.4                    | 1955                   | 1955         | 52.6                    | 37.7                   | 1968 | 1968 | 51.7 | 38.0 | 1968 | 1968 | 51.7 | 38.0 | 1956    |
| Apr    | 59.9            | 55.6                    | 53.1                   | 1977         | 52.4                    | 1984                   | 1984         | 62.1                    | 48.7                   | 1977 | 1977 | 57.4 | 47.3 | 1966 | 1966 | 57.4 | 47.3 | 1955    |
| May    | 72.0            | 65.5                    | 60.8                   | 1992         | 63.6                    | 1984                   | 1984         | 71.4                    | 58.7                   | 1992 | 1992 | 65.1 | 54.8 | 1987 | 1987 | 65.1 | 54.8 | 1955    |
| Jun    | 82.6            | 75.1                    | 68.7                   | 1986         | 75.3                    | 1956                   | 1956         | 84.5                    | 70.2                   | 1966 | 1966 | 73.4 | 62.8 | 1969 | 1969 | 73.4 | 62.8 | 1984    |
| Jul    | 90.9            | 81.7                    | 75.2                   | 1973         | 81.0                    | 1993                   | 1993         | 88.2                    | 75.4                   | 1967 | 1967 | 81.1 | 70.8 | 1967 | 1967 | 81.1 | 70.8 | 1955    |
| Aug    | 87.6            | 82.7                    | 78.6                   | 1971         | 81.6                    | 1960                   | 1960         | 89.2                    | 77.5                   | 1967 | 1967 | 83.9 | 75.3 | 1967 | 1967 | 83.9 | 75.3 | 1999(a) |
| Sep    | 74.0            | 74.6                    | 74.9                   | 1967         | 65.5                    | 1985                   | 1985         | 82.2                    | 68.8                   | 1967 | 1967 | 81.4 | 70.1 | 1967 | 1967 | 81.4 | 70.1 | 1978    |
| Oct    | 56.5            | 62.4                    | 67.2                   | 1988         | 52.4                    | 1985                   | 1985         | 66.6                    | 57.9                   | 1967 | 1967 | 72.3 | 62.9 | 1967 | 1967 | 72.3 | 62.9 | 1959    |
| Nov    | 40.8            | 48.1                    | 56.7                   | 1999         | 31.9                    | 1985                   | 1985         | 54.0                    | 42.5                   | 1974 | 1974 | 62.7 | 51.2 | 1974 | 1974 | 62.7 | 51.2 | 1955    |
| Dec    | 33.4            | 39.1                    | 47.7                   | 1974         | 26.5                    | 1984                   | 1984         | 45.0                    | 34.1                   | 1974 | 1974 | 54.6 | 41.4 | 1974 | 1974 | 54.6 | 41.4 | 1955    |
| Annual | 59.7            | 58.8                    | 59.7                   | 1967         | 55.9                    | 1955                   | 1955         | 63.0                    | 54.6                   | 1967 | 1967 | 67.3 | 55.5 | 1987 | 1987 | 67.3 | 55.5 | 1955    |

| Absolute Hourly Extremes |      |      |
|--------------------------|------|------|
| 156.8                    | 1996 | -2.0 |
| 93.0                     | 1967 | 16.1 |
| 85.3                     | 1967 | 32.2 |
|                          | 1979 | 1957 |

(a) Most recent of multiple occurrences.

Table 3.14. Monthly and Seasonal Heating-Degree Days

| Year    | Jul                | Aug                | Sep                | Oct                | Nov                  | Dec                  | Jan                  | Feb                  | Mar                | Apr                | May                | Jun               | Season               |
|---------|--------------------|--------------------|--------------------|--------------------|----------------------|----------------------|----------------------|----------------------|--------------------|--------------------|--------------------|-------------------|----------------------|
| 1944-45 | --                 | --                 | --                 | --                 | --                   | --                   | 967                  | 738                  | 709                | 442                | 141                | 38                | --                   |
| 1945-46 | 0                  | 2                  | 97                 | 277                | 733                  | 1,000                | 949                  | 710                  | 603                | 331                | 79                 | 42                | 4,823                |
| 1946-47 | 0                  | 1                  | 101                | 479                | 875                  | 935                  | 1,168                | 702                  | 476                | 266                | 36 <sup>(a)</sup>  | 25                | 5,064                |
| 1947-48 | 0                  | 7                  | 70                 | 351                | 714                  | 989                  | 1,024                | 963                  | 709                | 471                | 237                | 5                 | 5,540                |
| 1948-49 | 2                  | 0                  | 109                | 438                | 725                  | 1,184                | 1,581                | 928                  | 616                | 281                | 85                 | 36                | 5,985                |
| 1949-50 | 1                  | 0                  | 52                 | 456                | 592                  | 927                  | 1,640 <sup>(a)</sup> | 959                  | 704                | 452                | 196                | 66                | 6,045                |
| 1950-51 | 0                  | 0                  | 64                 | 431                | 728                  | 895                  | 994                  | 786                  | 773                | 325                | 146                | 45                | 5,187                |
| 1951-52 | 5                  | 19                 | 46                 | 421                | 763                  | 1,164                | 1,235                | 823                  | 645                | 311                | 118                | 45                | 5,595                |
| 1952-53 | 0                  | 2                  | 34                 | 200 <sup>(a)</sup> | 929                  | 934                  | 694 <sup>(a)</sup>   | 664                  | 585                | 419                | 228                | 90 <sup>(a)</sup> | 4,779                |
| 1953-54 | 0                  | 3                  | 59                 | 298                | 649                  | 851                  | 1,118                | 720                  | 722                | 408                | 124                | 77                | 5,029                |
| 1954-55 | 10                 | 4                  | 79                 | 423                | 567                  | 957                  | 1,090                | 832                  | 794 <sup>(a)</sup> | 522 <sup>(a)</sup> | 253                | 23                | 5,554                |
| 1955-56 | 22 <sup>(a)</sup>  | 0                  | 108                | 364                | 1,008                | 1,105                | 1,029                | 1,147 <sup>(a)</sup> | 655                | 273                | 110                | 55                | 5,876                |
| 1956-57 | 0                  | 6                  | 32                 | 399                | 850                  | 940                  | 1,499                | 862                  | 650                | 308                | 50                 | 11                | 5,607                |
| 1957-58 | 0                  | 0                  | 37                 | 443                | 739                  | 822 <sup>(a)</sup>   | 862                  | 576                  | 666                | 411                | 72                 | 3                 | 4,631                |
| 1958-59 | 0                  | 0                  | 74                 | 339                | 731                  | 927                  | 1,025                | 827                  | 617                | 325                | 248                | 29                | 5,142                |
| 1959-60 | 4                  | 6                  | 118                | 359                | 855                  | 987                  | 1,292                | 799                  | 616                | 374                | 227                | 21                | 5,658                |
| 1960-61 | 0                  | 32 <sup>(a)</sup>  | 35                 | 330                | 717                  | 1,114                | 930                  | 598                  | 587                | 380                | 179                | 16                | 4,918                |
| 1961-62 | 0                  | 0                  | 91                 | 418                | 893                  | 974                  | 1,090                | 797                  | 698                | 287                | 255                | 51                | 5,554                |
| 1962-63 | 12                 | 1                  | 60                 | 385                | 657                  | 874                  | 1,228                | 747                  | 577                | 456                | 170                | 25                | 5,192                |
| 1963-64 | 1                  | 1                  | 25                 | 285                | 668                  | 1,078                | 913                  | 784                  | 656                | 445                | 195                | 33                | 5,084                |
| 1964-65 | 0                  | 21                 | 94                 | 360                | 804                  | 1,224                | 1,009                | 686                  | 685                | 307                | 171                | 16                | 5,377                |
| 1965-66 | 5                  | 14                 | 115                | 247                | 660                  | 995                  | 963                  | 702                  | 605                | 311                | 133                | 58                | 4,808                |
| 1966-67 | 17                 | 2                  | 26                 | 362                | 638                  | 829                  | 782                  | 598                  | 639                | 519                | 175                | 12                | 4,599                |
| 1967-68 | 0                  | 0                  | 13                 | 305                | 704                  | 993                  | 907                  | 670                  | 495                | 416                | 117                | 23                | 4,643                |
| 1968-69 | 0                  | 13                 | 50                 | 458                | 702                  | 1,064                | 1,399                | 932                  | 591                | 384                | 88                 | 6                 | 5,687                |
| 1969-70 | 0                  | 5                  | 39                 | 431                | 745                  | 941                  | 1,064                | 683                  | 625                | 480                | 137                | 23                | 5,173                |
| 1970-71 | 0                  | 0                  | 122                | 439                | 758                  | 1,063                | 906                  | 726                  | 752                | 392                | 124                | 50                | 5,332                |
| 1971-72 | 13                 | 3                  | 133                | 420                | 728                  | 1,064                | 1,065                | 878                  | 560                | 463                | 112                | 23                | 5,462                |
| 1972-73 | 1                  | 3                  | 179                | 397                | 754                  | 1,168                | 1,112                | 742                  | 544                | 338                | 144                | 38                | 5,420                |
| 1973-74 | 2                  | 9                  | 73                 | 389                | 798                  | 837                  | 1,104                | 675                  | 611                | 361                | 236                | 27                | 5,122                |
| 1974-75 | 8                  | 0                  | 32                 | 388                | 698                  | 892                  | 996                  | 880                  | 704                | 504                | 174                | 31                | 5,307                |
| 1975-76 | 0                  | 13                 | 25                 | 388                | 764                  | 949                  | 1,024                | 796                  | 735                | 422                | 159                | 74                | 5,349                |
| 1976-77 | 5                  | 15                 | 23                 | 392                | 736                  | 1,065                | 1,232                | 684                  | 608                | 253                | 258                | 22                | 5,293                |
| 1977-78 | 5                  | 7                  | 153                | 401                | 783                  | 967                  | 1,001                | 761                  | 550                | 393                | 203                | 22                | 5,246                |
| 1978-79 | 1                  | 10                 | 76                 | 390                | 981                  | 1,162                | 1,582                | 861                  | 571                | 369                | 94                 | 21                | 6,118 <sup>(a)</sup> |
| 1979-80 | 13                 | 0                  | 10                 | 266                | 924                  | 887                  | 1,277                | 888                  | 638                | 302                | 138                | 68                | 5,411                |
| 1980-81 | 5                  | 18                 | 53                 | 394                | 723                  | 883                  | 838                  | 707                  | 503                | 345                | 165                | 51                | 4,685                |
| 1981-82 | 8                  | 0                  | 108                | 402                | 668                  | 998                  | 1,092                | 754                  | 590                | 469                | 164                | 17                | 5,270                |
| 1982-83 | 10                 | 0                  | 75                 | 420                | 844                  | 1,023                | 855                  | 676                  | 511                | 419                | 151                | 50                | 5,034                |
| 1983-84 | 8                  | 0                  | 125                | 387                | 643                  | 1,357                | 1,035                | 763                  | 552                | 432                | 292 <sup>(a)</sup> | 70                | 5,664                |
| 1984-85 | 0                  | 3                  | 145                | 532 <sup>(a)</sup> | 768                  | 1,288                | 1,245                | 982                  | 651                | 288                | 137                | 21                | 6,060                |
| 1985-86 | 0                  | 10                 | 197 <sup>(a)</sup> | 475                | 1,206 <sup>(a)</sup> | 1,362 <sup>(a)</sup> | 959                  | 724                  | 509                | 426                | 213                | 10                | 6,091                |
| 1986-87 | 18                 | 0                  | 153                | 319                | 680                  | 1,009                | 1,066                | 696                  | 522                | 239                | 85                 | 16                | 4,803                |
| 1987-88 | 1                  | 0                  | 32                 | 304                | 640                  | 1,040                | 1,028                | 695                  | 591                | 301                | 166                | 65                | 4,863                |
| 1988-89 | 3                  | 0                  | 100                | 208                | 625                  | 1,033                | 859                  | 1,054                | 658                | 254                | 141                | 6                 | 4,941                |
| 1989-90 | 1                  | 0                  | 12                 | 339                | 621                  | 985                  | 763                  | 767                  | 530                | 217                | 149                | 28                | 4,412                |
| 1990-91 | 4                  | 0 <sup>(a)</sup>   | 0 <sup>(a)</sup>   | 401                | 553 <sup>(a)</sup>   | 1,269                | 1,124                | 575 <sup>(a)</sup>   | 649                | 330                | 148                | 55                | 5,108                |
| 1991-92 | 0                  | 0                  | 12                 | 381                | 710                  | 842                  | 851                  | 648                  | 418 <sup>(a)</sup> | 278                | 77                 | 13                | 4,230 <sup>(a)</sup> |
| 1992-93 | 1                  | 18                 | 94                 | 298                | 716                  | 1,084                | 1,247                | 958                  | 674                | 374                | 94                 | 23                | 5,581                |
| 1993-94 | 1                  | 13                 | 89                 | 303                | 911                  | 914                  | 819                  | 813                  | 490                | 217 <sup>(a)</sup> | 97                 | 22                | 4,689                |
| 1994-95 | 0                  | 0                  | 3                  | 332                | 759                  | 924                  | 954                  | 614                  | 581                | 372                | 89                 | 46                | 4,674                |
| 1995-96 | 0                  | 1                  | 24                 | 398                | 623                  | 1,003                | 1,124                | 935                  | 623                | 302                | 225                | 14                | 5,272                |
| 1996-97 | 3                  | 0                  | 99                 | 401                | 797                  | 1,090                | 973                  | 692                  | 544                | 395                | 95                 | 2                 | 5,091                |
| 1997-98 | 2                  | 0                  | 38                 | 367                | 658                  | 941                  | 892                  | 642                  | 521                | 332                | 131                | 1 <sup>(a)</sup>  | 4,523                |
| 1998-99 | 0 <sup>(a,b)</sup> | 0 <sup>(a,b)</sup> | 15                 | 393                | 582                  | 1,000                | 829                  | 651                  | 581                | 424                | 265                | 62                | 4,802                |
| 1999-00 | 8                  | 17                 | 65                 | 407                | 576                  | 846                  | --                   | --                   | --                 | --                 | --                 | --                | --                   |
| Average | 4                  | 5                  | 71                 | 374                | 743                  | 1,012                | 1,059                | 772                  | 612                | 366                | 154                | 33                | 5,206                |
| Normal  | 15                 | 5                  | 78                 | 377                | 746                  | 1,042                | 1,044                | 764                  | 602                | 372                | 164                | 32                | 5,231                |

(a) Greatest and least values.

(b) Most recent of numerous occurrences.

Table 3.15. Monthly and Annual Cooling-Degree Days

| Year    | Jan | Feb                | Mar | Apr                | May                | Jun                | Jul                | Aug                | Sep                | Oct                | Nov                | Dec | Annual               |
|---------|-----|--------------------|-----|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----|----------------------|
| 1945    | 0   | 0                  | 0   | 0                  | 39                 | 113                | 325                | 388                | 86                 | 11                 | 0                  | 0   | 962                  |
| 1946    | 0   | 0                  | 0   | 9                  | 53                 | 100                | 345                | 360                | 57                 | 0                  | 0                  | 0   | 924                  |
| 1947    | 0   | 0                  | 0   | 3                  | 153                | 108                | 321                | 217                | 86                 | 11                 | 0                  | 0   | 899                  |
| 1948    | 0   | 0                  | 0   | 0                  | 31                 | 230                | 243                | 213                | 90                 | 0                  | 0                  | 0   | 807                  |
| 1949    | 0   | 0                  | 0   | 4                  | 147                | 168                | 311                | 307                | 146                | 0                  | 0                  | 0   | 1,083                |
| 1950    | 0   | 0                  | 0   | 0                  | 13                 | 112                | 321                | 353                | 139                | 0                  | 0                  | 0   | 938                  |
| 1951    | 0   | 0                  | 0   | 1                  | 26                 | 173                | 370                | 303                | 123                | 0                  | 0                  | 0   | 996                  |
| 1952    | 0   | 0                  | 0   | 16                 | 46                 | 110                | 371                | 281                | 151                | 16                 | 0                  | 0   | 991                  |
| 1953    | 0   | 0                  | 0   | 0                  | 8                  | 26 <sup>(a)</sup>  | 336                | 282                | 143                | 1                  | 0                  | 0   | 796                  |
| 1954    | 0   | 0                  | 0   | 0                  | 55                 | 90                 | 289                | 204                | 91                 | 0                  | 0                  | 0   | 729                  |
| 1955    | 0   | 0                  | 0   | 0                  | 4                  | 174                | 270                | 325                | 13                 | 0                  | 0                  | 0   | 786                  |
| 1956    | 0   | 0                  | 0   | 10                 | 122                | 78                 | 430                | 322                | 106                | 0                  | 0                  | 0   | 1,068                |
| 1957    | 0   | 0                  | 0   | 12                 | 77                 | 185                | 289                | 255                | 160                | 0                  | 0                  | 0   | 978                  |
| 1958    | 0   | 0                  | 0   | 0                  | 167 <sup>(a)</sup> | 282                | 500                | 447                | 93                 | 14                 | 0                  | 0   | 1,503 <sup>(a)</sup> |
| 1959    | 0   | 0                  | 0   | 0                  | 15                 | 137                | 397                | 218                | 45                 | 0                  | 0                  | 0   | 812                  |
| 1960    | 0   | 0                  | 0   | 2                  | 26                 | 174                | 518                | 233                | 118                | 3                  | 0                  | 0   | 1,074                |
| 1961    | 0   | 0                  | 0   | 0                  | 23                 | 288                | 447                | 469                | 55                 | 0                  | 0                  | 0   | 1,282                |
| 1962    | 0   | 0                  | 0   | 5                  | 3 <sup>(a)</sup>   | 148                | 352                | 215                | 125                | 0                  | 0                  | 0   | 848                  |
| 1963    | 0   | 0                  | 0   | 0                  | 67                 | 156                | 232                | 333                | 205                | 5                  | 0                  | 0   | 998                  |
| 1964    | 0   | 0                  | 0   | 0                  | 30                 | 115                | 299                | 171 <sup>(a)</sup> | 34                 | 0                  | 0                  | 0   | 649 <sup>(a)</sup>   |
| 1965    | 0   | 0                  | 0   | 0                  | 31                 | 145                | 362                | 314                | 33                 | 2                  | 0                  | 0   | 887                  |
| 1966    | 0   | 0                  | 0   | 0                  | 80                 | 116                | 274                | 332                | 141                | 1                  | 0                  | 0   | 944                  |
| 1967    | 0   | 0                  | 0   | 0                  | 34                 | 237                | 419                | 508 <sup>(a)</sup> | 216                | 0                  | 0                  | 0   | 1,414                |
| 1968    | 0   | 0                  | 0   | 5                  | 35                 | 168                | 451                | 213                | 104                | 0                  | 0                  | 0   | 976                  |
| 1969    | 0   | 0                  | 0   | 0                  | 73                 | 310                | 338                | 245                | 110                | 0                  | 0                  | 0   | 1,076                |
| 1970    | 0   | 0                  | 0   | 0                  | 29                 | 281                | 421                | 351                | 27                 | 1                  | 0                  | 0   | 1,110                |
| 1971    | 0   | 0                  | 0   | 0                  | 94                 | 59                 | 437                | 481                | 28                 | 10                 | 0                  | 0   | 1,109                |
| 1972    | 0   | 0                  | 0   | 0                  | 87                 | 164                | 339                | 392                | 67                 | 1                  | 0                  | 0   | 1,050                |
| 1973    | 0   | 0                  | 0   | 0                  | 87                 | 149                | 413                | 285                | 94                 | 0                  | 0                  | 0   | 1,028                |
| 1974    | 0   | 0                  | 0   | 0                  | 12                 | 264                | 303                | 326                | 125                | 0                  | 0                  | 0   | 1,030                |
| 1975    | 0   | 0                  | 0   | 0                  | 28                 | 102                | 451                | 202                | 117                | 0                  | 0                  | 0   | 900                  |
| 1976    | 0   | 0                  | 0   | 0                  | 22                 | 91                 | 319                | 195                | 141                | 3                  | 0                  | 0   | 771                  |
| 1977    | 0   | 0                  | 0   | 24                 | 5                  | 253                | 276                | 447                | 46                 | 0                  | 0                  | 0   | 1,051                |
| 1978    | 0   | 0                  | 0   | 0                  | 5                  | 182                | 332                | 248                | 41                 | 0                  | 0                  | 0   | 808                  |
| 1979    | 0   | 0                  | 0   | 1                  | 65                 | 197                | 394                | 299                | 138                | 5                  | 0                  | 0   | 1,099                |
| 1980    | 0   | 0                  | 0   | 7                  | 26                 | 57                 | 305                | 207                | 80                 | 9                  | 0                  | 0   | 691                  |
| 1981    | 0   | 0                  | 0   | 16                 | 25                 | 82                 | 287                | 438                | 144                | 0                  | 0                  | 0   | 992                  |
| 1982    | 0   | 0                  | 0   | 0                  | 20                 | 261                | 315                | 333                | 88                 | 0                  | 0                  | 0   | 1,017                |
| 1983    | 0   | 0                  | 0   | 0                  | 115                | 61                 | 203                | 291                | 26                 | 1                  | 0                  | 0   | 697                  |
| 1984    | 0   | 0                  | 0   | 0                  | 11                 | 88                 | 340                | 280                | 60                 | 0                  | 0                  | 0   | 779                  |
| 1985    | 0   | 0                  | 0   | 3                  | 83                 | 175                | 532 <sup>(a)</sup> | 183                | 11 <sup>(a)</sup>  | 0                  | 0                  | 0   | 987                  |
| 1986    | 0   | 1 <sup>(a)</sup>   | 0   | 3                  | 125                | 245                | 192                | 442                | 68                 | 1                  | 0                  | 0   | 1,077                |
| 1987    | 0   | 0                  | 0   | 26 <sup>(a)</sup>  | 125                | 265                | 289                | 359                | 179                | 11                 | 0                  | 0   | 1,254                |
| 1988    | 0   | 0                  | 0   | 6                  | 45                 | 187                | 385                | 318                | 113                | 44 <sup>(a)</sup>  | 0                  | 0   | 1,098                |
| 1989    | 0   | 0                  | 0   | 1                  | 34                 | 215                | 323                | 260                | 89                 | 0                  | 1 <sup>(a)</sup>   | 0   | 923                  |
| 1990    | 0   | 0                  | 0   | 3                  | 16                 | 182                | 491                | 367                | 222 <sup>(a)</sup> | 3                  | 0                  | 0   | 1,284                |
| 1991    | 0   | 0                  | 0   | 3                  | 6                  | 72                 | 400                | 427                | 155                | 7                  | 0                  | 0   | 1,070                |
| 1992    | 0   | 0                  | 0   | 11                 | 147                | 365 <sup>(a)</sup> | 362                | 392                | 81                 | 10                 | 0                  | 0   | 1,368                |
| 1993    | 0   | 0                  | 0   | 0                  | 139                | 127                | 171 <sup>(a)</sup> | 265                | 135                | 6                  | 0                  | 0   | 843                  |
| 1994    | 0   | 0                  | 0   | 15                 | 94                 | 163                | 501                | 358                | 167                | 3                  | 0                  | 0   | 1,301                |
| 1995    | 0   | 0                  | 0   | 0                  | 73                 | 142                | 376                | 216                | 174                | 0                  | 0                  | 0   | 981                  |
| 1996    | 0   | 0                  | 0   | 4                  | 14                 | 134                | 450                | 324                | 79                 | 9                  | 0                  | 0   | 1,014                |
| 1997    | 0   | 0                  | 0   | 0                  | 96                 | 118                | 324                | 404                | 92                 | 0                  | 0                  | 0   | 1,034                |
| 1998    | 0   | 0 <sup>(a,b)</sup> | 0   | 16                 | 55                 | 183                | 527                | 398                | 195                | 3                  | 0                  | 0   | 1,377                |
| 1999    | 0   | 0 <sup>(a,b)</sup> | 0   | 0 <sup>(a,t)</sup> | 43                 | 135                | 281                | 366                | 66                 | 0 <sup>(a,b)</sup> | 0 <sup>(a,b)</sup> | 0   | 891                  |
| Average | 0   | <1                 | 0   | 4                  | 56                 | 163                | 355                | 316                | 104                | 4                  | <1                 | 0   | 1,001                |
| Normal  | 0   | <1                 | 0   | 3                  | 48                 | 175                | 351                | 317                | 98                 | 3                  | <1                 | 0   | 994                  |

(a) Greatest and least values.  
 (b) Most recent of numerous occurrences.



---

## 4.0 Precipitation Climatology

### 4.1 Monthly and Annual Totals

Table 4.1 shows monthly and annual precipitation totals for the period of record, 1946 through 1999. Normal monthly precipitation amounts for the period 1961 through 1990 and averages for the entire period of record are noted on the table, as are monthly and annual extremes. Normal annual precipitation at the Hanford Meteorology Station is 6.26 inches. The wettest year on record was 1995, with 12.31 inches; the driest was 1976, with 2.99 inches.

The months of November through February provide 3.35 inches (54%) of the normal annual precipitation. December is the wettest month, receiving 1.03 inches; July is the driest, receiving only 0.18 inch. The wettest month on record was December 1996, with 3.69 inches. September 1999, September 1991, August 1988, and August 1955 received no precipitation.

### 4.2 Total Monthly Precipitation Distributions

A new method of presenting climatological data on daily temperature maxima and minima was described in Section 3.5. This method of presentation of climatological data is appropriate for monthly precipitation totals as well. Figure 4.1 shows climatological statistics for total precipitation for January at the Hanford Meteorology Station. Note that the median value is nearer the bottom of the expected range of values than it is to the top of the range. This is characteristic of precipitation distributions, and it is the reason that it is not practical to show climatological statistics of daily precipitation totals using the new method. If the distribution of daily precipitation totals were shown, the median value, the bottom of the expected range, and record low value would all be zero because on most days there is no precipitation at all. The following information can be drawn from the figure:

- The median precipitation for January is about 0.8 inch (the average precipitation is 0.93 inch).
- The record high precipitation for month is about 2.5 inches.
- The record low precipitation the month is about 0.1 inch.
- About 70 percent of the time (14 out of 20 years), the monthly total precipitation will be between 0.33 inch and 1.7 inches.
- About 15 percent of the time (3 out of 20 years), the monthly total precipitation will be more than 1.7 inches.
- About 35 percent of the time (7 out of 20 years), the monthly total precipitation will be between 0.8 inch and 1.7 inches.

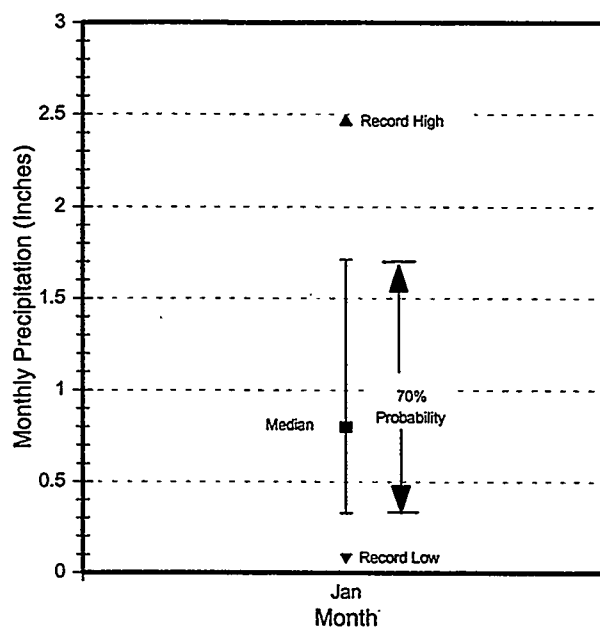


Figure 4.1. Graphical Representation of Total Monthly Precipitation

- About 35 percent of the time (7 out of 20 years), the monthly total precipitation will be between 0.33 inch and 0.8 inch.
- About 15 percent of the time (3 out of 20 years), the monthly total precipitation will be less than 0.33 inch.

Figure 4.2 shows the climatological statistics of total monthly precipitation. The statistics are based on the data in Table 4.1. The only months for which the median monthly total precipitation exceeds 0.5 inch are November, December, January, and February. Yet, 0.5 inch of rain is within the range of typical values for all months except July.

The climatological statistics of annual accumulation of precipitation are shown in Figure 4.3. The accumulation begins in July because July has the lowest expected monthly-total precipitation. In addition, the precipitation in December and the following January contributes to the water supply for the same growing season. July is therefore a natural starting point. This choice of starting points for precipitation accumulation does not affect the median accumulation (6.41 inches). However, it does increase the ranges of variability in accumulation during the 12 month period over the ranges determined starting accumulation in January. The range of variability is increased because there is a small but significant positive correlation between precipitation in December and precipitation in the following January. For example, if the precipitation in December is below average, the precipitation is more likely to be below average. Similarly, if the precipitation in December is above average, the precipitation in the following January is also more likely to be above average. This correlation is not found between the precipitation in January and the precipitation in the following December.

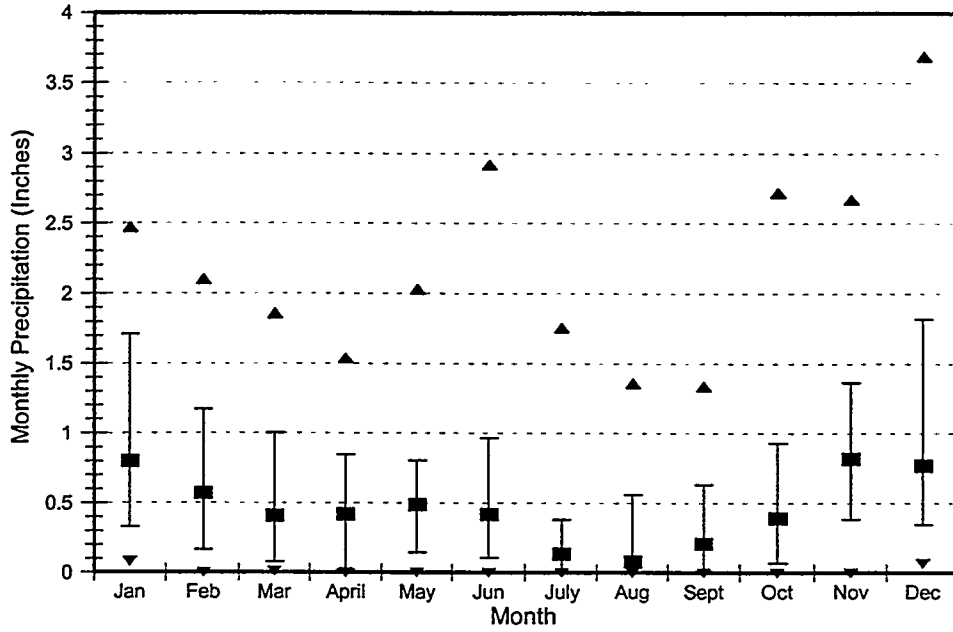


Figure 4.2. Climatological Statistics of Total Monthly Precipitation

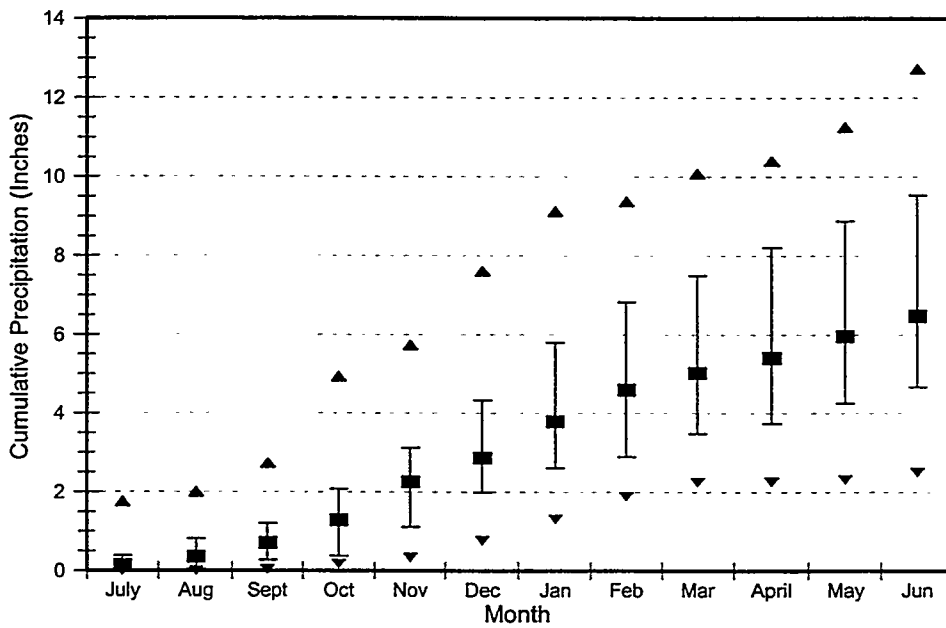


Figure 4.3. Climatological Statistics of Precipitation Accumulation

### **4.3 Seasonal Precipitation**

Table 4.2 provides seasonal precipitation information, with normal and average seasonal data noted. The extremes for each season are also noted. The wettest season was the winter of 1996-1997, with 5.45 inches; the driest received only 0.03 inch (summer 1973).

### **4.4 Average Number of Days with Specified Amounts of Precipitation**

Table 4.3 presents information on the average number of days per year with precipitation events in six categories. A trace is less than 0.01 inch of precipitation. An average of 123 days per year have a trace or more of precipitation; however, only 23 days receive totals of 0.10 inch or more. During the 54-year period of record, only 4 days had an inch or more of precipitation.

### **4.5 Total Time with Precipitation Observed**

The total time during which precipitation was observed at the Hanford Meteorology Station includes all types of precipitation. Observations of precipitation are recorded in hours and minutes, with the weather observer recording the starting and ending time of each precipitation event. These data are presented in Table 4.4. No record was kept for the hours 1600 through 2400 from July 1971 through June 1974; therefore, a 3-year gap exists in the record for those hours. Also, beginning in late April 1995, operations at the Hanford Meteorology Station were decreased to 8 hours (0600 to 1400) on weekends and holidays. However, a combination of precipitation sensors and computer programs was initiated to help ascertain the beginning and ending times of precipitation events during periods when the Hanford Meteorology Station is not staffed. Table 4.5 lists total hours of precipitation by month for the period 1946 through 1999. As previously noted, complete precipitation duration data for the period July 1971 through June 1974 are not available, and incomplete data are not included.

The months of November through February, which contribute more than half of the annual precipitation, received precipitation 10.2% of the time, three times more than the other 8 months of the year (3.3%).

Table 4.1. Monthly and Annual Precipitation (inches)

| Year    | Jan                 | Feb                 | Mar                 | Apr                 | May                 | Jun                 | Jul                 | Aug                 | Sep                 | Oct                 | Nov                 | Dec                 | Annual               |
|---------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|
| 1946    | --                  | --                  | --                  | --                  | --                  | --                  | 0.15                | 0.35                | 0.52                | 0.65                | 0.66                | 0.11                | --                   |
| 1947    | 0.32                | 0.27                | 0.42                | 0.70                | 0.02                | 1.07                | 0.71                | 0.68                | 1.34 <sup>(a)</sup> | 2.20                | 0.81                | 0.75                | 9.29                 |
| 1948    | 1.36                | 0.69                | 0.07                | 0.95                | 1.71                | 1.47                | 0.40                | 0.39                | 0.16                | 0.45                | 0.95                | 1.11                | 9.71                 |
| 1949    | 0.13                | 0.68                | 1.12                | 0.02                | 0.16                | 0.01                | 0.01                | 0.03                | 0.23                | 0.10                | 1.47                | 0.16                | 4.12                 |
| 1950    | 1.80                | 1.06                | 0.87                | 0.47                | 0.27                | 2.92 <sup>(a)</sup> | 0.07                | T                   | 0.01                | 2.46                | 0.55                | 0.97                | 11.45                |
| 1951    | 0.84                | 0.51                | 0.46                | 0.53                | 0.43                | 1.38                | 0.37                | 0.15                | 0.10                | 0.71                | 0.82                | 0.70                | 7.00                 |
| 1952    | 0.65                | 0.50                | 0.06                | 0.13                | 0.58                | 1.07                | T                   | 0.08                | 0.08                | 0.04                | 0.20                | 0.77                | 4.16                 |
| 1953    | 2.16                | 0.25                | 0.17                | 0.77                | 0.28                | 0.55                | T                   | 0.96                | 0.13                | 0.20                | 0.96                | 0.49                | 6.92                 |
| 1954    | 1.48                | 0.28                | 0.59                | 0.07                | 0.41                | 0.10                | 0.22                | 0.42                | 0.51                | 0.42                | 0.86                | 0.35                | 5.71                 |
| 1955    | 0.56                | 0.22                | 0.17                | 0.40                | 0.59                | 0.28                | 0.57                | 0 <sup>(a,b)</sup>  | 0.77                | 0.40                | 1.54                | 2.03                | 7.53                 |
| 1956    | 1.71                | 0.56                | 0.10                | T                   | 0.22                | 0.86                | T                   | 0.38                | 0.01                | 1.03                | 0.15                | 0.58                | 5.60                 |
| 1957    | 0.48                | 0.23                | 1.86 <sup>(a)</sup> | 0.38                | 0.82                | 0.47                | 0.05                | 0.02                | 0.34                | 2.72 <sup>(a)</sup> | 0.39                | 0.53                | 8.29                 |
| 1958    | 1.74                | 1.48                | 0.46                | 0.64                | 0.74                | 0.81                | 0.02                | T                   | 0.05                | 0.19                | 0.77                | 1.84                | 8.74                 |
| 1959    | 2.05                | 1.17                | 0.40                | 0.20                | 0.50                | 0.23                | T                   | 0.03                | 1.26                | 0.56                | 0.41                | 0.26                | 7.07                 |
| 1960    | 0.51                | 0.58                | 0.67                | 0.53                | 0.71                | 0.14                | T                   | 0.26                | 0.23                | 0.23                | 0.92                | 0.64                | 5.42                 |
| 1961    | 0.33                | 2.10 <sup>(a)</sup> | 1.02                | 0.48                | 0.80                | 0.42                | 0.15                | 0.09                | T                   | 0.07                | 0.49                | 0.89                | 6.84                 |
| 1962    | 0.13                | 0.90                | 0.14                | 0.34                | 1.35                | 0.12                | T                   | 0.50                | 0.38                | 0.95                | 0.65                | 0.60                | 6.06                 |
| 1963    | 0.95                | 0.69                | 0.53                | 1.17                | 0.43                | 0.28                | 0.31                | 0.01                | 0.02                | 0.04                | 0.74                | 1.14                | 6.31                 |
| 1964    | 0.37                | 0.01                | 0.03                | 0.11                | 0.04                | 0.90                | 0.04                | 0.24                | 0.09                | 0.28                | 0.94                | 2.34                | 5.39                 |
| 1965    | 0.93                | 0.14                | 0.03                | 0.09                | 0.15                | 0.49                | 0.11                | 0.03                | 0.11                | 0.01                | 1.17                | 0.39                | 3.65                 |
| 1966    | 0.68                | 0.03                | 0.39                | 0.03                | 0.05                | 0.43                | 0.81                | T                   | 0.27                | 0.39                | 2.25                | 0.60                | 5.93                 |
| 1967    | 0.32                | T                   | 0.14                | 0.90                | 0.56                | 0.57                | T                   | T                   | 0.05                | 0.13                | 0.16                | 0.43                | 3.26                 |
| 1968    | 0.88                | 0.58                | 0.02 <sup>(a)</sup> | 0.01                | 0.06                | 0.19                | 0.04                | 0.51                | 0.25                | 0.93                | 1.23                | 1.25                | 5.95                 |
| 1969    | 1.24                | 0.54                | 0.10                | 1.22                | 0.51                | 0.75                | T                   | T                   | 0.48                | 0.10                | 0.13                | 1.29                | 6.36                 |
| 1970    | 2.47 <sup>(a)</sup> | 0.75                | 0.27                | 0.45                | 0.54                | 0.25                | 0.01                | T                   | 0.03                | 0.24                | 0.71                | 0.61                | 6.33                 |
| 1971    | 0.78                | 0.10                | 1.02                | 0.07                | 0.56                | 0.71                | 0.13                | 0.09                | 1.13                | 0.18                | 0.46                | 1.07                | 6.30                 |
| 1972    | 0.19                | 0.27                | 0.58                | 0.10                | 2.03 <sup>(a)</sup> | 0.66                | 0.16                | 0.56                | 0.02                | T                   | 0.55                | 1.27                | 6.39                 |
| 1973    | 0.90                | 0.21                | 0.08                | T                   | 0.24                | 0.01                | T                   | 0.02                | 0.43                | 1.72                | 2.64                | 2.02                | 8.27                 |
| 1974    | 0.90                | 0.41                | 0.52                | 0.46                | 0.28                | 0.12                | 0.71                | T                   | 0.01                | 0.21                | 0.71                | 0.97                | 5.30                 |
| 1975    | 1.43                | 0.98                | 0.33                | 0.42                | 0.38                | 0.24                | 0.32                | 1.16                | 0.03                | 0.87                | 0.60                | 0.70                | 7.46                 |
| 1976    | 0.56                | 0.36                | 0.23                | 0.41                | 0.08                | 0.11                | 0.13                | 0.96                | T                   | 0.04                | T                   | 0.11 <sup>(a)</sup> | 2.99 <sup>(a)</sup>  |
| 1977    | 0.08 <sup>(a)</sup> | 0.57                | 0.41                | T                   | 0.65                | 0.37                | 0.06                | 1.36 <sup>(a)</sup> | 0.66                | 0.15                | 0.63                | 1.47                | 6.41                 |
| 1978    | 1.72                | 0.92                | 0.30                | 0.46                | 0.41                | 0.09                | 0.52                | 0.57                | 0.11                | T                   | 1.21                | 0.26                | 6.57                 |
| 1979    | 0.54                | 0.17                | 0.54                | 0.52                | 0.10                | T                   | 0.09                | 0.38                | 0.20                | 0.67                | 1.36                | 0.99                | 5.56                 |
| 1980    | 1.32                | 1.30                | 0.30                | 0.86                | 1.41                | 0.96                | T <sup>(b)</sup>    | 0.02                | 0.85                | 0.33                | 0.44                | 1.89                | 9.68                 |
| 1981    | 0.56                | 0.60                | 0.70                | 0.02                | 0.99                | 0.43                | 0.19                | 0.03                | 0.60                | 0.39                | 1.08                | 1.45                | 7.04                 |
| 1982    | 0.33                | 0.57                | 0.30                | 0.75                | 0.28                | 0.75                | 0.22                | 0.20                | 0.55                | 1.33                | 0.91                | 1.79                | 7.98                 |
| 1983    | 1.44                | 1.36                | 1.00                | 0.42                | 0.52                | 0.68                | 0.31                | 0.12                | 0.46                | 0.52                | 2.12                | 2.12                | 11.07                |
| 1984    | 0.23                | 0.94                | 1.01                | 0.60                | 0.55                | 0.99                | 0.06                | T                   | 0.42                | 0.07                | 1.83                | 0.57                | 7.27                 |
| 1985    | 0.34                | 0.82                | 0.36                | 0.01                | 0.12                | 0.15                | 0.12                | 0.01                | 0.63                | 0.46                | 1.24                | 0.84                | 5.10                 |
| 1986    | 1.76                | 1.37                | 0.76                | T                   | 0.30                | T <sup>(b)</sup>    | 0.21                | 0.02                | 0.96                | 0.29                | 0.65                | 0.77                | 7.09                 |
| 1987    | 0.80                | 0.19                | 1.05                | 0.14                | 0.17                | 0.11                | 0.50                | 0.07                | 0.01                | T <sup>(b)</sup>    | 0.40                | 1.63                | 5.07                 |
| 1988    | 0.48                | T <sup>(b)</sup>    | 0.39                | 1.12                | 0.33                | 0.11                | 0.13                | 0 <sup>(b)</sup>    | 0.39                | 0.01                | 0.82                | 0.40                | 4.18                 |
| 1989    | 0.21                | 1.67                | 1.56                | 0.84                | 0.59                | 0.01                | 0.01                | 0.26                | 0.02                | 0.42                | 1.04                | 0.29                | 6.92                 |
| 1990    | 0.77                | 0.09                | 0.10                | 0.40                | 0.86                | 0.36                | 0.14                | 0.83                | T                   | 0.78                | 0.02                | 0.72                | 5.07                 |
| 1991    | 0.33                | 0.19                | 1.12                | 0.45                | 0.49                | 1.44                | 0.29                | 0.07                | 0                   | 0.53                | 1.44                | 0.40                | 6.75                 |
| 1992    | 0.44                | 0.94                | 0.09                | 0.94                | T <sup>(a)</sup>    | 1.14                | 0.38                | 0.20                | 0.27                | 0.61                | 1.07                | 1.82                | 7.90                 |
| 1993    | 1.30                | 1.17                | 0.67                | 0.71                | 0.60                | 0.12                | 1.76 <sup>(a)</sup> | 0.24                | 0.04                | 0.09                | 0.19                | 0.94                | 7.83                 |
| 1994    | 0.44                | 0.11                | 0.03                | 0.61                | 1.27                | 0.38                | 0.15                | 0.08                | 0.08                | 0.93                | 0.68                | 1.36                | 6.12                 |
| 1995    | 2.14                | 0.69                | 0.95                | 1.54 <sup>(a)</sup> | 0.79                | 0.77                | 0.34                | 0.07                | 0.79                | 0.87                | 1.04                | 2.32                | 12.31 <sup>(a)</sup> |
| 1996    | 1.42                | 1.22                | 0.83                | 0.43                | 0.62                | 0.05                | 0.14                | 0.02                | 0.22                | 0.88                | 2.67 <sup>(a)</sup> | 3.69 <sup>(a)</sup> | 12.19                |
| 1997    | 1.51                | 0.25                | 0.70                | 0.33                | 0.33                | 0.46                | 0.19                | 0.06                | 0.32                | 0.92                | 1.01                | 0.31                | 6.39                 |
| 1998    | 1.24                | 1.15                | 0.50                | 0.07                | 0.52                | 0.48                | 0.34                | 0.04                | 0.10                | 0.28                | 1.29                | 0.44                | 6.45                 |
| 1999    | 0.89                | 0.70                | 0.06                | T <sup>(b)</sup>    | 0.34                | 0.31                | 0.07                | 0.57                | 0 <sup>(a,b)</sup>  | 0.48                | 0.26                | 0.07                | 3.75                 |
| Average | 0.93                | 0.63                | 0.50                | 0.44                | 0.52                | 0.52                | 0.22                | 0.24                | 0.31                | 0.55                | 0.89                | 0.99                | 6.76                 |
| Normal  | 0.79                | 0.62                | 0.47                | 0.41                | 0.51                | 0.38                | 0.18                | 0.27                | 0.31                | 0.39                | 0.91                | 1.03                | 6.26                 |

(a) Greatest and least values.

(b) Most recent of multiple occurrences.

T = Trace.

Table 4.2. Seasonal Precipitation (inches)

| Year    | Winter <sup>(a)</sup><br>Dec-Feb | Spring<br>Mar-May   | Summer<br>Jun-Aug   | Autumn<br>Sep-Nov   |
|---------|----------------------------------|---------------------|---------------------|---------------------|
| 1946    | --                               | --                  | --                  | 1.83                |
| 1947    | 0.70 <sup>(b)</sup>              | 1.14                | 2.46                | 4.35                |
| 1948    | 2.80                             | 2.73                | 2.26                | 1.56                |
| 1949    | 1.92                             | 1.30                | 0.05                | 1.80                |
| 1950    | 3.02                             | 1.61                | 2.99 <sup>(b)</sup> | 3.02                |
| 1951    | 2.32                             | 1.42                | 1.90                | 1.63                |
| 1952    | 1.85                             | 0.77                | 1.15                | 0.32                |
| 1953    | 3.18                             | 1.22                | 1.51                | 1.29                |
| 1954    | 2.25                             | 1.07                | 0.74                | 1.79                |
| 1955    | 1.13                             | 1.16                | 0.85                | 2.71                |
| 1956    | 4.30                             | 0.32                | 1.24                | 1.19                |
| 1957    | 1.29                             | 3.06                | 0.54                | 3.45                |
| 1958    | 3.75                             | 1.84                | 0.83                | 1.01                |
| 1959    | 5.06                             | 1.10                | 0.26                | 2.23                |
| 1960    | 1.35                             | 1.91                | 0.40                | 1.38                |
| 1961    | 3.07                             | 2.30                | 0.66                | 0.56                |
| 1962    | 1.92                             | 1.83                | 0.62                | 1.98                |
| 1963    | 2.24                             | 2.13                | 0.60                | 0.80                |
| 1964    | 1.52                             | 0.18                | 1.18                | 1.31                |
| 1965    | 3.41                             | 0.27                | 0.63                | 1.29                |
| 1966    | 1.10                             | 0.47                | 1.24                | 2.91                |
| 1967    | 0.92                             | 1.60                | 0.57                | 0.34                |
| 1968    | 1.89                             | 0.09 <sup>(b)</sup> | 0.74                | 2.41                |
| 1969    | 3.03                             | 1.83                | 0.75                | 0.71                |
| 1970    | 4.51                             | 1.26                | 0.26                | 0.98                |
| 1971    | 1.49                             | 1.65                | 0.93                | 1.77                |
| 1972    | 1.53                             | 2.71                | 1.38                | 0.57                |
| 1973    | 2.38                             | 0.32                | 0.03 <sup>(b)</sup> | 4.79 <sup>(b)</sup> |
| 1974    | 3.33                             | 1.26                | 0.83                | 0.93                |
| 1975    | 3.65                             | 1.13                | 1.72                | 1.50                |
| 1976    | 1.62                             | 0.72                | 1.20                | 0.04 <sup>(b)</sup> |
| 1977    | 0.76                             | 1.06                | 1.79                | 1.44                |
| 1978    | 3.91                             | 1.17                | 1.18                | 1.32                |
| 1979    | 0.97                             | 1.16                | 0.47                | 2.23                |
| 1980    | 3.61                             | 2.57                | 0.98                | 1.62                |
| 1981    | 3.05                             | 1.71                | 0.65                | 2.07                |
| 1982    | 2.35                             | 1.33                | 1.17                | 2.79                |
| 1983    | 4.59                             | 1.94                | 1.11                | 3.10                |
| 1984    | 3.29                             | 2.16                | 1.05                | 2.32                |
| 1985    | 1.73                             | 0.49                | 0.28                | 2.33                |
| 1986    | 3.97                             | 1.06                | 0.23                | 1.90                |
| 1987    | 1.76                             | 1.36                | 0.68                | 0.41                |
| 1988    | 2.11                             | 1.84                | 0.24                | 1.22                |
| 1989    | 2.28                             | 2.99                | 0.28                | 1.48                |
| 1990    | 1.15                             | 1.36                | 1.33                | 0.80                |
| 1991    | 1.24                             | 2.06                | 1.80                | 1.97                |
| 1992    | 1.78                             | 1.03                | 1.72                | 1.95                |
| 1993    | 4.29                             | 1.98                | 2.12                | 0.32                |
| 1994    | 1.49                             | 1.91                | 0.61                | 1.69                |
| 1995    | 4.19                             | 3.28 <sup>(b)</sup> | 1.18                | 2.70                |
| 1996    | 4.96                             | 1.88                | 0.21                | 3.77                |
| 1997    | 5.45 <sup>(b)</sup>              | 1.36                | 0.71                | 2.25                |
| 1998    | 2.70                             | 1.09                | 0.86                | 1.67                |
| 1999    | 2.03                             | 0.40                | 0.95                | 0.74                |
| Average | 2.57                             | 1.46                | 0.98                | 1.75                |
| Normal  | 2.44                             | 1.40                | 0.83                | 1.60                |

(a) For the winter season, December is included in the previous year.

(b) Greatest and least values.

**Table 4.3.** Average Number of Days with Precipitation of Specified Amount

| Month                 | Trace or more | 0.01 in. or more | 0.10 in. or more | 0.25 in. or more | 0.50 in. or more | 1.00 in. or more |
|-----------------------|---------------|------------------|------------------|------------------|------------------|------------------|
| Jan                   | 16            | 9                | 3                | 1                | (a)              | 0                |
| Feb                   | 12            | 7                | 2                | 1                | (a)              | 0                |
| Mar                   | 11            | 6                | 2                | (a)              | (a)              | 0                |
| Apr                   | 10            | 5                | 2                | 1                | (a)              | 0                |
| May                   | 10            | 5                | 2                | 1                | (a)              | 0                |
| Jun                   | 9             | 5                | 2                | 1                | (a)              | (a)              |
| Jul                   | 5             | 2                | 1                | (a)              | (a)              | (a)              |
| Aug                   | 5             | 3                | 1                | (a)              | (a)              | 0                |
| Sep                   | 6             | 3                | 1                | (a)              | (a)              | 0                |
| Oct                   | 9             | 5                | 2                | 1                | (a)              | (a)              |
| Nov                   | 14            | 9                | 3                | 1                | (a)              | (a)              |
| Dec                   | 16            | 10               | 3                | 1                | (a)              | 0                |
| Annual <sup>(b)</sup> | 123           | 68               | 23               | 7                | 1 <sup>(c)</sup> | (a)              |

(a) Used to denote an average of less than 1/2 day.

(b) Annual totals may differ from summation of monthly events because of rounding.

(c) Although the number of days with 0.50 inch or more averages less than 1/2 day for any one month, 72 such days were recorded during 52 years of record.

**Table 4.4.** Monthly and Annual Averages and Extremes in Total Time with Precipitation Observed: July 1946 Through June 1971, July 1974 Through December 1999

| Month  | Averages     |           | Greatest     |           |      | Least        |           |                     |
|--------|--------------|-----------|--------------|-----------|------|--------------|-----------|---------------------|
|        | No. of Hours | % of Time | No. of Hours | % of Time | Year | No. of Hours | % of Time | Year                |
| Jan    | 89.5         | 12.0      | 212.0        | 28.5      | 1969 | 29.2         | 3.9       | 1949                |
| Feb    | 56.2         | 8.3       | 151.6        | 22.6      | 1980 | 2.5          | 0.4       | 1988                |
| Mar    | 39.1         | 5.3       | 135.2        | 18.2      | 1957 | 6.4          | 0.9       | 1994                |
| Apr    | 29.0         | 4.0       | 69.2         | 9.6       | 1953 | 1.6          | 0.2       | 1985                |
| May    | 31.0         | 4.2       | 89.9         | 12.1      | 1948 | 1.2          | 0.2       | 1992                |
| Jun    | 26.8         | 3.7       | 80.8         | 11.2      | 1950 | 2.9          | 0.4       | 1986                |
| Jul    | 10.6         | 1.4       | 38.2         | 5.1       | 1966 | 0.5          | 0.1       | 1984                |
| Aug    | 12.0         | 1.6       | 61.7         | 8.3       | 1968 | 0.0          | 0.0       | 1988 <sup>(a)</sup> |
| Sep    | 15.5         | 2.2       | 66.4         | 9.2       | 1977 | 0.0          | 0.0       | 1999 <sup>(a)</sup> |
| Oct    | 31.7         | 4.3       | 119.9        | 16.1      | 1947 | 0.4          | 0.1       | 1978                |
| Nov    | 61.1         | 8.5       | 146.5        | 20.3      | 1985 | 4.8          | 0.7       | 1976                |
| Dec    | 88.2         | 11.9      | 230.5        | 31.0      | 1985 | 15.8         | 2.1       | 1976                |
| Annual | 490.8        | 5.6       | 738.0        | 8.4       | 1950 | 286.7        | 3.3       | 1990                |

(a) Most recent of several occurrences.

**Table 4.5. Total Duration (hours) of Precipitation by Month and Year**

| Year    | Jan                  | Feb                  | Mar                  | Apr                 | May                 | Jun                 | Jul                 | Aug                  | Sep                 | Oct                  | Nov                  | Dec                  | Annual               |
|---------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| 1946    | —                    | —                    | —                    | —                   | —                   | —                   | 6.0                 | 16.3                 | 12.2                | 38.2                 | 66.0                 | 31.5                 | —                    |
| 1947    | 34.6                 | 29.8                 | 30.2                 | 32.7                | 4.8                 | 38.4                | 17.4                | 12.6                 | 36.4                | 119.9 <sup>(a)</sup> | 48.1                 | 71.1                 | 476.0                |
| 1948    | 70.7                 | 70.4                 | 16.6                 | 43.8                | 89.9 <sup>(a)</sup> | 36.4                | 15.2                | 16.6                 | 15.8                | 19.7                 | 44.4                 | 81.9                 | 521.4                |
| 1949    | 29.2 <sup>(a)</sup>  | 69.9                 | 63.5                 | 5.6                 | 13.2                | 3.2                 | 2.2                 | 1.6                  | 21.2                | 15.0                 | 98.7                 | 32.1                 | 355.4                |
| 1950    | 147.4                | 78.0                 | 72.0                 | 23.3                | 13.9                | 80.8 <sup>(a)</sup> | 5.0                 | 2.3                  | 1.3                 | 112.3                | 92.9                 | 108.8                | 738.0 <sup>(a)</sup> |
| 1951    | 66.3                 | 55.9                 | 34.8                 | 21.5                | 23.7                | 60.8                | 12.8                | 17.7                 | 26.6                | 66.5                 | 66.0                 | 86.7                 | 539.3                |
| 1952    | 151.0                | 57.8                 | 19.3                 | 22.1                | 25.4                | 77.7                | 4.3                 | 5.4                  | 7.1                 | 3.6                  | 71.2                 | 137.0                | 581.9                |
| 1953    | 89.3                 | 29.7                 | 32.3                 | 69.2 <sup>(a)</sup> | 20.6                | 37.1                | 2.0                 | 25.2                 | 7.1                 | 23.6                 | 59.4                 | 32.2                 | 427.7                |
| 1954    | 92.6                 | 90.0                 | 35.8                 | 18.4                | 33.7                | 32.4                | 17.8                | 22.2                 | 15.1                | 17.9                 | 74.3                 | 39.9                 | 490.1                |
| 1955    | 116.4                | 33.4                 | 20.0                 | 57.2                | 47.8                | 10.2                | 36.9                | 0.0                  | 40.1                | 42.3                 | 132.2                | 141.0                | 677.5                |
| 1956    | 126.9                | 74.4                 | 15.9                 | 1.8                 | 35.8                | 30.8                | 4.2                 | 17.4                 | 6.6                 | 65.7                 | 71.0                 | 98.8                 | 549.3                |
| 1957    | 140.6                | 46.4                 | 135.2 <sup>(a)</sup> | 19.5                | 43.4                | 20.8                | 2.6                 | 5.7                  | 23.1                | 72.0                 | 21.4                 | 49.3                 | 580.0                |
| 1958    | 82.8                 | 106.8                | 37.5                 | 54.5                | 24.2                | 24.2                | 1.2                 | 2.0                  | 13.4                | 13.6                 | 58.5                 | 107.7                | 526.4                |
| 1959    | 129.5                | 98.2                 | 32.6                 | 17.5                | 33.0                | 29.8                | 4.2                 | 15.9                 | 52.2                | 27.2                 | 44.8                 | 51.8                 | 536.7                |
| 1960    | 86.8                 | 48.0                 | 49.9                 | 32.8                | 47.2                | 6.3                 | 3.5                 | 27.3                 | 15.8                | 34.8                 | 64.1                 | 120.8                | 537.3                |
| 1961    | 91.8                 | 94.4                 | 60.7                 | 39.2                | 48.7                | 23.9                | 4.2                 | 17.2                 | 2.0                 | 15.9                 | 57.2                 | 99.0                 | 554.2                |
| 1962    | 43.9                 | 58.8                 | 55.1                 | 24.8                | 80.2                | 13.9                | 4.3                 | 24.9                 | 21.6                | 71.5                 | 44.4                 | 139.6                | 583.0                |
| 1963    | 56.3                 | 88.4                 | 31.2                 | 66.5                | 51.3                | 37.1                | 20.9                | 4.4                  | 11.2                | 26.4                 | 61.0                 | 179.6                | 634.3                |
| 1964    | 49.1                 | 5.2                  | 8.3                  | 15.7                | 6.1                 | 46.8                | 14.5                | 14.1                 | 7.2                 | 19.2                 | 109.0                | 149.0                | 444.2                |
| 1965    | 153.3                | 18.8                 | 14.2                 | 30.9                | 15.2                | 28.6                | 6.8                 | 18.4                 | 11.2                | 11.2                 | 89.1                 | 57.8                 | 455.5                |
| 1966    | 51.7                 | 12.4                 | 42.9                 | 9.1                 | 7.2                 | 30.4                | 38.2 <sup>(a)</sup> | 3.7                  | 15.9                | 26.3                 | 103.5                | 75.6                 | 416.9                |
| 1967    | 34.1                 | 4.7                  | 30.6                 | 60.9                | 52.9                | 23.3                | 2.2                 | 1.7                  | 12.1                | 29.4                 | 27.0                 | 88.2                 | 367.1                |
| 1968    | 99.1                 | 42.0                 | 7.3                  | 18.6                | 29.9                | 38.3                | 5.6                 | 61.7 <sup>(a)</sup>  | 17.2                | 45.3                 | 68.9                 | 134.2                | 568.1                |
| 1969    | 212.0 <sup>(a)</sup> | 75.4                 | 9.7                  | 52.2                | 51.9                | 38.7                | 1.3                 | 0.3                  | 26.8                | 20.4                 | 44.1                 | 148.3                | 681.1                |
| 1970    | 157.2                | 72.9                 | 34.0                 | 19.2                | 27.2                | 31.1                | 6.9                 | 2.3                  | 5.3                 | 32.2                 | 85.8                 | 83.9                 | 558.0                |
| 1971    | 49.5                 | 14.8                 | 68.0                 | 25.0                | 43.7                | 52.7                | (b)                 | (b)                  | (b)                 | (b)                  | (b)                  | (b)                  | (b)                  |
| 1972    | (b)                  | (b)                  | (b)                  | (b)                 | (b)                 | (b)                 | (b)                 | (b)                  | (b)                 | (b)                  | (b)                  | (b)                  | (b)                  |
| 1973    | (b)                  | (b)                  | (b)                  | (b)                 | (b)                 | (b)                 | (b)                 | (b)                  | (b)                 | (b)                  | (b)                  | (b)                  | (b)                  |
| 1974    | (b)                  | (b)                  | (b)                  | (b)                 | (b)                 | (b)                 | 21.8                | 0.8                  | 1.3                 | 26.2                 | 58.9                 | 64.9                 | (b)                  |
| 1975    | 105.7                | 103.8                | 42.3                 | 29.5                | 29.2                | 20.8                | 13.5                | 26.8                 | 1.0                 | 65.6                 | 56.1                 | 76.6                 | 570.9                |
| 1976    | 79.8                 | 28.6                 | 35.2                 | 36.8                | 16.7                | 10.1                | 15.1                | 38.8                 | 2.2                 | 10.7                 | 4.8 <sup>(a)</sup>   | 15.8 <sup>(a)</sup>  | 294.6                |
| 1977    | 138.7                | 37.1                 | 37.8                 | 4.6                 | 45.9                | 24.8                | 14.2                | 28.9                 | 66.4 <sup>(a)</sup> | 15.8                 | 77.1                 | 98.1                 | 589.4                |
| 1978    | 147.9                | 98.6                 | 46.2                 | 53.4                | 45.2                | 8.1                 | 27.6                | 37.7                 | 27.9                | 0.4 <sup>(a)</sup>   | 71.6                 | 43.7                 | 608.3                |
| 1979    | 111.5                | 73.7                 | 45.0                 | 29.6                | 14.0                | 4.5                 | 8.6                 | 27.4                 | 10.0                | 47.3                 | 86.9                 | 104.2                | 562.7                |
| 1980    | 118.5                | 151.6 <sup>(a)</sup> | 35.4                 | 33.8                | 60.2                | 45.0                | 1.5                 | 8.8                  | 24.5                | 22.0                 | 44.2                 | 121.2                | 666.7                |
| 1981    | 72.0                 | 31.7                 | 32.0                 | 3.4                 | 28.4                | 21.1                | 7.5                 | 1.0                  | 17.4                | 24.8                 | 34.1                 | 91.8                 | 365.2                |
| 1982    | 47.5                 | 29.2                 | 27.8                 | 33.6                | 9.4                 | 21.8                | 5.8                 | 5.3                  | 23.2                | 40.1                 | 42.8                 | 81.7                 | 368.2                |
| 1983    | 72.5                 | 76.1                 | 59.4                 | 15.2                | 13.2                | 22.4                | 17.9                | 13.7                 | 12.5                | 19.8                 | 79.3                 | 133.2                | 535.2                |
| 1984    | 32.6                 | 58.1                 | 40.8                 | 35.2                | 34.2                | 37.9                | 0.5 <sup>(a)</sup>  | 0.5                  | 20.5                | 7.1                  | 97.6                 | 75.5                 | 440.5                |
| 1985    | 151.2                | 54.9                 | 26.0                 | 1.6 <sup>(a)</sup>  | 7.0                 | 17.4                | 3.2                 | 1.2                  | 30.8                | 17.2                 | 146.5 <sup>(a)</sup> | 230.5 <sup>(a)</sup> | 687.5                |
| 1986    | 107.6                | 68.9                 | 47.4                 | 14.4                | 22.3                | 2.9 <sup>(a)</sup>  | 13.3                | 1.1                  | 28.2                | 10.3                 | 31.3                 | 143.8                | 491.5                |
| 1987    | 64.6                 | 20.8                 | 74.0                 | 10.8                | 14.6                | 11.8                | 16.1                | 4.5                  | 0.5                 | 1.8                  | 21.1                 | 125.6                | 366.2                |
| 1988    | 92.4                 | 2.5 <sup>(a)</sup>   | 24.8                 | 36.2                | 18.3                | 17.4                | 6.2                 | 0.0 <sup>(a,c)</sup> | 13.8                | 2.2                  | 55.8                 | 62.7                 | 332.3                |
| 1989    | 35.2                 | 114.4                | 102.2                | 36.8                | 25.8                | 5.4                 | 3.8                 | 14.4                 | 0.7                 | 23.1                 | 33.2                 | 57.9                 | 452.9                |
| 1990    | 34.6                 | 20.5                 | 18.2                 | 29.9                | 31.0                | 8.6                 | 7.3                 | 15.4                 | 0.1                 | 49.1                 | 7.1                  | 64.9                 | 286.7 <sup>(a)</sup> |
| 1991    | 57.5                 | 28.0                 | 43.8                 | 15.8                | 39.0                | 41.8                | 9.8                 | 4.2                  | 0.0                 | 42.9                 | 70.2                 | 48.2                 | 401.2                |
| 1992    | 36.2                 | 56.2                 | 7.9                  | 42.0                | 1.2 <sup>(a)</sup>  | 35.9                | 22.5                | 6.6                  | 23.6                | 36.6                 | 53.0                 | 92.6                 | 414.3                |
| 1993    | 171.0                | 64.4                 | 65.2                 | 57.0                | 38.7                | 13.0                | 35.2                | 12.1                 | 3.0                 | 6.8                  | 30.3                 | 58.2                 | 554.9                |
| 1994    | 40.5                 | 55.8                 | 6.4 <sup>(a)</sup>   | 43.2                | 40.7                | 21.2                | 4.7                 | 3.8                  | 8.9                 | 37.6                 | 52.9                 | 72.2                 | 387.9                |
| 1995    | 113.8                | 39.2                 | 47.3                 | 56.2                | 27.3                | 52.6                | 8.3                 | 7.9                  | 14.5                | 33.0                 | 47.1                 | 62.2                 | 509.4                |
| 1996    | 102.1                | 73.0                 | 55.4                 | 23.2                | 30.8                | 3.6                 | 8.2                 | 3.3                  | 13.7                | 46.8                 | 81.5                 | 124.4                | 566.0                |
| 1997    | 69.5                 | 17.7                 | 36.1                 | 13.7                | 19.2                | 14.7                | 12.7                | 4.1                  | 19.7                | 29.4                 | 43.6                 | 15.5                 | 295.9                |
| 1998    | 60.0                 | 72.3                 | 34.2                 | 8.6                 | 45.7                | 13.7                | 12.7                | 1.8                  | 6.8                 | 14.8                 | 45.1                 | 54.1                 | 369.8                |
| 1999    | 52.9                 | 56.6                 | 4.8                  | 3.1                 | 15.2                | 9.4                 | 2.1                 | 9.4                  | 0.0 <sup>(a)</sup>  | 20.9                 | 44.8                 | 35.2                 | 254.4                |
| Average | 89.5                 | 56.2                 | 39.1                 | 29.0                | 31.0                | 26.8                | 10.6                | 12.0                 | 15.5                | 31.7                 | 61.1                 | 88.2                 | 490.8                |
| Normal  | 89.3                 | 54.0                 | 39.9                 | 28.4                | 30.7                | 23.9                | 10.7                | 13.9                 | 15.2                | 25.2                 | 60.7                 | 101.8                | 495.4                |

(a) Greatest and least values.  
 (b) Incomplete data not included. See Section 4.5.  
 (c) Most recent of numerous occurrences.



## 4.6 Notable Wet Periods

Nine periods are listed when precipitation was particularly high:

| Period                      | Number of Days with<br>Trace or More |                         | Total Amount, inches        |                     |               |
|-----------------------------|--------------------------------------|-------------------------|-----------------------------|---------------------|---------------|
|                             | Altogether                           | Greatest<br>Consecutive | Measurable<br>Precipitation | Water<br>Equivalent | Snow-<br>fall |
| Oct 7 - Nov 4, 1947         | 23 out of 29                         | 10                      | 17                          | 2.21                | 0.0           |
| Jan 3 - 28, 1950            | 21 out of 26                         | 10                      | 15                          | 1.80                | 23.4          |
| Nov 11 - Dec 19, 1950       | 33 out of 39                         | 12                      | 20                          | 1.37                | 3.7           |
| Nov 16 - Dec 22, 1955       | 31 out of 37                         | 15                      | 24                          | 3.19                | 22.7          |
| Oct 31 - Dec 7, 1973        | 32 out of 38                         | 14                      | 20                          | 3.45                | 8.1           |
| Nov 15 - Dec 7, 1985        | 17 out of 23                         | 8                       | 14                          | 1.96                | 25.2          |
| Dec 27, 1992 - Jan 23, 1993 | 26 out of 29                         | 12                      | 19                          | 2.02                | 26.8          |
| Nov 13 - 27, 1996           | 12 out of 15                         | 7                       | 10                          | 2.66                | 11.9          |
| Dec 20 - 31, 1996           | 11 out of 12                         | 9                       | 9                           | 3.00                | 20.1          |

From a precipitation standpoint, 1973 was an unusual year. Total precipitation for 1973 was 8.27 inches, 132% of normal (6.26 inches). The period March 30 through September 18, 1973, was extremely dry, receiving only 0.29 inch of precipitation during that 173-day period; however, the period October 31 through December 7, 1973 was a notable wet period. During the months of October, November, and December 1973, 6.38 inches of precipitation were recorded, 289% of normal (2.21 inches) for those months. November and December 1996 received 6.36 inches of precipitation, 328% of normal (1.94 inches) for those months, which is greater than the normal precipitation amount for an entire year (6.26 inches).

## 4.7 Notable Dry Periods

The Hanford Meteorology Station is in a semiarid region; thus, it experiences many dry periods. January, March, and December are the only months that have always received measurable precipitation (1946 through 1999). A total of 39 months during the period of record have been without measurable precipitation, with the months of July and August accounting for 20 of those months. The record number of consecutive days with no precipitation (not even a trace) occurred in 1988, when the period July 14 through September 17 (66 days) was totally dry. The following list indicates some long periods with small amounts of precipitation.

| Notable Dry Periods |        |        |                |                           |
|---------------------|--------|--------|----------------|---------------------------|
| Year                | From   | To     | Number of Days | Total Precipitation, inch |
| 1952                | Jun 30 | Nov 10 | 134            | 0.20                      |
| 1967                | Jun 22 | Nov 7  | 139            | 0.18                      |
| 1968                | Feb 24 | Aug 13 | 172            | 0.32                      |
| 1973                | Mar 30 | Sep 18 | 173            | 0.29                      |
| 1976                | Aug 26 | Dec 31 | 128            | 0.15                      |
| 1985                | Mar 31 | Sep 7  | 161            | 0.43                      |
| 1986                | May 6  | Sep 12 | 129            | 0.30                      |
| 1987                | Jul 19 | Oct 31 | 105            | 0.08                      |
| 1988                | Jun 6  | Sep 17 | 105            | 0.13                      |

The driest year on record was 1976, which had 2.99 inches recorded (less than 50% of normal). During the period September through December 1976, total precipitation was 0.15 inch, which was 6% of normal (2.52 inches) for those months.

## 4.8 Snowfall

Snowfall, which includes all frozen precipitation, varied from a seasonal total of 0.3 to 56.1 inches in 1957-1958 and 1992-1993, respectively. Table 4.6 provides information on monthly and seasonal snowfall amounts, as well as the dates and amounts of earliest and latest snowfall each season. The earliest measurable snowfall (0.3 inch) was recorded on October 26, 1957; the latest measurable snowfall (1.0 inch) was recorded on April 6, 1982. The average date of the first measurable snow is November 30; the average last measurable snow date is February 11. Normal snowfall for the period 1961 through 1990 and averages for the entire period of record are noted on the table, as are monthly and seasonal extremes.

Table 4.7 lists the greatest single storm snowfall amounts by month for the period 1946 through 1999. The greatest single snowstorm, on February 18-20, 1993, produced 12.4 inches of snow. During the winter of 1957-58 (actually the only snowfall was recorded in October – not yet winter), the greatest single snowstorm produced only 0.3 inch.

Table 4.8 lists some miscellaneous snowfall statistics for the Hanford Meteorology Station for the period 1946 through 1999. Included in this table are average number of days per month with snow depth above certain threshold values, greatest number of days per month with snow depth above certain threshold values, record number of consecutive days with snow depth above certain threshold values, record monthly snow depth, and 24-hour snowfall amounts. The record snow depth at the Hanford Meteorology Station is 15.6 inches, recorded in December 1985. The record number of days with snow depth  $\geq 6$  inches was 43 days in the winter of 1992-1993.

Table 4.6. Monthly and Seasonal Snowfall (inches), Including First and Last Dates of Both Trace and Measurable Snowfalls

| Season    | First              |      |                   |                     |      |                    |                    |                    |       |        |       |        | Last Measurable |        |       | Last   |  |  |
|-----------|--------------------|------|-------------------|---------------------|------|--------------------|--------------------|--------------------|-------|--------|-------|--------|-----------------|--------|-------|--------|--|--|
|           | Oct                | Nov  | Dec               | Jan                 | Feb  | Mar                | Apr                | Total              | Date  | Amount | Date  | Amount | Date            | Amount | Date  | Amount |  |  |
| 1945-1946 | --                 | --   | --                | --                  | --   | --                 | --                 | --                 | --    | --     | --    | --     | --              | --     | --    | --     |  |  |
| 1946-1947 | 0                  | 0    | 0                 | 0                   | 0    | 0                  | 0                  | 0                  | 0     | 0      | 0     | 0      | 0               | 0      | 0     | 0      |  |  |
| 1947-1948 | 0                  | 0    | 0                 | 0                   | 0    | 0                  | 0                  | 0                  | 0     | 0      | 0     | 0      | 0               | 0      | 0     | 0      |  |  |
| 1948-1949 | 0                  | 0    | 0                 | 0                   | 0    | 0                  | 0                  | 0                  | 0     | 0      | 0     | 0      | 0               | 0      | 0     | 0      |  |  |
| 1949-1950 | T                  | 0    | 0.7               | 23.4 <sup>(e)</sup> | 6.9  | 3.1                | 1.5                | 28.7               | 10/18 | T      | 12/16 | 0.2    | 03/13           | 0.3    | 04/02 | T      |  |  |
| 1950-1951 | 0                  | 0.8  | 2.9               | 5.3                 | 5.3  | 4.2 <sup>(e)</sup> | 0                  | 18.5               | 11/19 | T      | 11/30 | 0.8    | 03/12           | 1.1    | 03/20 | T      |  |  |
| 1951-1952 | 0                  | 0.5  | 4.4               | 7.5                 | 3.1  | T                  | 0                  | 15.5               | 11/22 | T      | 11/25 | 0.5    | 02/24           | 0.1    | 03/31 | T      |  |  |
| 1952-1953 | 0                  | T    | 3.1               | 2.7                 | 0    | T                  | 0                  | 5.8                | 11/22 | T      | 12/01 | 0.3    | 01/02           | 2.7    | 03/10 | T      |  |  |
| 1953-1954 | 0                  | 0    | 1.0               | 14.3                | 1.6  | T                  | 0                  | 16.9               | 12/03 | T      | 12/08 | 1.0    | 02/11           | 1.6    | 03/10 | T      |  |  |
| 1954-1955 | 0                  | 0    | 1.8               | 6.0                 | 2.4  | 0.7                | T                  | 10.9               | 12/03 | T      | 12/04 | 1.8    | 03/25           | 0.7    | 04/02 | T      |  |  |
| 1955-1956 | 0                  | 12.7 | 13.4              | 10.2                | 2.2  | T                  | 0                  | 38.5               | 10/26 | T      | 11/02 | 0.2    | 02/23           | 0.1    | 03/26 | T      |  |  |
| 1956-1957 | T                  | 0.1  | 2.5               | 7.9                 | 1.4  | 4.0                | T                  | 15.9               | 10/26 | T      | 11/26 | 0.1    | 03/06           | 1.7    | 03/12 | T      |  |  |
| 1957-1958 | 0.3                | 0    | T                 | T                   | 0    | T                  | 0                  | 0.3 <sup>(e)</sup> |       | T      | 10/26 | 0.3    | 10/26           | 0.3    | 03/16 | T      |  |  |
| 1958-1959 | 0                  | T    | 0.9               | 4.5                 | 12.7 | 0                  | 0                  | 18.1               | 11/14 | T      | 12/06 | 0.4    | 02/19           | 1.2    |       |        |  |  |
| 1959-1960 | 0                  | 0.3  | 1.0               | 5.9                 | T    | 1.5                | 0                  | 8.7                | 11/04 | T      | 11/15 | 0.1    | 03/05           | 1.4    |       |        |  |  |
| 1960-1961 | 0                  | 0    | 3.3               | 1.9                 | 0    | 1.6                | 0                  | 6.8                | 12/09 | T      | 12/10 | 0.1    | 03/05           | 1.6    |       |        |  |  |
| 1961-1962 | 0                  | 0.5  | 6.1               | 0.4                 | 2.4  | 0.9                | 0                  | 10.3               | 11/18 | T      | 11/23 | 0.1    | 03/09           | 0.1    | 03/11 | T      |  |  |
| 1962-1963 | 0                  | T    | T <sup>(ab)</sup> | 7.1                 | 0.6  | 0                  | 0                  | 7.7                | 11/29 | T      | 01/30 | 0.4    | 02/01           | 0.6    | 02/13 | T      |  |  |
| 1963-1964 | 0                  | T    | 6.4               | 2.9                 | T    | T                  | 0                  | 9.3                | 11/19 | T      | 12/08 | 4.3    | 01/24           | 1.5    | 03/22 | T      |  |  |
| 1964-1965 | 0                  | 0.1  | 19.1              | 6.6                 | T    | T                  | 0                  | 25.8               | 11/21 | T      | 11/29 | 0.1    | 01/23           | 3.1    | 03/27 | T      |  |  |
| 1965-1966 | 0                  | T    | 6.9               | 2.6                 | T    | T                  | 0                  | 9.5                | 11/23 | T      | 12/23 | 0.6    | 01/22           | 0.2    | 03/21 | T      |  |  |
| 1966-1967 | 0                  | 0.4  | 2.8               | 0.1                 | 0    | 0                  | 0                  | 3.3                |       | T      | 11/11 | 0.2    | 01/26           | 0.1    |       |        |  |  |
| 1967-1968 | 0                  | 0    | 5.7               | 4.5                 | 0.3  | 0                  | T                  | 10.5               | 12/06 | T      | 12/09 | 0.6    | 02/17           | 0.3    | 04/16 | T      |  |  |
| 1968-1969 | 0                  | T    | 9.7               | 15.9                | 2.1  | 0                  | 0                  | 27.7               | 11/16 | T      | 12/19 | 0.1    | 02/23           | 2.0    | 02/28 | T      |  |  |
| 1969-1970 | 0                  | T    | 2.7               | 6.6                 | T    | 0.2                | 0                  | 9.5                | 11/29 | T      | 12/08 | 1.3    | 03/01           | 0.2    |       |        |  |  |
| 1970-1971 | 0                  | 0.5  | 4.4               | 2.0                 | T    | 0.6                | 0                  | 7.5                | 11/22 | T      | 11/30 | 0.5    | 03/14           | 0.1    | 03/22 | T      |  |  |
| 1971-1972 | 0.6                | T    | 8.1               | 4.9                 | 1.4  | 0.1                | T                  | 15.1               | 11/27 | T      | 11/29 | 0.1    | 02/05           | 0.1    | 04/12 | T      |  |  |
| 1972-1973 | 0                  | T    | 7.2               | 4.3                 | 1.7  | 0                  | 0                  | 13.2               | 12/02 | T      | 12/03 | 1.7    | 02/10           | 1.7    | 02/13 | T      |  |  |
| 1973-1974 | 1.5 <sup>(e)</sup> | 6.6  | 7.5               | 3.9                 | 0    | T                  | 0                  | 19.5               | 12/02 | T      | 10/31 | 1.5    | 01/12           | 2.3    | 03/06 | T      |  |  |
| 1974-1975 | 0                  | 0    | 0.7               | 2.5                 | 12.1 | T                  | 0                  | 15.3               | 12/02 | T      | 12/12 | 0.3    | 02/09           | 1.7    | 04/04 | T      |  |  |
| 1975-1976 | 0                  | 1.7  | 3.8               | 6.0                 | 0.2  | T                  | 0                  | 11.7               |       | T      | 11/10 | 0.6    | 02/03           | 0.2    | 04/01 | T      |  |  |
| 1976-1977 | 0                  | 0    | 0.2               | 2.9                 | T    | T                  | 0                  | 3.1                | 12/04 | T      | 12/23 | 0.2    | 01/31           | 0.2    | 03/27 | T      |  |  |
| 1977-1978 | 0                  | 2.1  | 3.4               | 2.9                 | 0.9  | T                  | 0                  | 9.3                | 11/15 | T      | 11/18 | 0.1    | 02/26           | 0.1    | 03/05 | T      |  |  |
| 1978-1979 | 0                  | 10.1 | 1.4               | 10.3                | 0.5  | 0.1                | 0                  | 22.6               | 11/15 | T      | 11/18 | 5.3    | 03/03           | 0.1    |       |        |  |  |
| 1979-1980 | 0                  | 5.6  | 7.3               | 8.7                 | 4.5  | 0.3                | 0                  | 26.2               |       | T      | 11/22 | 1.4    | 03/05           | 0.3    |       |        |  |  |
| 1980-1981 | 0                  | 0.3  | 2.2               | 2.4                 | T    | 0                  | 0                  | 2.5                | 12/03 | T      | 11/14 | 0.3    | 12/06           | 0.3    | 02/13 | T      |  |  |
| 1981-1982 | 0                  | 0    | 12.1              | 2.4                 | T    | T                  | 1.0 <sup>(e)</sup> | 15.5               |       | T      | 12/13 | 2.5    | 04/06           | 1.0    |       |        |  |  |
| 1982-1983 | 0                  | 0.2  | 4.6               | 3.2                 | 2.3  | 0                  | 0                  | 10.3               | 11/12 | T      | 11/26 | 0.2    | 02/09           | 0.3    |       |        |  |  |
| 1983-1984 | 0                  | T    | 17.8              | 1.5                 | T    | 0                  | 0                  | 19.3               | 11/28 | T      | 12/02 | 0.5    | 01/21           | 1.5    | 02/09 | T      |  |  |
| 1984-1985 | T                  | 4.9  | 5.8               | 1.3                 | 8.5  | 1.4                | 0                  | 21.9               | 10/23 | T      | 11/24 | 0.2    | 03/04           | 1.4    |       |        |  |  |

Table 4.6. (contd)

| Season    | First             |                     |                     |                   |                     |                   |                   |                     |       |        |       |        | Last Measurable |        | Last  |        |
|-----------|-------------------|---------------------|---------------------|-------------------|---------------------|-------------------|-------------------|---------------------|-------|--------|-------|--------|-----------------|--------|-------|--------|
|           | Oct               | Nov                 | Dec                 | Jan               | Feb                 | Mar               | Apr               | Total               | Date  | Amount | Date  | Amount | Date            | Amount | Date  | Amount |
| 1985-1986 | 0                 | 18.3 <sup>(a)</sup> | 7.6                 | 2.7               | 5.5                 | 0                 | 0                 | 34.1                | 11/10 | 0.6    | 02/21 | 0.9    | 02/21           | 0.9    |       |        |
| 1986-1987 | 0                 | 0                   | 5.1                 | 3.3               | 0                   | 0                 | 0                 | 8.4                 | 12/04 | 0.4    | 01/26 | 0.1    | 01/26           | 0.1    |       |        |
| 1987-1988 | 0                 | 1.1                 | 4.7                 | 5.6               | 0                   | 0                 | 0.2               | 11.6                | 11/30 | 1.1    | 04/30 | 0.2    | 04/30           | 0.2    |       |        |
| 1988-1989 | 0                 | 0                   | 3.5                 | 0.2               | 17.0 <sup>(a)</sup> | 3.1               | T                 | 23.8                | 12/18 | 0.3    | 03/05 | 0.2    | 03/05           | 0.2    | 05/18 | T      |
| 1989-1990 | 0                 | 0                   | 1.4                 | 0.6               | 0.7                 | T                 | 0                 | 2.7                 | 12/25 | T      | 02/17 | 0.2    | 02/17           | 0.2    |       |        |
| 1990-1991 | 0                 | 0                   | 6.1                 | 3.8               | 0 <sup>(ab)</sup>   | 0.1               | 0                 | 10.0                | 12/18 | 0.1    | 03/02 | 0.1    | 03/02           | 0.1    |       |        |
| 1991-1992 | 1.2               | T                   | 0.6                 | 0.3               | T                   | 0                 | 0                 | 2.1                 | 10/28 | 0.8    | 01/05 | 0.3    | 01/05           | 0.3    | 02/07 | T      |
| 1992-1993 | 0                 | 2.1                 | 21.0                | 17.1              | 12.4                | 3.5               | 0                 | 56.1 <sup>(a)</sup> | 11/21 | 0.2    | 03/03 | 1.5    | 03/03           | 1.5    | 03/16 | T      |
| 1993-1994 | 0                 | 1.4                 | 1.8                 | 0 <sup>(ab)</sup> | 0.9                 | 0                 | 0                 | 4.1                 | 11/22 | 0.6    | 02/26 | 0.3    | 02/26           | 0.3    |       |        |
| 1994-1995 | 0                 | 0.1                 | 4.2                 | 2.7               | T                   | 0                 | T                 | 7.0                 | 11/17 | 0.1    | 12/14 | 0.7    | 12/14           | 0.7    | 04/14 | T      |
| 1995-1996 | 0                 | 1.0                 | 4.0                 | 16.7              | 5.9                 | 0.4               | 0                 | 28.0                | 11/10 | 1.0    | 03/04 | 0.4    | 03/04           | 0.4    | 03/05 | T      |
| 1996-1997 | 0                 | 11.9                | 22.6 <sup>(a)</sup> | 1.8               | 2.7                 | 1.5               | 0                 | 40.5                | 11/19 | 6.2    | 03/15 | 1.5    | 03/15           | 1.5    | 03/31 | T      |
| 1997-1998 | 0                 | 0                   | 1.8                 | 6.3               | T                   | T                 | 0                 | 8.1                 | 12/07 | 1.8    | 01/21 | 0.2    | 01/21           | 0.2    | 03/05 | T      |
| 1998-1999 | 0                 | 0                   | 0.9                 | T                 | T                   | 0 <sup>(ab)</sup> | 0 <sup>(ab)</sup> | 0.9                 | 12/05 | T      | 12/24 | 0.9    | 12/24           | 0.9    | 02/18 | T      |
| 1999-2000 | 0 <sup>(ab)</sup> | 0 <sup>(ab)</sup>   | 0.6                 | --                | --                  | --                | --                | --                  | 12/08 | T      |       |        |                 |        |       |        |
| Average   | 0.1               | 1.7                 | 5.2                 | 4.9               | 2.4                 | 0.5               | T                 | 14.9                | 11/30 |        | 02/13 |        | 02/13           |        | 03/11 |        |
| Normal    | 0.1               | 1.7                 | 5.7                 | 3.9               | 2.0                 | 0.3               | T                 | 13.8                | 12/03 |        | 02/15 |        | 02/15           |        | 03/11 |        |

(a) Greatest and least values.  
 (b) Most recent of multiple occurrences.  
 T = Trace.

Table 4.7. Snowfall (inches) - Greatest Amount from a Single Storm

| Year      | Jul | Aug | Sep | Oct                | Nov                | Dec                | Jan                | Feb                 | Mar                | Apr                | May                | Jun | Season              |
|-----------|-----|-----|-----|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|--------------------|-----|---------------------|
| 1946-47   | 0   | 0   | 0   | T                  | 4.5                | 0.3                | 2.2                | T                   | T                  | 0                  | 0                  | 0   | 4.5                 |
| 1947-48   | 0   | 0   | 0   | 0                  | T                  | 1.8                | 2.6                | 5.2                 | 0.1                | T                  | 0                  | 0   | 5.2                 |
| 1948-49   | 0   | 0   | 0   | 0                  | 1.7                | 1.9                | 0.8                | 4.4                 | T                  | 0                  | 0                  | 0   | 4.4                 |
| 1949-50   | 0   | 0   | 0   | T                  | 0                  | 0.4                | 5.1                | 2.2                 | 1.2                | T                  | 0                  | 0   | 5.1                 |
| 1950-51   | 0   | 0   | 0   | 0                  | 0.8                | 2.1                | 2.3                | 3.5                 | 2.2                | 0                  | 0                  | 0   | 3.5                 |
| 1951-52   | 0   | 0   | 0   | 0                  | 0.5                | 2.1                | 3.0                | 2.5                 | T                  | 0                  | 0                  | 0   | 3.0                 |
| 1952-53   | 0   | 0   | 0   | 0                  | T                  | 1.1                | 2.7                | 0                   | T                  | 0                  | 0                  | 0   | 2.7                 |
| 1953-54   | 0   | 0   | 0   | 0                  | 0                  | 1.0                | 9.6 <sup>(a)</sup> | 1.6                 | T                  | 0                  | 0                  | 0   | 9.6                 |
| 1954-55   | 0   | 0   | 0   | 0                  | 0                  | 1.8                | 1.7                | 2.2                 | 0.7                | T                  | T                  | 0   | 2.2                 |
| 1955-56   | 0   | 0   | 0   | 0                  | 4.8                | 3.4                | 4.4                | 0.6                 | T                  | 0                  | 0                  | 0   | 4.8                 |
| 1956-57   | 0   | 0   | 0   | T                  | 0.1                | 2.4                | 3.5                | 1.2                 | 2.2                | 0                  | 0                  | 0   | 3.5                 |
| 1957-58   | 0   | 0   | 0   | 0.3                | 0                  | T                  | T                  | 0                   | T                  | 0                  | 0                  | 0   | 0.3 <sup>(a)</sup>  |
| 1958-59   | 0   | 0   | 0   | 0                  | T                  | 0.4                | 2.7                | 5.9                 | 0                  | 0                  | 0                  | 0   | 5.9                 |
| 1959-60   | 0   | 0   | 0   | 0                  | 0.2                | 0.6                | 3.6                | T                   | 1.5                | 0                  | T                  | 0   | 3.6                 |
| 1960-61   | 0   | 0   | 0   | 0                  | 0                  | 2.0                | 1.9                | 0                   | 1.6                | 0                  | 0                  | 0   | 2.0                 |
| 1961-62   | 0   | 0   | 0   | 0                  | 0.4                | 3.0                | 0.3                | 2.0                 | 0.8                | 0                  | 0                  | 0   | 3.0                 |
| 1962-63   | 0   | 0   | 0   | 0                  | 0                  | T                  | 7.1                | 0.6                 | 0                  | 0                  | 0                  | 0   | 7.1                 |
| 1963-64   | 0   | 0   | 0   | 0                  | T                  | 4.3                | 1.5                | T                   | T                  | T                  | T                  | 0   | 4.3                 |
| 1964-65   | 0   | 0   | 0   | 0                  | 0.1                | 5.3                | 3.2                | T                   | T                  | 0                  | 0                  | 0   | 5.3                 |
| 1965-66   | 0   | 0   | 0   | 0                  | T                  | 5.4                | 1.9                | T                   | T                  | 0                  | 0                  | 0   | 5.4                 |
| 1966-67   | 0   | 0   | 0   | 0                  | 0.4                | 0.3                | 0.1                | 0                   | T                  | 0                  | 0                  | 0   | 0.4                 |
| 1967-68   | 0   | 0   | 0   | 0                  | 0                  | 3.3                | 2.9                | 0.3                 | 0                  | T                  | 0                  | 0   | 3.3                 |
| 1968-69   | 0   | 0   | 0   | 0                  | T                  | 3.6                | 6.4                | 2.0                 | 0                  | 0                  | 0                  | 0   | 6.4                 |
| 1969-70   | 0   | 0   | 0   | 0                  | T                  | 1.3                | 3.0                | T                   | 0.2                | 0                  | 0                  | 0   | 3.0                 |
| 1970-71   | 0   | 0   | 0   | 0                  | 0.5                | 3.1                | 1.8                | T                   | 0.5                | 0                  | 0                  | 0   | 3.1                 |
| 1971-72   | 0   | 0   | 0   | 0.6                | T                  | 3.4                | 3.9                | 1.3                 | 0.1                | T                  | 0                  | 0   | 3.9                 |
| 1972-73   | 0   | 0   | 0   | 0                  | T                  | 4.0                | 2.8                | 1.7                 | 0                  | 0                  | 0                  | 0   | 4.0                 |
| 1973-74   | 0   | 0   | 0   | 1.5 <sup>(a)</sup> | 3.9                | 5.8                | 2.3                | 0                   | 0                  | 0                  | 0                  | 0   | 5.8                 |
| 1974-75   | 0   | 0   | 0   | 0                  | 0                  | 0.4                | 0.9                | 5.6                 | T                  | T                  | 0                  | 0   | 5.6                 |
| 1975-76   | 0   | 0   | 0   | 0                  | 1.7                | 3.1                | 2.4                | 0.2                 | T                  | 0                  | 0                  | 0   | 3.1                 |
| 1976-77   | 0   | 0   | 0   | 0                  | 0                  | 0.2                | 1.8                | T                   | T                  | 0                  | 0                  | 0   | 1.8                 |
| 1977-78   | 0   | 0   | 0   | 0                  | 1.8                | 2.5                | 2.2                | 0.8                 | T                  | 0                  | 0                  | 0   | 2.5                 |
| 1978-79   | 0   | 0   | 0   | 0                  | 9.1 <sup>(a)</sup> | 1.0                | 5.0                | 0.3                 | 0                  | 0                  | 0                  | 0   | 9.1                 |
| 1979-80   | 0   | 0   | 0   | 0                  | 3.4                | 3.6                | 6.4                | 4.5                 | 0.3                | 0                  | 0                  | 0   | 6.4                 |
| 1980-81   | 0   | 0   | 0   | 0                  | 0.3                | 1.9                | T                  | T                   | 0                  | 0                  | 0                  | 0   | 1.9                 |
| 1981-82   | 0   | 0   | 0   | 0                  | 0                  | 3.8                | 1.0                | T                   | T                  | 1.0 <sup>(a)</sup> | 0                  | 0   | 3.8                 |
| 1982-83   | 0   | 0   | 0   | 0                  | 0.2                | 2.6                | 2.0                | 2.0                 | 0                  | 0                  | T                  | 0   | 2.6                 |
| 1983-84   | 0   | 0   | 0   | 0                  | T                  | 5.1                | 1.5                | T                   | 0                  | 0                  | 0                  | 0   | 5.1                 |
| 1984-85   | 0   | 0   | 0   | T                  | 4.7                | 2.4                | 1.3                | 2.9                 | 0                  | 0                  | 0                  | 0   | 4.7                 |
| 1985-86   | 0   | 0   | 0   | 0                  | 8.8                | 6.6 <sup>(a)</sup> | 1.1                | 2.7                 | 0                  | 0                  | 0                  | 0   | 8.8                 |
| 1986-87   | 0   | 0   | 0   | 0                  | 0                  | 2.1                | 0.8                | 0                   | 0                  | 0                  | 0                  | 0   | 2.1                 |
| 1987-88   | 0   | 0   | 0   | 0                  | 1.1                | 4.4                | 2.3                | 0                   | 0                  | 0                  | 0                  | 0   | 4.4                 |
| 1988-89   | 0   | 0   | 0   | 0                  | 0                  | 1.7                | 0.2                | 10.0                | 2.7 <sup>(a)</sup> | T                  | T <sup>(a,b)</sup> | 0   | 10.0                |
| 1989-90   | 0   | 0   | 0   | 0                  | 0                  | 1.1                | 0.6                | 0.7                 | T                  | 0                  | 0                  | 0   | 1.1                 |
| 1990-91   | 0   | 0   | 0   | 0                  | 0                  | 2.8                | 2.1                | 0                   | 0.1                | 0                  | 0                  | 0   | 2.8                 |
| 1991-92   | 0   | 0   | 0   | 0.9                | T                  | 0.6                | 0.3                | T                   | 0                  | 0                  | 0                  | 0   | 0.9                 |
| 1992-93   | 0   | 0   | 0   | 0                  | 1.6                | 3.8                | T                  | 12.4 <sup>(a)</sup> | 2.0                | 0                  | 0                  | 0   | 12.4 <sup>(a)</sup> |
| 1993-94   | 0   | 0   | 0   | 0                  | 0.6                | 1.0                | 0                  | 0.3                 | 0                  | 0                  | 0                  | 0   | 1.0                 |
| 1994-95   | 0   | 0   | 0   | 0                  | 0.1                | 1.7                | 1.9                | T                   | 0                  | T                  | 0                  | 0   | 1.9                 |
| 1995-96   | 0   | 0   | 0   | 0                  | 1.0                | 2.7                | 3.5                | 4.0                 | 0.4                | 0                  | 0                  | 0   | 4.0                 |
| 1996-97   | 0   | 0   | 0   | 0                  | 7.1                | 6.0                | 0.9                | 2.7                 | 1.5                | 0                  | 0                  | 0   | 7.1                 |
| 1997-98   | 0   | 0   | 0   | 0                  | 0                  | 1.8                | 3.3                | T                   | T                  | 0                  | 0                  | 0   | 3.3                 |
| 1998-99   | 0   | 0   | 0   | 0                  | 0                  | 0.9                | T                  | 0                   | 0                  | 0                  | 0                  | 0   | 0.9                 |
| 1999-2000 | 0   | 0   | 0   | 0                  | 0                  | 0.6                | --                 | --                  | --                 | --                 | --                 | --  | --                  |

(a) Greatest value.

(b) Most recent of multiple occurrences.

T = Trace

**Table 4.8. Miscellaneous Snowfall Statistics, 1946 Through 1999**

|   | Oct                   | Nov                      | Dec              | Jan         | Feb         | Mar        | Season          |
|---|-----------------------|--------------------------|------------------|-------------|-------------|------------|-----------------|
| <b>Average Number of Days of Given Depth at 0400 PST</b>            |                       |                          |                  |             |             |            |                 |
| ≥1 inch   | (a)                   | 1                        | 7                | 9           | 4           | (a)        | 22              |
| ≥3 inches   | 0                     | 1                        | 3                | 6           | 3           | (a)        | 12              |
| ≥6 inches   | 0                     | (a)                      | 1                | 3           | 1           | (a)        | 5               |
| ≥12 inches  | 0                     | 0                        | (a)              | (a)         | 0           | 0          | (a)             |
| <b>Record Greatest Number of Days of Given Depth at 0400 PST</b>    |                       |                          |                  |             |             |            |                 |
| ≥1 inch   | 0                     | 12 (1996) <sup>(b)</sup> | 31 (1985)        | 31 (1969)   | 20 (1989)   | 7 (1993)   | 72 (1992-93)    |
| ≥3 inches   | 0                     | 12 (1996)                | 31 (1985)        | 27 (1993)   | 16 (1950)   | 6 (1993)   | 58 (1985-86)    |
| ≥6 inches   | 0                     | 9 (1985)                 | 23 (1985)        | 25 (1993)   | 9 (1993)    | 5 (1993)   | 43 (1992-93)    |
| ≥12 inches  | 0                     | 0                        | 4 (1964)         | 10 (1993)   | 0           | 0          | 10 (1992-93)    |
| <b>Record Greatest Depth</b>  | 1.5 (1973)            | 10.0 (1985)              | 15.6 (1985)      | 15.0 (1993) | 10.0 (1969) | 9.1 (1993) | 15.6 (Dec 1985) |
| <b>Greatest in 24 hours</b>   | 1.5 (1973)            | 8.8 (1985)               | 6.6 (1985)       | 7.1 (1954)  | 10.2 (1993) | 2.7 (1989) | 10.2 (Feb 1993) |
| <b>Record Consecutive Number of Days of Given Depth at 0400 PST</b> |                       |                          |                  |             |             |            |                 |
|   | <u>Number of Days</u> | <u>From</u>              | <u>To</u>        |             |             |            |                 |
| ≥1 inch   | 60                    | November 20, 1985        | January 18, 1986 |             |             |            |                 |
| ≥3 inches   | 57                    | November 22, 1985        | January 17, 1986 |             |             |            |                 |
| ≥6 inches   | 32                    | December 20, 1964        | January 20, 1965 |             |             |            |                 |
| ≥12 inches  | 6                     | January 15, 1993         | January 20, 1993 |             |             |            |                 |

(a) Denotes less than ½ day.  
 (b) Year of occurrence in parentheses.  
 PST = Pacific Standard Time.

## 4.9 Normal and Maximum Daily Precipitation

Table 4.9 contains annual maximum precipitation statistics for the time periods 1, 2, 3, 6, 12, and 24 hours, including the dates of occurrence for each time period, 1947 through 1999. Table 4.10 contains normal and maximum values of precipitation (minimum values are not needed because every day of the year has a minimum value of 0). The normal precipitation values are based on the period 1961 through 1990; the daily maximum values are for the entire period of record (1945 through 1999). The maximum daily value for each month is noted on the table.

Climatologically speaking, the wettest period of the year is from December 14 through 24, with each day having a normal precipitation value of 0.04 inch. Although previously stated in Section 4.2, most days do not receive any precipitation, those that do typically receive considerably more than 0.04 inch. The driest period is from July 23 through August 11, with each day having a normal value of only a trace. October 1, 1957, recorded the greatest precipitation in one day, 1.60 inches. There have been only 4 days during the period of record that have never received measurable precipitation. However, all have received a trace.

Table 4.9. Maximum Precipitation (inches)

| Year | 1 h                 | Date                 | 2 h                 | Date                 | 3 h                 | Date                 | 6 h                 | Date                 | 12 h                | Date        | 24 h                | Date        |
|------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|-------------|---------------------|-------------|
| 1947 | 0.48                | 08-29                | 0.51                | 06-07                | 0.54                | 06-07                | 0.67                | 09-15                | 0.75                | 09/16-17    | 0.88                | 10/19-20    |
| 1948 | 0.24                | 05-19                | 0.30                | 06-11                | 0.31                | 06/10-11             | 0.50                | 01/6-7               | 0.65                | 01-06       | 1.08                | 01/06-07    |
| 1949 | 0.18                | 11-23                | 0.28                | 11-23                | 0.41                | 11-23                | 0.60                | 11-23                | 0.63                | 11-23       | 0.65                | 11/23-24    |
| 1950 | 0.30                | 06-17                | 0.52                | 06-17                | 0.58                | 06-17                | 0.87                | 06-17                | 1.05                | 06-17       | 1.24                | 06/16-17    |
| 1951 | 0.28                | 04-28                | 0.41                | 04-28                | 0.44                | 04-28                | 0.45                | 06-06                | 0.47                | 06-06       | 0.70                | 06/05-06    |
| 1952 | 0.27                | 05-10                | 0.27                | 05-10                | 0.27                | 05-10                | 0.29                | 06-29                | 0.39                | 06-29       | 0.48                | 06-29       |
| 1953 | 0.35                | 08-26                | 0.35                | 08-26                | 0.35                | 08-26                | 0.44                | 01/08-09             | 0.77                | 01/08-09    | 0.83                | 01/08-09    |
| 1954 | 0.16                | 03-19                | 0.19                | 05-26                | 0.27                | 01-16                | 0.52                | 01-16                | 0.72                | 01/15-16    | 0.77                | 01/15-16    |
| 1955 | 0.13                | 12-31                | 0.21                | 12-21                | 0.31                | 12-21                | 0.49                | 12-21                | 0.61                | 12-21       | 0.64                | 11/26-27    |
| 1956 | 0.16                | 06-14                | 0.22                | 06-14                | 0.27                | 06-14                | 0.28 <sup>(a)</sup> | 01-15                | 0.44                | 01/14-15    | 0.73                | 01/14-15    |
| 1957 | 0.47                | 10-01                | 0.88 <sup>(a)</sup> | 10-01                | 1.08 <sup>(a)</sup> | 10-01                | 1.68 <sup>(a)</sup> | 10/01-02             | 1.88 <sup>(a)</sup> | 10/01-02    | 1.91 <sup>(b)</sup> | 10/01-02    |
| 1958 | 0.43                | 06-12                | 0.43                | 06-12                | 0.43                | 06-12                | 0.65                | 12/10-11             | 0.88                | 12/10-11    | 1.00                | 12/10-11    |
| 1959 | 0.18                | 05-17                | 0.18                | 05-17 <sup>(b)</sup> | 0.23                | 09-14 <sup>(b)</sup> | 0.40                | 01-11                | 0.54                | 01/11-12    | 0.82                | 01/11-12    |
| 1960 | 0.22                | 03-27                | 0.23                | 03-27                | 0.33                | 05/06-07             | 0.43                | 05/06-07             | 0.44                | 05/06-07    | 0.44                | 05/06-07    |
| 1961 | 0.21                | 02-01                | 0.39                | 02-01                | 0.42                | 02-01                | 0.46                | 05/09-10             | 0.72                | 02-01       | 0.72                | 02-01       |
| 1962 | 0.19                | 11-30                | 0.27                | 11-30                | 0.34                | 02-09                | 0.40                | 10-12                | 0.52                | 10-12       | 0.52                | 10-12       |
| 1963 | 0.22                | 01-31                | 0.37                | 01-31                | 0.44                | 01-31                | 0.54                | 01-31                | 0.94                | 01-31/02-01 | 0.98                | 01-31/02-01 |
| 1964 | 0.16                | 12-22                | 0.20                | 06-08                | 0.32                | 12-21                | 0.42                | 12-21                | 0.54                | 12-21       | 0.60                | 12/21-22    |
| 1965 | 0.10 <sup>(a)</sup> | 05-19                | 0.14 <sup>(a)</sup> | 11-24 <sup>(b)</sup> | 0.18 <sup>(a)</sup> | 06-17                | 0.29                | 06-17                | 0.39                | 06-17       | 0.48                | 06-17       |
| 1966 | 0.14                | 07-02                | 0.17                | 07-02                | 0.22                | 11-19                | 0.37                | 11-19                | 0.74                | 11/19-20    | 0.78                | 11/19-20    |
| 1967 | 0.15                | 04-18                | 0.26                | 06-21                | 0.31                | 06-21                | 0.31                | 06-21                | 0.32 <sup>(a)</sup> | 06-21       | 0.37 <sup>(b)</sup> | 04/17-18    |
| 1968 | 0.12                | 12-24                | 0.21                | 12-24                | 0.28                | 12-24                | 0.36                | 12-24                | 0.43                | 10-11       | 0.54                | 10/07-08    |
| 1969 | 0.55 <sup>(a)</sup> | 06-12                | 0.59                | 06-12                | 0.59                | 06-12                | 0.60                | 06-12                | 0.60                | 06/12-13    | 0.60                | 06-12       |
| 1970 | 0.15                | 05-12                | 0.29                | 05-12                | 0.37                | 05-12                | 0.47                | 05-12                | 0.50                | 05-12       | 0.61                | 01/22-23    |
| 1971 | 0.15                | 03-15                | 0.26                | 03-25                | 0.35                | 01-16                | 0.48                | 03/25-26             | 0.53                | 01-16       | 0.53                | 01-16       |
| 1972 | 0.18                | 05-20                | 0.32                | 05-30                | 0.45                | 05-20                | 0.80                | 05/20-21             | 1.24                | 5/20-21     | 1.39                | 05/20-21    |
| 1973 | 0.15                | 10-31                | 0.21                | 10-31 <sup>(b)</sup> | 0.30                | 11-12                | 0.53                | 10-31                | 0.64                | 10-31       | 0.64                | 11/11-12    |
| 1974 | 0.45                | 07-19                | 0.45                | 07-19                | 0.45                | 07-19                | 0.45                | 07-19                | 0.45                | 07-19       | 0.45                | 07-19       |
| 1975 | 0.30                | 08-18                | 0.47                | 08-18                | 0.55                | 08-18                | 0.69                | 08-18                | 0.69                | 08-18       | 0.69                | 08-18       |
| 1976 | 0.32                | 08-07                | 0.33                | 08-07                | 0.33                | 08-07                | 0.33                | 08-07                | 0.33                | 08-07       | 0.40                | 08/24-25    |
| 1977 | 0.16                | 12-13                | 0.28                | 12-13                | 0.36                | 12-13                | 0.61                | 12-13                | 0.75                | 12-13       | 0.89                | 08/29-30    |
| 1978 | 0.15                | 04-27                | 0.22                | 04-27                | 0.23                | 04-27                | 0.31                | 11-18 <sup>(b)</sup> | 0.58                | 11/18-19    | 0.67                | 11/18-19    |
| 1979 | 0.11                | 04-17                | 0.18                | 03-27                | 0.22                | 03-27                | 0.29                | 03-27                | 0.40                | 03-27       | 0.42                | 11-16+      |
| 1980 | 0.14                | 12-25                | 0.24                | 04-20                | 0.29                | 04-20                | 0.47                | 05/25-26             | 0.74                | 09-13       | 0.90                | 05/25-26    |
| 1981 | 0.22                | 05-25                | 0.34                | 05-25                | 0.38                | 05-25                | 0.73                | 05-25                | 0.74                | 05-25       | 0.74                | 05-25       |
| 1982 | 0.22                | 07-07                | 0.33                | 11-18                | 0.40                | 11-18                | 0.64                | 10-28                | 0.95                | 10/28-29    | 0.97                | 10/28-29    |
| 1983 | 0.24                | 09-01                | 0.31                | 11-10                | 0.39                | 11-10                | 0.45                | 11/23-24             | 0.60                | 11/23-24    | 0.66                | 11-10       |
| 1984 | 0.20                | 06-28                | 0.38                | 03-20                | 0.39                | 03-20                | 0.48                | 03/20-21             | 0.51                | 03/20-21    | 0.53                | 03/20-21    |
| 1985 | 0.14                | 12-07                | 0.22                | 11-21                | 0.29                | 11-21                | 0.46                | 11-21                | 0.52                | 11/21-22    | 0.52                | 11/21-22    |
| 1986 | 0.24                | 09-15                | 0.43                | 09-15                | 0.45                | 09-15                | 0.47                | 09-15                | 0.47                | 09-15       | 0.54                | 09-15       |
| 1987 | 0.21                | 07-09                | 0.24                | 07-09                | 0.27                | 07-09                | 0.31                | 12-09                | 0.34                | 12-09       | 0.55                | 12-09       |
| 1988 | 0.31                | 04-28                | 0.42                | 04-28                | 0.42                | 04-28                | 0.42                | 04-28                | 0.48                | 04-28       | 0.49                | 04/27-28    |
| 1989 | 0.16                | 04-25                | 0.25                | 04-25                | 0.26                | 04-25                | 0.31                | 05-23                | 0.38                | 02/16-17    | 0.56                | 02/16-17    |
| 1990 | 0.25                | 06-06                | 0.33                | 08-21 <sup>(b)</sup> | 0.43                | 08-21                | 0.66                | 08-21                | 0.77                | 08/20-21    | 0.77                | 08/20-21    |
| 1991 | 0.49                | 06-29                | 0.50                | 06-29                | 0.51                | 06-29                | 0.51                | 06-29                | 0.53                | 06-29       | 0.59                | 06/05-06    |
| 1992 | 0.17                | 06-12                | 0.25                | 06-12                | 0.31                | 06-12                | 0.44                | 06-12                | 0.70                | 06-12       | 0.79                | 06-12       |
| 1993 | 0.32                | 07-17                | 0.45                | 07-17                | 0.55                | 07-17                | 0.82                | 07-17                | 1.01                | 07/16-17    | 1.39                | 07/16-17    |
| 1994 | 0.27                | 05-15                | 0.32                | 10-14                | 0.37                | 05-15                | 0.49                | 05-15                | 0.58                | 05-15       | 0.59                | 05/14-15    |
| 1995 | 0.48                | 05-09                | 0.53                | 05-09                | 0.53                | 05-09                | 0.55                | 12-12                | 0.65                | 12-12       | 1.04                | 12/11-12    |
| 1996 | 0.16                | 12-31 <sup>(b)</sup> | 0.29                | 12-29                | 0.40                | 12-29                | 0.65                | 12-29                | 0.90                | 11-19       | 1.70                | 11/18-19    |
| 1997 | 0.27                | 10-08                | 0.36                | 10-08                | 0.40                | 10-08                | 0.48                | 01-31                | 0.57                | 11-07       | 0.70                | 01-17       |
| 1998 | 0.19                | 11-05                | 0.29                | 11-05                | 0.36                | 11-05                | 0.49                | 11-05                | 0.62                | 11-05       | 0.62                | 11-05       |
| 1999 | 0.40                | 08-05                | 0.40                | 08-05                | 0.47                | 08-05                | 0.48                | 08-05                | 0.48                | 08-05       | 0.51                | 01/22-23    |

(a) Greatest and least values.  
 (b) Last of multiple occurrences.



Table 4.10. Normal and Maximum Daily Precipitation (inches)

| Day      | Normal Period (1961-1990) |                 |         |         | Historical Period (1945-1999) |                     |                     |
|----------|---------------------------|-----------------|---------|---------|-------------------------------|---------------------|---------------------|
|          | Normal                    | Number of Years |         | Maximum | Year                          | Maximum             | Year                |
|          |                           | W/Meas.         | W/Trace |         |                               |                     |                     |
| January  |                           |                 |         |         |                               |                     |                     |
| 1        | 0.02                      | 5               | 10      | 0.20    | 1987                          | 0.20                | 1987                |
| 2        | 0.02                      | 9               | 9       | 0.17    | 1983                          | 0.27                | 1953                |
| 3        | 0.02                      | 8               | 7       | 0.28    | 1966                          | 0.28                | 1966                |
| 4        | 0.02                      | 7               | 10      | 0.17    | 1976                          | 0.25                | 1956                |
| 5        | 0.02                      | 9               | 8       | 0.23    | 1966                          | 0.23                | 1966                |
| 6        | 0.02                      | 4               | 8       | 0.50    | 1983                          | 0.87                | 1948                |
| 7        | 0.02                      | 8               | 5       | 0.31    | 1990                          | 0.31                | 1990                |
| 8        | 0.02                      | 7               | 9       | 0.25    | 1978                          | 0.59                | 1953                |
| 9        | 0.02                      | 8               | 9       | 0.20    | 1980 <sup>(a)</sup>           | 0.41                | 1995 <sup>(a)</sup> |
| 10       | 0.03                      | 10              | 5       | 0.20    | 1979 <sup>(a)</sup>           | 0.22                | 1995                |
| 11       | 0.03                      | 4               | 10      | 0.17    | 1980                          | 0.48                | 1959                |
| 12       | 0.03                      | 9               | 10      | 0.32    | 1973                          | 0.58                | 1958                |
| 13       | 0.03                      | 10              | 8       | 0.33    | 1980                          | 0.37                | 1950                |
| 14       | 0.03                      | 10              | 3       | 0.43    | 1978                          | 0.43                | 1978                |
| 15       | 0.03                      | 7               | 5       | 0.18    | 1968                          | 0.34                | 1956                |
| 16       | 0.03                      | 10              | 6       | 0.53    | 1971                          | 0.70                | 1954                |
| 17       | 0.02                      | 5               | 7       | 0.10    | 1986                          | 0.31                | 1997                |
| 18       | 0.02                      | 7               | 8       | 0.25    | 1974                          | 0.28                | 1996                |
| 19       | 0.02                      | 8               | 1       | 0.32    | 1970                          | 0.39                | 1950                |
| 20       | 0.02                      | 5               | 6       | 0.26    | 1985                          | 0.32                | 1953                |
| 21       | 0.02                      | 6               | 5       | 0.15    | 1984                          | 0.16                | 1997 <sup>(a)</sup> |
| 22       | 0.02                      | 6               | 7       | 0.54    | 1970                          | 0.54                | 1970                |
| 23       | 0.03                      | 8               | 9       | 0.27    | 1965                          | 0.27                | 1965                |
| 24       | 0.03                      | 8               | 6       | 0.22    | 1970                          | 0.26                | 1996                |
| 25       | 0.03                      | 6               | 6       | 0.72    | 1975                          | 0.72                | 1975                |
| 26       | 0.03                      | 8               | 4       | 0.36    | 1970                          | 0.36                | 1970                |
| 27       | 0.03                      | 6               | 6       | 0.20    | 1981                          | 0.32                | 1954                |
| 28       | 0.03                      | 6               | 7       | 0.19    | 1986                          | 0.19                | 1995 <sup>(a)</sup> |
| 29       | 0.03                      | 9               | 4       | 0.31    | 1965                          | 0.33                | 1958                |
| 30       | 0.03                      | 8               | 8       | 0.12    | 1986                          | 0.24                | 1995                |
| 31       | 0.03                      | 9               | 10      | 0.94    | 1963                          | 0.94 <sup>(b)</sup> | 1963 <sup>(b)</sup> |
| February |                           |                 |         |         |                               |                     |                     |
| 1        | 0.03                      | 8               | 4       | 0.72    | 1961                          | 0.72                | 1961                |
| 2        | 0.02                      | 5               | 8       | 0.26    | 1963                          | 0.26                | 1963                |
| 3        | 0.02                      | 5               | 6       | 0.06    | 1990                          | 0.31                | 1998                |
| 4        | 0.02                      | 5               | 5       | 0.28    | 1975                          | 0.28                | 1975                |
| 5        | 0.02                      | 7               | 7       | 0.07    | 1978                          | 0.15                | 1953                |
| 6        | 0.02                      | 10              | 2       | 0.18    | 1961                          | 0.18                | 1961                |
| 7        | 0.02                      | 5               | 4       | 0.27    | 1985                          | 0.27                | 1985                |
| 8        | 0.02                      | 5               | 8       | 0.12    | 1985                          | 0.12                | 1985                |
| 9        | 0.02                      | 9               | 5       | 0.37    | 1962                          | 0.43                | 1959                |
| 10       | 0.02                      | 5               | 5       | 0.64    | 1961                          | 0.64                | 1961                |
| 11       | 0.02                      | 10              | 3       | 0.30    | 1969                          | 0.30                | 1969                |
| 12       | 0.03                      | 9               | 6       | 0.20    | 1986                          | 0.42                | 1958                |
| 13       | 0.02                      | 10              | 6       | 0.21    | 1981                          | 0.21                | 1981                |
| 14       | 0.03                      | 5               | 11      | 0.39    | 1986                          | 0.39                | 1986                |
| 15       | 0.03                      | 12              | 7       | 0.30    | 1970                          | 0.30                | 1970                |
| 16       | 0.03                      | 7               | 7       | 0.42    | 1989                          | 0.42                | 1989                |
| 17       | 0.03                      | 10              | 7       | 0.42    | 1989                          | 0.42                | 1989                |
| 18       | 0.03                      | 9               | 2       | 0.34    | 1983                          | 0.34                | 1983 <sup>(a)</sup> |
| 19       | 0.02                      | 9               | 5       | 0.14    | 1989                          | 0.78 <sup>(b)</sup> | 1993 <sup>(b)</sup> |

Table 4.10. (contd)

| Day   | Normal Period (1961-1990) |                 |         |         |                     | Historical Period (1945-1999) |                     |
|-------|---------------------------|-----------------|---------|---------|---------------------|-------------------------------|---------------------|
|       | Normal                    | Number of Years |         | Maximum | Year                | Maximum                       | Year                |
|       |                           | W/Meas.         | W/Trace |         |                     |                               |                     |
| 20    | 0.02                      | 5               | 3       | 0.18    | 1984                | 0.18                          | 1984                |
| 21    | 0.02                      | 8               | 3       | 0.20    | 1986                | 0.36                          | 1956                |
| 22    | 0.02                      | 4               | 5       | 0.15    | 1989                | 0.21                          | 1949                |
| 23    | 0.02                      | 5               | 4       | 0.22    | 1968                | 0.22                          | 1968                |
| 24    | 0.02                      | 5               | 5       | 0.10    | 1981                | 0.33                          | 1950                |
| 25    | 0.02                      | 9               | 3       | 0.22    | 1983                | 0.25                          | 1948                |
| 26    | 0.02                      | 6               | 4       | 0.30    | 1976                | 0.30                          | 1976                |
| 27    | 0.02                      | 9               | 3       | 0.24    | 1980                | 0.32                          | 1999                |
| 28    | 0.02                      | 7               | 4       | 0.33    | 1977                | 0.33                          | 1977                |
| 29    | 0.02                      | 1               | 1       | 0.04    | 1984                | 0.04                          | 1984                |
| March |                           |                 |         |         |                     |                               |                     |
| 1     | 0.02                      | 8               | 4       | 0.15    | 1972                | 0.15                          | 1972                |
| 2     | 0.01                      | 4               | 8       | 0.07    | 1989                | 0.20                          | 1991 <sup>(a)</sup> |
| 3     | 0.01                      | 3               | 7       | 0.15    | 1977                | 0.15                          | 1991 <sup>(a)</sup> |
| 4     | 0.01                      | 9               | 6       | 0.16    | 1985                | 0.44                          | 1957                |
| 5     | 0.01                      | 6               | 7       | 0.23    | 1989                | 0.23                          | 1989                |
| 6     | 0.02                      | 7               | 3       | 0.07    | 1971 <sup>(a)</sup> | 0.24                          | 1957                |
| 7     | 0.02                      | 6               | 4       | 0.21    | 1986                | 0.21                          | 1986                |
| 8     | 0.02                      | 8               | 2       | 0.19    | 1988                | 0.23                          | 1951                |
| 9     | 0.02                      | 6               | 6       | 0.31    | 1989                | 0.42                          | 1995                |
| 10    | 0.02                      | 11              | 4       | 0.06    | 1980 <sup>(a)</sup> | 0.21                          | 1995                |
| 11    | 0.02                      | 8               | 6       | 0.24    | 1989                | 0.24                          | 1989                |
| 12    | 0.02                      | 9               | 6       | 0.42    | 1987                | 0.42                          | 1987                |
| 13    | 0.02                      | 7               | 8       | 0.35    | 1983                | 0.35                          | 1983                |
| 14    | 0.02                      | 9               | 3       | 0.14    | 1970                | 0.16                          | 1995                |
| 15    | 0.02                      | 7               | 4       | 0.18    | 1987                | 0.25                          | 1949                |
| 16    | 0.01                      | 7               | 5       | 0.22    | 1989                | 0.34                          | 1997 <sup>(a)</sup> |
| 17    | 0.01                      | 3               | 7       | 0.05    | 1967                | 0.16                          | 1949                |
| 18    | 0.01                      | 7               | 5       | 0.04    | 1989                | 0.25                          | 1949                |
| 19    | 0.01                      | 3               | 4       | 0.12    | 1987                | 0.12                          | 1987                |
| 20    | 0.01                      | 5               | 4       | 0.43    | 1984                | 0.43                          | 1984                |
| 21    | 0.01                      | 5               | 2       | 0.10    | 1984 <sup>(a)</sup> | 0.18                          | 1958                |
| 22    | 0.02                      | 4               | 8       | 0.22    | 1961                | 0.22                          | 1961                |
| 23    | 0.02                      | 7               | 4       | 0.26    | 1986                | 0.26                          | 1986                |
| 24    | 0.02                      | 4               | 2       | 0.12    | 1961                | 0.52 <sup>(b)</sup>           | 1991 <sup>(b)</sup> |
| 25    | 0.02                      | 9               | 3       | 0.43    | 1971                | 0.43                          | 1971                |
| 26    | 0.02                      | 5               | 6       | 0.50    | 1981                | 0.50                          | 1981                |
| 27    | 0.02                      | 5               | 4       | 0.42    | 1979                | 0.42                          | 1979                |
| 28    | 0.02                      | 5               | 3       | 0.13    | 1982                | 0.13                          | 1982                |
| 29    | 0.01                      | 8               | 1       | 0.15    | 1983                | 0.15                          | 1983                |
| 30    | 0.01                      | 4               | 7       | 0.23    | 1974                | 0.23                          | 1974                |
| 31    | 0.01                      | 4               | 6       | 0.14    | 1976                | 0.26                          | 1996                |
| April |                           |                 |         |         |                     |                               |                     |
| 1     | 0.01                      | 3               | 12      | 0.18    | 1983                | 0.22                          | 1958                |
| 2     | 0.01                      | 6               | 3       | 0.10    | 1979                | 0.18                          | 1948                |
| 3     | 0.01                      | 2               | 3       | 0.03    | 1963                | 0.18                          | 1947                |
| 4     | 0.01                      | 5               | 9       | 0.13    | 1984                | 0.18                          | 1948                |
| 5     | 0.01                      | 6               | 6       | 0.44    | 1969                | 0.44                          | 1969                |
| 6     | 0.01                      | 6               | 3       | 0.36    | 1982                | 0.36                          | 1982                |
| 7     | 0.01                      | 3               | 1       | 0.22    | 1984                | 0.30                          | 1953                |
| 8     | 0.01                      | 5               | 2       | 0.17    | 1976                | 0.18                          | 1991                |
| 9     | 0.01                      | 3               | 10      | 0.12    | 1980                | 0.32                          | 1992                |

Table 4.10. (contd)

| Day | Normal Period (1961-1990) |                 |         |         |                     | Historical Period (1945-1999) |                     |
|-----|---------------------------|-----------------|---------|---------|---------------------|-------------------------------|---------------------|
|     | Normal                    | Number of Years |         | Maximum | Year                | Maximum                       | Year                |
|     |                           | W/Meas.         | W/Trace |         |                     |                               |                     |
| 10  | 0.01                      | 2               | 6       | 0.03    | 1969                | 0.10                          | 1958                |
| 11  | 0.01                      | 4               | 9       | 0.23    | 1982                | 0.23                          | 1982                |
| 12  | 0.01                      | 4               | 5       | 0.08    | 1961                | 0.36                          | 1995                |
| 13  | 0.01                      | 1               | 3       | 0.01    | 1990                | 0.39                          | 1992                |
| 14  | 0.01                      | 4               | 4       | 0.17    | 1975 <sup>(a)</sup> | 0.17                          | 1975 <sup>(a)</sup> |
| 15  | 0.01                      | 3               | 8       | 0.09    | 1962                | 0.17                          | 1991                |
| 16  | 0.02                      | 4               | 7       | 0.08    | 1979 <sup>(a)</sup> | 0.11                          | 1948                |
| 17  | 0.02                      | 6               | 6       | 0.36    | 1988                | 0.36                          | 1988                |
| 18  | 0.02                      | 4               | 6       | 0.31    | 1967                | 0.31                          | 1967                |
| 19  | 0.02                      | 7               | 9       | 0.41    | 1970                | 0.41                          | 1970                |
| 20  | 0.02                      | 6               | 6       | 0.56    | 1980                | 0.56 <sup>(b)</sup>           | 1980 <sup>(b)</sup> |
| 21  | 0.02                      | 2               | 7       | 0.07    | 1989                | 0.07                          | 1989                |
| 22  | 0.02                      | 7               | 6       | 0.12    | 1974                | 0.28                          | 1996                |
| 23  | 0.01                      | 6               | 5       | 0.22    | 1974                | 0.22                          | 1974                |
| 24  | 0.01                      | 4               | 8       | 0.22    | 1975                | 0.22                          | 1975                |
| 25  | 0.02                      | 3               | 6       | 0.35    | 1989                | 0.35                          | 1989                |
| 26  | 0.02                      | 2               | 7       | 0.04    | 1989                | 0.25                          | 1955                |
| 27  | 0.02                      | 7               | 5       | 0.28    | 1989 <sup>(a)</sup> | 0.34                          | 1995                |
| 28  | 0.02                      | 6               | 5       | 0.48    | 1988                | 0.51                          | 1951                |
| 29  | 0.02                      | 2               | 3       | 0.30    | 1961                | 0.30                          | 1961                |
| 30  | 0.02                      | 6               | 4       | 0.12    | 1984                | 0.12                          | 1984                |
| May |                           |                 |         |         |                     |                               |                     |
| 1   | 0.02                      | 5               | 6       | 0.19    | 1984                | 0.19                          | 1984                |
| 2   | 0.01                      | 5               | 1       | 0.17    | 1975                | 0.17                          | 1975                |
| 3   | 0.01                      | 4               | 3       | 0.29    | 1977                | 0.29                          | 1977                |
| 4   | 0.01                      | 6               | 5       | 0.10    | 1967                | 0.10                          | 1967                |
| 5   | 0.02                      | 8               | 3       | 0.28    | 1963                | 0.28                          | 1963                |
| 6   | 0.02                      | 4               | 6       | 0.20    | 1986                | 0.20                          | 1986                |
| 7   | 0.02                      | 3               | 1       | 0.39    | 1983                | 0.39                          | 1983                |
| 8   | 0.02                      | 5               | 7       | 0.55    | 1972                | 0.55                          | 1972                |
| 9   | 0.02                      | 5               | 5       | 0.25    | 1961                | 0.53                          | 1995                |
| 10  | 0.02                      | 6               | 7       | 0.39    | 1961                | 0.39                          | 1961                |
| 11  | 0.02                      | 4               | 4       | 0.19    | 1967                | 0.39                          | 1951                |
| 12  | 0.02                      | 4               | 7       | 0.50    | 1970                | 0.50                          | 1970                |
| 13  | 0.01                      | 4               | 2       | 0.11    | 1985                | 0.15                          | 1952                |
| 14  | 0.01                      | 4               | 6       | 0.25    | 1978                | 0.25                          | 1978                |
| 15  | 0.01                      | 3               | 6       | 0.06    | 1975                | 0.58                          | 1994                |
| 16  | 0.01                      | 0               | 8       | T       | 1988 <sup>(a)</sup> | 0.14                          | 1991                |
| 17  | 0.01                      | 4               | 3       | 0.13    | 1982                | 0.25                          | 1959                |
| 18  | 0.01                      | 5               | 2       | 0.13    | 1981                | 0.13                          | 1981                |
| 19  | 0.01                      | 7               | 3       | 0.15    | 1965                | 0.55                          | 1948                |
| 20  | 0.02                      | 4               | 1       | 0.70    | 1972                | 0.70                          | 1972                |
| 21  | 0.02                      | 3               | 4       | 0.69    | 1972                | 0.69                          | 1972                |
| 22  | 0.02                      | 6               | 5       | 0.12    | 1984                | 0.12                          | 1984                |
| 23  | 0.03                      | 5               | 6       | 0.33    | 1990                | 0.33                          | 1990                |
| 24  | 0.03                      | 4               | 5       | 0.51    | 1962                | 0.51                          | 1962                |
| 25  | 0.02                      | 6               | 2       | 0.74    | 1981                | 0.74                          | 1981                |
| 26  | 0.02                      | 4               | 6       | 0.79    | 1980                | 0.79 <sup>(b)</sup>           | 1980 <sup>(b)</sup> |
| 27  | 0.02                      | 6               | 2       | 0.11    | 1990                | 0.11                          | 1990                |
| 28  | 0.02                      | 5               | 7       | 0.28    | 1988                | 0.28                          | 1988                |
| 29  | 0.02                      | 5               | 3       | 0.11    | 1961                | 0.11                          | 1961                |
| 30  | 0.01                      | 6               | 1       | 0.14    | 1987                | 0.14                          | 1987                |
| 31  | 0.02                      | 2               | 5       | 0.35    | 1971                | 0.35                          | 1971                |

Table 4.10. (contd)

| Day  | Normal Period (1961-1990) |                 |         |         |                     | Historical Period (1945-1999) |                     |
|------|---------------------------|-----------------|---------|---------|---------------------|-------------------------------|---------------------|
|      | Normal                    | Number of Years |         | Maximum | Year                | Maximum                       | Year                |
|      |                           | W/Meas.         | W/Trace |         |                     |                               |                     |
| June |                           |                 |         |         |                     |                               |                     |
| 1    | 0.02                      | 3               | 5       | 0.29    | 1977                | 0.29                          | 1977                |
| 2    | 0.02                      | 5               | 6       | 0.12    | 1966                | 0.12                          | 1966                |
| 3    | 0.02                      | 6               | 9       | 0.30    | 1971                | 0.30                          | 1971                |
| 4    | 0.02                      | 6               | 3       | 0.25    | 1984                | 0.45                          | 1951                |
| 5    | 0.02                      | 4               | 4       | 0.14    | 1981                | 0.49                          | 1991                |
| 6    | 0.02                      | 6               | 3       | 0.36    | 1990                | 0.54                          | 1951                |
| 7    | 0.01                      | 5               | 5       | 0.15    | 1972                | 0.71                          | 1947                |
| 8    | 0.01                      | 6               | 6       | 0.49    | 1964                | 0.49                          | 1964                |
| 9    | 0.02                      | 3               | 4       | 0.07    | 1963                | 0.22                          | 1948                |
| 10   | 0.02                      | 2               | 7       | 0.08    | 1983                | 0.14                          | 1956                |
| 11   | 0.01                      | 3               | 5       | 0.13    | 1961                | 0.39                          | 1950                |
| 12   | 0.01                      | 4               | 8       | 0.60    | 1969                | 0.79                          | 1992                |
| 13   | 0.01                      | 6               | 4       | 0.35    | 1980                | 0.49                          | 1948                |
| 14   | 0.01                      | 4               | 2       | 0.04    | 1983                | 0.37                          | 1956                |
| 15   | 0.01                      | 4               | 1       | 0.15    | 1964                | 0.15                          | 1964                |
| 16   | 0.01                      | 2               | 5       | 0.14    | 1980                | 0.18                          | 1948                |
| 17   | 0.01                      | 2               | 5       | 0.48    | 1965                | 1.09 <sup>(b)</sup>           | 1950 <sup>(b)</sup> |
| 18   | 0.01                      | 2               | 5       | 0.07    | 1983                | 0.09                          | 1994                |
| 19   | 0.01                      | 1               | 3       | 0.01    | 1983                | 0.29                          | 1998                |
| 20   | 0.01                      | 5               | 2       | 0.24    | 1984                | 0.24                          | 1984                |
| 21   | 0.01                      | 5               | 2       | 0.32    | 1967                | 0.32                          | 1967                |
| 22   | 0.01                      | 4               | 7       | 0.14    | 1971                | 0.14                          | 1971                |
| 23   | 0.01                      | 7               | 2       | 0.17    | 1963                | 0.17                          | 1963                |
| 24   | 0.01                      | 5               | 3       | 0.21    | 1972                | 0.21                          | 1972                |
| 25   | 0.01                      | 3               | 4       | 0.02    | 1980                | 0.03                          | 1954                |
| 26   | 0.01                      | 2               | 6       | 0.27    | 1982                | 0.27                          | 1982                |
| 27   | 0.01                      | 4               | 3       | 0.37    | 1983                | 0.37                          | 1983                |
| 28   | 0.01                      | 2               | 8       | 0.23    | 1984                | 0.24                          | 1992                |
| 29   | 0.01                      | 4               | 2       | 0.16    | 1984                | 0.53                          | 1991                |
| 30   | 0.01                      | 1               | 1       | 0.06    | 1976                | 0.06                          | 1976                |
| July |                           |                 |         |         |                     |                               |                     |
| 1    | 0.01                      | 5               | 3       | 0.31    | 1966                | 0.31                          | 1966                |
| 2    | 0.01                      | 3               | 6       | 0.34    | 1966                | 0.34                          | 1966                |
| 3    | 0.01                      | 3               | 3       | 0.31    | 1978                | 0.31                          | 1978                |
| 4    | 0.01                      | 3               | 4       | 0.10    | 1986                | 0.10                          | 1986                |
| 5    | 0.01                      | 1               | 3       | 0.19    | 1981                | 0.36                          | 1951                |
| 6    | 0.01                      | 1               | 3       | 0.02    | 1979                | 0.04                          | 1993                |
| 7    | 0.01                      | 3               | 2       | 0.30    | 1963                | 0.30                          | 1963                |
| 8    | 0.01                      | 5               | 3       | 0.14    | 1974                | 0.20                          | 1995                |
| 9    | 0.01                      | 3               | 2       | 0.27    | 1987                | 0.27                          | 1987                |
| 10   | 0.01                      | 2               | 5       | 0.05    | 1972                | 0.16                          | 1954                |
| 11   | 0.01                      | 2               | 4       | 0.04    | 1979                | 0.04                          | 1979                |
| 12   | T                         | 0               | 4       | T       | 1982 <sup>(a)</sup> | T                             | 1982 <sup>(a)</sup> |
| 13   | T                         | 2               | 5       | 0.28    | 1975                | 0.28                          | 1975                |
| 14   | T                         | 1               | 2       | 0.03    | 1966                | 0.05                          | 1957                |
| 15   | T                         | 2               | 2       | 0.04    | 1975                | 0.08                          | 1991                |
| 16   | T                         | 4               | 3       | 0.07    | 1966                | 0.50                          | 1993                |
| 17   | T                         | 3               | 1       | 0.05    | 1987 <sup>(a)</sup> | 0.89 <sup>(b)</sup>           | 1993 <sup>(b)</sup> |
| 18   | T                         | 2               | 2       | 0.12    | 1987                | 0.12                          | 1987                |
| 19   | T                         | 2               | 2       | 0.45    | 1974                | 0.45                          | 1974                |
| 20   | T                         | 2               | 2       | 0.09    | 1965                | 0.09                          | 1965                |
| 21   | T                         | 1               | 2       | 0.02    | 1965                | 0.02                          | 1965                |

Table 4.10. (contd)

| Day       | Normal Period (1961-1990) |                 |         |         |                     | Historical Period (1945-1999) |                           |
|-----------|---------------------------|-----------------|---------|---------|---------------------|-------------------------------|---------------------------|
|           | Normal                    | Number of Years |         | Maximum | Year                | Maximum                       | Year                      |
|           |                           | W/Meas.         | W/Trace |         |                     |                               |                           |
| 22        | T                         | 0               | 2       | T       | 1987 <sup>(a)</sup> | T                             | 1993 <sup>(a)</sup>       |
| 23        | T                         | 2               | 0       | 0.15    | 1961                | 0.28                          | 1992                      |
| 24        | T                         | 2               | 2       | 0.06    | 1990                | 0.07                          | 1955                      |
| 25        | T                         | 3               | 2       | 0.23    | 1983                | 0.23                          | 1983                      |
| 26        | T                         | 0               | 1       | T       | 1978                | 0.22                          | 1955                      |
| 27        | T                         | 1               | 1       | 0.02    | 1983                | 0.31                          | 1947                      |
| 28        | T                         | 1               | 3       | 0.06    | 1984                | 0.28                          | 1947                      |
| 29        | T                         | 1               | 1       | 0.01    | 1964                | 0.05                          | 1997                      |
| 30        | T                         | 0               | 3       | T       | 1987 <sup>(a)</sup> | T                             | 1997 <sup>(a)</sup>       |
| 31        | T                         | 1               | 2       | 0.12    | 1985                | 0.16                          | 1998                      |
| August    |                           |                 |         |         |                     |                               |                           |
| 1         | T                         | 2               | 1       | 0.08    | 1976 <sup>(a)</sup> | 0.08                          | 1976 <sup>(a)</sup>       |
| 2         | T                         | 1               | 3       | 0.01    | 1976                | 0.01                          | 1996 <sup>(a)</sup>       |
| 3         | T                         | 1               | 2       | 0.29    | 1962                | 0.29                          | 1962                      |
| 4         | T                         | 1               | 2       | 0.01    | 1985                | 0.04                          | 1948                      |
| 5         | T                         | 0               | 3       | T       | 1984 <sup>(a)</sup> | 0.48                          | 1999                      |
| 6         | T                         | 1               | 2       | 0.11    | 1976                | 0.11                          | 1976                      |
| 7         | T                         | 2               | 1       | 0.33    | 1976                | 0.33                          | 1976                      |
| 8         | T                         | 0               | 4       | T       | 1989 <sup>(a)</sup> | 0.08                          | 1952                      |
| 9         | T                         | 2               | 2       | 0.10    | 1982                | 0.10                          | 1982                      |
| 10        | T                         | 0               | 3       | T       | 1984 <sup>(a)</sup> | 0.01                          | 1947                      |
| 11        | T                         | 1               | 4       | 0.01    | 1983                | 0.11                          | 1947                      |
| 12        | 0.01                      | 3               | 5       | 0.18    | 1962                | 0.18                          | 1962                      |
| 13        | 0.01                      | 4               | 2       | 0.04    | 1987 <sup>(a)</sup> | 0.06                          | 1995                      |
| 14        | 0.01                      | 5               | 3       | 0.09    | 1979                | 0.09                          | 1979                      |
| 15        | 0.01                      | 3               | 1       | 0.42    | 1972                | 0.42                          | 1972                      |
| 16        | 0.01                      | 1               | 1       | 0.01    | 1968                | 0.24                          | 1993                      |
| 17        | 0.01                      | 0               | 3       | T       | 1980 <sup>(a)</sup> | T                             | 1995 <sup>(a)</sup>       |
| 18        | 0.01                      | 4               | 3       | 0.69    | 1975                | 0.69                          | 1975                      |
| 19        | 0.01                      | 3               | 5       | 0.05    | 1979                | 0.18                          | 1954                      |
| 20        | 0.01                      | 4               | 6       | 0.03    | 1978                | 0.22                          | 1953                      |
| 21        | 0.02                      | 3               | 4       | 0.76    | 1990                | <b>0.76<sup>(b)</sup></b>     | <b>1990<sup>(b)</sup></b> |
| 22        | 0.01                      | 6               | 1       | 0.18    | 1978                | 0.18                          | 1978                      |
| 23        | 0.02                      | 4               | 1       | 0.14    | 1975                | 0.14                          | 1975                      |
| 24        | 0.02                      | 6               | 1       | 0.38    | 1977                | 0.38                          | 1977                      |
| 25        | 0.01                      | 2               | 6       | 0.29    | 1976                | 0.29                          | 1976                      |
| 26        | 0.01                      | 3               | 4       | 0.19    | 1968                | 0.38                          | 1953                      |
| 27        | 0.01                      | 5               | 3       | 0.14    | 1989                | 0.14                          | 1989                      |
| 28        | 0.01                      | 2               | 4       | 0.13    | 1975                | 0.13                          | 1975                      |
| 29        | 0.01                      | 6               | 1       | 0.28    | 1977                | 0.51                          | 1947                      |
| 30        | 0.01                      | 2               | 4       | 0.61    | 1977                | 0.61                          | 1977                      |
| 31        | 0.01                      | 2               | 3       | 0.02    | 1961                | 0.02                          | 1961 <sup>(a)</sup>       |
| September |                           |                 |         |         |                     |                               |                           |
| 1         | 0.01                      | 7               | 2       | 0.43    | 1971                | 0.43                          | 1971                      |
| 2         | 0.01                      | 2               | 4       | 0.17    | 1971                | 0.17                          | 1971                      |
| 3         | 0.01                      | 3               | 1       | 0.13    | 1979                | 0.15                          | 1997                      |
| 4         | 0.01                      | 1               | 1       | 0.02    | 1977                | 0.19                          | 1960                      |
| 5         | T                         | 3               | 2       | 0.19    | 1971                | 0.19                          | 1971                      |
| 6         | T                         | 3               | 0       | 0.29    | 1971                | 0.48                          | 1995                      |
| 7         | T                         | 2               | 0       | 0.04    | 1978                | 0.23                          | 1947                      |
| 8         | T                         | 2               | 3       | 0.10    | 1985                | 0.10                          | 1985                      |
| 9         | T                         | 2               | 4       | 0.07    | 1985                | 0.07                          | 1985                      |
| 10        | 0.01                      | 3               | 3       | 0.06    | 1985                | 0.06                          | 1985                      |

Table 4.10. (contd)

| Day     | Normal Period (1961-1990) |                 |         |         |                     | Historical Period (1945-1999) |                     |
|---------|---------------------------|-----------------|---------|---------|---------------------|-------------------------------|---------------------|
|         | Normal                    | Number of Years |         | Maximum | Year                | Maximum                       | Year                |
|         |                           | W/Meas.         | W/Trace |         |                     |                               |                     |
| 11      | 0.01                      | 4               | 1       | 0.10    | 1966                | 0.10                          | 1966                |
| 12      | 0.01                      | 0               | 3       | T       | 1980 <sup>(a)</sup> | 0.03                          | 1958                |
| 13      | 0.01                      | 5               | 2       | 0.79    | 1980                | 0.79 <sup>(b)</sup>           | 1980 <sup>(b)</sup> |
| 14      | 0.01                      | 3               | 4       | 0.04    | 1985                | 0.41                          | 1959                |
| 15      | 0.01                      | 2               | 5       | 0.54    | 1986                | 0.54                          | 1986                |
| 16      | 0.02                      | 2               | 7       | 0.03    | 1985                | 0.66                          | 1947                |
| 17      | 0.01                      | 4               | 5       | 0.26    | 1969                | 0.26                          | 1969                |
| 18      | 0.01                      | 4               | 6       | 0.22    | 1983                | 0.41                          | 1959                |
| 19      | 0.01                      | 6               | 4       | 0.26    | 1973                | 0.26                          | 1973                |
| 20      | 0.01                      | 4               | 8       | 0.13    | 1988                | 0.13                          | 1988                |
| 21      | 0.01                      | 2               | 4       | 0.03    | 1971                | 0.03                          | 1971                |
| 22      | 0.01                      | 4               | 4       | 0.20    | 1984                | 0.20                          | 1984                |
| 23      | 0.01                      | 4               | 2       | 0.21    | 1986                | 0.21                          | 1986                |
| 24      | 0.01                      | 4               | 0       | 0.10    | 1977                | 0.10                          | 1977                |
| 25      | 0.01                      | 3               | 3       | 0.25    | 1982                | 0.25                          | 1982                |
| 26      | 0.01                      | 4               | 1       | 0.22    | 1981                | 0.22                          | 1981                |
| 27      | 0.01                      | 4               | 2       | 0.38    | 1981                | 0.43                          | 1955                |
| 28      | 0.01                      | 5               | 3       | 0.34    | 1962                | 0.34                          | 1962                |
| 29      | 0.01                      | 3               | 1       | 0.07    | 1986                | 0.07                          | 1986                |
| 30      | 0.01                      | 2               | 3       | 0.02    | 1969                | 0.03                          | 1953 <sup>(a)</sup> |
| October |                           |                 |         |         |                     |                               |                     |
| 1       | T                         | 2               | 5       | 0.01    | 1969 <sup>(a)</sup> | 1.60 <sup>(b)</sup>           | 1957 <sup>(b)</sup> |
| 2       | T                         | 5               | 5       | 0.06    | 1967                | 0.31                          | 1957                |
| 3       | T                         | 2               | 1       | 0.04    | 1975                | 0.38                          | 1995                |
| 4       | T                         | 1               | 4       | 0.01    | 1970                | 0.15                          | 1950                |
| 5       | T                         | 0               | 9       | T       | 1981 <sup>(a)</sup> | 0.25                          | 1950                |
| 6       | T                         | 5               | 4       | 0.22    | 1973                | 0.22                          | 1973                |
| 7       | 0.01                      | 3               | 3       | 0.25    | 1985                | 0.25                          | 1985                |
| 8       | 0.01                      | 1               | 5       | 0.06    | 1964                | 0.49                          | 1950                |
| 9       | 0.01                      | 5               | 2       | 0.09    | 1968                | 0.32                          | 1947                |
| 10      | 0.01                      | 5               | 4       | 0.09    | 1985                | 0.32                          | 1959                |
| 11      | 0.01                      | 3               | 7       | 0.43    | 1968                | 0.43                          | 1968                |
| 12      | 0.01                      | 6               | 3       | 0.52    | 1962                | 0.52                          | 1962                |
| 13      | 0.01                      | 2               | 3       | 0.04    | 1980                | 0.16                          | 1994                |
| 14      | 0.01                      | 4               | 3       | 0.11    | 1962                | 0.43                          | 1950                |
| 15      | 0.01                      | 1               | 1       | 0.01    | 1980                | 0.15                          | 1947                |
| 16      | 0.01                      | 0               | 1       | T       | 1975                | 0.24                          | 1947                |
| 17      | 0.01                      | 2               | 3       | 0.16    | 1968                | 0.23                          | 1950                |
| 18      | 0.01                      | 4               | 3       | 0.28    | 1979                | 0.28                          | 1979                |
| 19      | 0.02                      | 5               | 4       | 0.12    | 1979                | 0.64                          | 1947                |
| 20      | 0.02                      | 5               | 5       | 0.15    | 1968                | 0.37                          | 1947                |
| 21      | 0.02                      | 8               | 3       | 0.45    | 1975                | 0.45                          | 1975                |
| 22      | 0.02                      | 5               | 9       | 0.20    | 1983                | 0.23                          | 1957                |
| 23      | 0.02                      | 4               | 2       | 0.39    | 1973                | 0.39                          | 1973                |
| 24      | 0.02                      | 4               | 5       | 0.11    | 1979                | 0.12                          | 1991                |
| 25      | 0.02                      | 5               | 3       | 0.22    | 1975                | 0.22                          | 1975                |
| 26      | 0.02                      | 6               | 3       | 0.12    | 1989                | 0.18                          | 1956                |
| 27      | 0.02                      | 7               | 4       | 0.09    | 1969                | 0.36                          | 1999                |
| 28      | 0.02                      | 4               | 6       | 0.93    | 1982                | 0.93                          | 1982                |
| 29      | 0.02                      | 7               | 8       | 0.18    | 1986                | 0.38                          | 1950                |
| 30      | 0.02                      | 3               | 7       | 0.52    | 1990                | 0.52                          | 1990                |
| 31      | 0.02                      | 3               | 6       | 0.64    | 1973                | 0.64                          | 1973                |

Table 4.10. (contd)

| Day      | Normal Period (1961-1990) |                 |         |         | Historical Period (1945-1999) |                     |                     |
|----------|---------------------------|-----------------|---------|---------|-------------------------------|---------------------|---------------------|
|          | Normal                    | Number of Years |         | Maximum | Year                          | Maximum             | Year                |
|          |                           | W/Meas.         | W/Trace |         |                               |                     |                     |
| November |                           |                 |         |         |                               |                     |                     |
| 1        | 0.02                      | 7               | 3       | 0.18    | 1987                          | 0.26                | 1948                |
| 2        | 0.02                      | 6               | 2       | 0.25    | 1984                          | 0.25                | 1984                |
| 3        | 0.02                      | 8               | 3       | 0.28    | 1965                          | 0.28                | 1965                |
| 4        | 0.02                      | 9               | 5       | 0.19    | 1973                          | 0.24                | 1991                |
| 5        | 0.02                      | 9               | 2       | 0.19    | 1963                          | 0.62                | 1998                |
| 6        | 0.02                      | 8               | 4       | 0.30    | 1980                          | 0.30                | 1980 <sup>(a)</sup> |
| 7        | 0.03                      | 5               | 7       | 0.23    | 1963                          | 0.57                | 1967                |
| 8        | 0.03                      | 9               | 6       | 0.50    | 1968                          | 0.50                | 1968                |
| 9        | 0.04                      | 8               | 7       | 0.16    | 1973                          | 0.27                | 1949                |
| 10       | 0.04                      | 11              | 4       | 0.66    | 1983                          | 0.66                | 1983                |
| 11       | 0.04                      | 12              | 3       | 0.26    | 1970                          | 0.26                | 1970                |
| 12       | 0.04                      | 10              | 4       | 0.57    | 1973                          | 0.57                | 1973                |
| 13       | 0.04                      | 7               | 4       | 0.47    | 1981                          | 0.47                | 1981                |
| 14       | 0.04                      | 7               | 6       | 0.35    | 1966                          | 0.35                | 1966                |
| 15       | 0.04                      | 12              | 5       | 0.17    | 1985                          | 0.19                | 1994                |
| 16       | 0.03                      | 9               | 5       | 0.42    | 1979                          | 0.42                | 1979                |
| 17       | 0.03                      | 9               | 7       | 0.12    | 1974                          | 0.18                | 1955                |
| 18       | 0.03                      | 7               | 4       | 0.46    | 1982                          | 0.51                | 1996                |
| 19       | 0.03                      | 7               | 5       | 0.37    | 1966                          | 1.39 <sup>(b)</sup> | 1996 <sup>(b)</sup> |
| 20       | 0.03                      | 4               | 7       | 0.42    | 1966                          | 0.42                | 1966                |
| 21       | 0.03                      | 6               | 8       | 0.50    | 1985                          | 0.50                | 1985                |
| 22       | 0.03                      | 6               | 10      | 0.30    | 1979                          | 0.30                | 1979                |
| 23       | 0.03                      | 12              | 5       | 0.42    | 1983                          | 0.63                | 1949                |
| 24       | 0.03                      | 10              | 7       | 0.37    | 1965                          | 0.37                | 1965                |
| 25       | 0.03                      | 5               | 10      | 0.25    | 1977                          | 0.25                | 1977                |
| 26       | 0.03                      | 8               | 6       | 0.11    | 1986 <sup>(a)</sup>           | 0.54                | 1955                |
| 27       | 0.03                      | 9               | 6       | 0.49    | 1984                          | 0.49                | 1984                |
| 28       | 0.02                      | 9               | 7       | 0.19    | 1986                          | 0.19                | 1986                |
| 29       | 0.03                      | 8               | 7       | 0.18    | 1978                          | 0.18                | 1978                |
| 30       | 0.03                      | 9               | 5       | 0.30    | 1962                          | 0.34                | 1998                |
| December |                           |                 |         |         |                               |                     |                     |
| 1        | 0.03                      | 8               | 4       | 0.19    | 1966                          | 0.29                | 1955                |
| 2        | 0.04                      | 8               | 8       | 0.34    | 1985 <sup>(a)</sup>           | 0.34                | 1985 <sup>(a)</sup> |
| 3        | 0.04                      | 7               | 9       | 0.56    | 1980                          | 0.56                | 1980                |
| 4        | 0.03                      | 13              | 3       | 0.28    | 1974                          | 0.28                | 1974                |
| 5        | 0.04                      | 11              | 7       | 0.43    | 1963                          | 0.43                | 1963                |
| 6        | 0.04                      | 12              | 8       | 0.18    | 1985                          | 0.18                | 1985                |
| 7        | 0.03                      | 8               | 5       | 0.32    | 1983                          | 0.36                | 1948                |
| 8        | 0.03                      | 5               | 7       | 0.36    | 1963                          | 0.36                | 1963                |
| 9        | 0.03                      | 9               | 8       | 0.55    | 1987                          | 0.55                | 1987                |
| 10       | 0.03                      | 9               | 4       | 0.25    | 1990                          | 0.54                | 1958                |
| 11       | 0.04                      | 6               | 8       | 0.33    | 1969                          | 0.53                | 1958                |
| 12       | 0.04                      | 10              | 5       | 0.29    | 1982                          | 0.65                | 1995                |
| 13       | 0.03                      | 8               | 5       | 0.76    | 1977                          | 0.76                | 1977                |
| 14       | 0.04                      | 12              | 5       | 0.25    | 1964                          | 0.25                | 1964                |
| 15       | 0.04                      | 15              | 2       | 0.22    | 1981                          | 0.22                | 1981                |
| 16       | 0.04                      | 9               | 9       | 0.30    | 1961                          | 0.37                | 1994                |
| 17       | 0.04                      | 10              | 5       | 0.22    | 1973                          | 0.22                | 1973                |
| 18       | 0.04                      | 11              | 8       | 0.22    | 1981                          | 0.27                | 1960                |
| 19       | 0.04                      | 15              | 7       | 0.19    | 1964                          | 0.20                | 1953                |
| 20       | 0.04                      | 13              | 7       | 0.33    | 1982                          | 0.33                | 1982                |
| 21       | 0.04                      | 10              | 10      | 0.54    | 1964                          | 0.61                | 1955                |

Table 4.10. (contd)

| Day | Normal Period (1961-1990) |                 |         |         |                     | Historical Period (1945-1999) |                     |
|-----|---------------------------|-----------------|---------|---------|---------------------|-------------------------------|---------------------|
|     | Normal                    | Number of Years |         | Maximum | Year                | Maximum                       | Year                |
|     |                           | W/Meas.         | W/Trace |         |                     |                               |                     |
| 22  | 0.04                      | 9               | 5       | 0.59    | 1964                | 0.59                          | 1964                |
| 23  | 0.04                      | 7               | 7       | 0.31    | 1975                | 0.31                          | 1975                |
| 24  | 0.04                      | 11              | 8       | 0.36    | 1968                | 0.36                          | 1968                |
| 25  | 0.03                      | 12              | 6       | 0.26    | 1980                | 0.32                          | 1996                |
| 26  | 0.03                      | 9               | 6       | 0.19    | 1973                | 0.58                          | 1996                |
| 27  | 0.03                      | 11              | 7       | 0.36    | 1973                | 0.36                          | 1973                |
| 28  | 0.02                      | 10              | 11      | 0.09    | 1990 <sup>(a)</sup> | 0.10                          | 1951                |
| 29  | 0.02                      | 9               | 7       | 0.55    | 1983                | 0.80 <sup>(b)</sup>           | 1996 <sup>(b)</sup> |
| 30  | 0.02                      | 5               | 9       | 0.15    | 1979                | 0.28                          | 1995                |
| 31  | 0.02                      | 4               | 9       | 0.29    | 1968                | 0.72                          | 1996                |

(a) Most recent of several occurrences.

(b) Greatest and year of occurrence.

T = Trace.



## 5.0 Wind Climatology

### 5.1 Monthly and Annual Prevailing Wind Directions, Average Speeds, and Peak Gusts

At the Hanford Meteorology Station, the prevailing wind direction for every month of the year is either WNW or NW (Table 5.1), and the peak gusts for every month are from the SSW, SW, or WSW. The highest monthly average wind speeds occur in June, the lowest in December. The variability in monthly average wind speeds is much greater in the winter months than during the remainder of the year. The highest January average (10.3 mph) is less than 3.5 times greater than the lowest (2.9 mph); however, in June, the highest average (10.7 mph) is only 1.4 times greater than the lowest (7.7 mph).

**Table 5.1.** Monthly and Annual Prevailing Wind Directions, Average Speeds, and Peak Gusts at 50-Foot Level, 1945 Through 1999

| Month  | Prevailing Direction | Average Speed, mph | Highest Average, mph | Lowest Average, mph |      | Peak Gusts          |           |      |          |
|--------|----------------------|--------------------|----------------------|---------------------|------|---------------------|-----------|------|----------|
|        |                      |                    |                      | Year                | Year | Speed, mph          | Direction | Year |          |
| Jan    | NW                   | 6.3                | 10.3                 | 1972                | 2.9  | 1985                | 80        | SW   | 1972     |
| Feb    | NW                   | 7.1                | 11.1                 | 1999                | 4.6  | 1963                | 65        | SW   | 1971     |
| Mar    | WNW                  | 8.2                | 10.7                 | 1977 <sup>(a)</sup> | 5.9  | 1958                | 70        | SW   | 1956     |
| Apr    | WNW                  | 8.9                | 11.1                 | 1972 <sup>(a)</sup> | 7.4  | 1989 <sup>(a)</sup> | 73        | SSW  | 1972     |
| May    | WNW                  | 8.8                | 10.7                 | 1983                | 5.8  | 1957                | 71        | SSW  | 1948     |
| Jun    | NW                   | 9.1                | 10.7                 | 1983 <sup>(a)</sup> | 7.7  | 1950 <sup>(a)</sup> | 72        | SW   | 1957     |
| Jul    | NW                   | 8.6                | 10.7                 | 1983                | 6.8  | 1955                | 69        | WSW  | 1979     |
| Aug    | WNW                  | 8.0                | 9.5                  | 1996                | 6.0  | 1956                | 66        | SW   | 1961     |
| Sep    | WNW                  | 7.5                | 9.2                  | 1961                | 5.4  | 1957                | 65        | SSW  | 1953     |
| Oct    | NW                   | 6.6                | 9.1                  | 1946                | 4.4  | 1952                | 72        | SW   | 1997     |
| Nov    | NW                   | 6.3                | 10.0                 | 1990                | 2.9  | 1956                | 67        | WSW  | 1993     |
| Dec    | NW                   | 6.0                | 8.3                  | 1968                | 3.3  | 1985                | 71        | SW   | 1955     |
| Annual | NW                   | 7.6                | 8.8                  | 1999                | 6.2  | 1989                | 80        | SW   | Jan 1972 |

(a) Also in earlier years.

### 5.2 Days with Peak Gusts Above or Below Specific Thresholds

Table 5.2 lists the number of days by month and year with peak wind gusts (at 50 foot) above or below specific threshold wind speeds. June and July have the highest average number of days with gusts  $\geq 25$  mph (nearly 20 each); however, January, March, and April have the highest average number of days with gusts  $\geq 40$  mph (nearly 3 days) and January has the highest average number of days with gusts  $\geq 50$  mph (0.9 day). January also has the record highest number of gusts  $\geq 40$  and  $\geq 50$  mph at 11 and

**Table 5.2. Number of Days with Peak Gusts Above or Below Specific Thresholds at 50-Foot Level, 1945 Through 1999**

| Month  | Days with Peak Gusts ≤12 mph |     |                     | Days with Peak Gusts ≥25 mph |     |                     | Days with Peak Gusts ≥40 mph |     |                     | Days with Peak Gusts ≥50 mph |     |                     |
|--------|------------------------------|-----|---------------------|------------------------------|-----|---------------------|------------------------------|-----|---------------------|------------------------------|-----|---------------------|
|        | Avg                          | Max | Year                | Avg                          | Max | Year                | Avg                          | Max | Year                | Avg                          | Max | Year                |
| Jan    | 9.7                          | 29  | 1985                | 7.7                          | 21  | 1953                | 2.9                          | 11  | 1990 <sup>(a)</sup> | 0.9                          | 7   | 1990                |
| Feb    | 6.4                          | 16  | 1963                | 8.7                          | 17  | 1976 <sup>(a)</sup> | 2.5                          | 10  | 1999 <sup>(a)</sup> | 0.6                          | 4   | 1972                |
| Mar    | 2.7                          | 8   | 1992                | 13.0                         | 21  | 1977                | 2.8                          | 9   | 1956                | 0.6                          | 4   | 1956                |
| Apr    | 0.6                          | 6   | 1951                | 17.3                         | 26  | 1954                | 2.8                          | 8   | 1991                | 0.4                          | 2   | 1997 <sup>(a)</sup> |
| May    | 0.3                          | 3   | 1955                | 18.6                         | 26  | 1978                | 2.3                          | 6   | 1990 <sup>(a)</sup> | 0.2                          | 2   | 1993 <sup>(a)</sup> |
| Jun    | 0.1                          | 1   | 1980 <sup>(a)</sup> | 19.6                         | 26  | 1963                | 2.3                          | 7   | 1985                | 0.3                          | 2   | 1992 <sup>(a)</sup> |
| Jul    | 0.1                          | 1   | 1957 <sup>(a)</sup> | 19.4                         | 26  | 1995                | 1.8                          | 5   | 1995 <sup>(a)</sup> | 0.1                          | 1   | 1995 <sup>(a)</sup> |
| Aug    | 0.3                          | 2   | 1972                | 15.6                         | 22  | 1988 <sup>(a)</sup> | 1.2                          | 5   | 1951                | 0.1                          | 1   | 1998 <sup>(a)</sup> |
| Sep    | 2.4                          | 9   | 1987                | 11.2                         | 17  | 1971                | 1.3                          | 4   | 1946                | 0.2                          | 2   | 1953                |
| Oct    | 6.8                          | 15  | 1974                | 8.9                          | 17  | 1985 <sup>(a)</sup> | 1.8                          | 8   | 1967                | 0.2                          | 2   | 1967                |
| Nov    | 9.0                          | 20  | 1956 <sup>(a)</sup> | 8.4                          | 16  | 1990                | 2.4                          | 8   | 1990                | 0.6                          | 4   | 1998 <sup>(a)</sup> |
| Dec    | 11.1                         | 23  | 1985                | 7.6                          | 15  | 1968                | 2.6                          | 8   | 1957 <sup>(a)</sup> | 0.7                          | 3   | 1995 <sup>(a)</sup> |
| Annual | 49.5                         | 87  | 1952                | 155.8                        | 192 | 1999                | 26.8                         | 57  | 1990                | 4.9                          | 18  | 1990                |

(a) Most recent of multiple occurrences.

7 days, respectively, in 1990. Calendar year 1990 recorded the most days with gusts  $\geq 40$  and  $\geq 50$  mph at 57 and 18 days, respectively. Of particular interest is that previous records for these categories were 41 days  $\geq 40$  mph in 1961 and 10 days  $\geq 50$  mph in 1972.

### 5.3 Frequency of Monthly and Annual Wind Direction and Speed at 50-Foot Level

Table 5.3 presents Hanford Meteorology Station data on the percent frequency of monthly and annual wind direction and wind speed at 50 foot. This table shows that for every month of the year the prevailing wind direction is either from the WNW or NW. Winds are relatively evenly distributed from the NNE through the SSW at between 2% and 4% on an annual average for each direction.

**Table 5.3.** Frequency (%) of Monthly and Annual Wind Direction and Speed at 50-Foot Level, 1955 Through 1999

| Direction  | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   | Total |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| N          | 4.3   | 4.7   | 4.7   | 4.1   | 3.8   | 3.6   | 4.6   | 4.7   | 5.6   | 5.0   | 4.3   | 4.3   | 4.5   |
| NNE        | 3.7   | 4.6   | 4.5   | 3.7   | 3.5   | 3.2   | 4.3   | 4.0   | 5.5   | 4.1   | 3.5   | 3.3   | 4.0   |
| NE         | 3.0   | 3.7   | 3.5   | 3.5   | 3.4   | 3.2   | 3.7   | 3.5   | 4.2   | 3.5   | 3.0   | 2.9   | 3.4   |
| ENE        | 2.3   | 2.1   | 2.1   | 2.4   | 2.5   | 2.2   | 2.6   | 2.5   | 2.4   | 2.6   | 2.5   | 2.5   | 2.4   |
| E          | 2.7   | 2.2   | 2.2   | 2.5   | 2.4   | 2.5   | 2.9   | 3.1   | 3.1   | 2.9   | 2.7   | 2.7   | 2.7   |
| ESE        | 2.8   | 2.6   | 2.7   | 2.5   | 2.6   | 2.7   | 2.8   | 3.3   | 3.2   | 3.7   | 3.2   | 3.2   | 3.0   |
| SE         | 4.1   | 3.6   | 3.7   | 3.0   | 3.1   | 2.9   | 2.9   | 3.5   | 3.8   | 5.0   | 4.4   | 4.5   | 3.7   |
| SSE        | 3.4   | 3.4   | 3.4   | 3.0   | 3.0   | 2.8   | 2.5   | 2.8   | 3.3   | 4.0   | 3.9   | 3.7   | 3.3   |
| S          | 3.4   | 3.3   | 3.5   | 3.1   | 2.7   | 2.7   | 2.4   | 2.6   | 2.6   | 3.6   | 4.1   | 3.6   | 3.1   |
| SSW        | 4.9   | 4.5   | 5.0   | 4.3   | 3.6   | 3.4   | 2.7   | 3.0   | 3.3   | 4.2   | 5.2   | 4.7   | 4.1   |
| SW         | 6.5   | 7.9   | 9.2   | 8.7   | 6.8   | 6.5   | 5.6   | 5.9   | 5.8   | 6.9   | 7.7   | 6.9   | 7.0   |
| WSW        | 6.5   | 7.5   | 10.4  | 11.8  | 10.4  | 9.7   | 8.3   | 8.8   | 9.3   | 8.6   | 7.9   | 7.3   | 8.9   |
| W          | 6.6   | 8.2   | 9.5   | 11.6  | 11.5  | 10.9  | 9.6   | 10.7  | 11.2  | 10.3  | 8.2   | 7.2   | 9.6   |
| WNW        | 15.2  | 14.6  | 14.6  | 16.4  | 18.4  | 19.1  | 19.4  | 17.9  | 15.1  | 13.3  | 12.7  | 13.6  | 15.8  |
| NW         | 19.3  | 17.8  | 14.5  | 14.4  | 17.5  | 19.5  | 20.1  | 17.8  | 14.7  | 13.6  | 15.8  | 17.9  | 16.9  |
| NNW        | 7.4   | 6.8   | 5.8   | 4.6   | 4.3   | 4.8   | 5.3   | 5.4   | 5.9   | 6.5   | 7.1   | 7.0   | 5.9   |
| Calm       | 4.1   | 2.4   | 0.8   | 0.5   | 0.5   | 0.4   | 0.3   | 0.5   | 0.9   | 2.2   | 3.7   | 4.7   | 1.7   |
| Total      | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Speed, mph | Jan   | Feb   | Mar   | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   | Total |
| Calm       | 4.1   | 2.4   | 0.8   | 0.5   | 0.5   | 0.4   | 0.3   | 0.5   | 0.9   | 2.2   | 3.7   | 4.7   | 1.7   |
| 1-3        | 30.7  | 24.6  | 16.8  | 13.1  | 11.7  | 9.6   | 10.7  | 13.4  | 18.1  | 26.3  | 29.4  | 33.4  | 19.8  |
| 4-7        | 34.5  | 35.4  | 36.5  | 34.7  | 35.1  | 35.9  | 39.2  | 42.2  | 41.5  | 39.0  | 35.6  | 33.5  | 36.9  |
| 8-12       | 20.1  | 23.9  | 27.6  | 28.7  | 30.6  | 30.3  | 29.3  | 27.7  | 25.9  | 21.7  | 20.2  | 18.2  | 25.3  |
| 13-18      | 6.8   | 8.8   | 12.1  | 15.7  | 15.7  | 16.5  | 14.3  | 11.8  | 9.8   | 7.7   | 7.1   | 6.4   | 11.0  |
| 19-24      | 2.5   | 3.3   | 4.5   | 5.7   | 5.5   | 6.2   | 5.3   | 3.9   | 3.2   | 2.6   | 2.8   | 2.6   | 4.0   |
| 25-31      | 1.0   | 1.3   | 1.5   | 1.5   | 0.9   | 1.1   | 0.9   | 0.6   | 0.6   | 0.6   | 1.0   | 0.9   | 1.0   |
| 32-38      | 0.3   | 0.3   | 0.2   | 0.1   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.2   | 0.2   | 0.1   |
| 39-46      | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| >46        | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total      | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

The wind speed class with the highest frequency of occurrence is 4 to 7 mph, with winds in that category 37% of the time. The speed class with the second highest frequency is 8 to 12 mph, at 25%. Winds averaging greater than 25 mph occur only 1% of the time on an annual basis, with the highest frequency occurring in March (1.7%).

## **5.4 Composite Wind Roses and Joint Frequency Distributions for the Hanford Meteorological Monitoring Network**

Figure 5.1 and Table 5.4 contain composite wind roses and joint frequency distributions at the 10-meter level for the entire Hanford Meteorological Monitoring Network (see Table 1.1 and Figure 1.1) for the period 1982 through 1999.

Figure 5.2 and Table 5.5 contain composite wind roses and joint frequency distributions at the 60-meter level for stations 9, 11, 13, and 21 for the period 1986 through 1999.

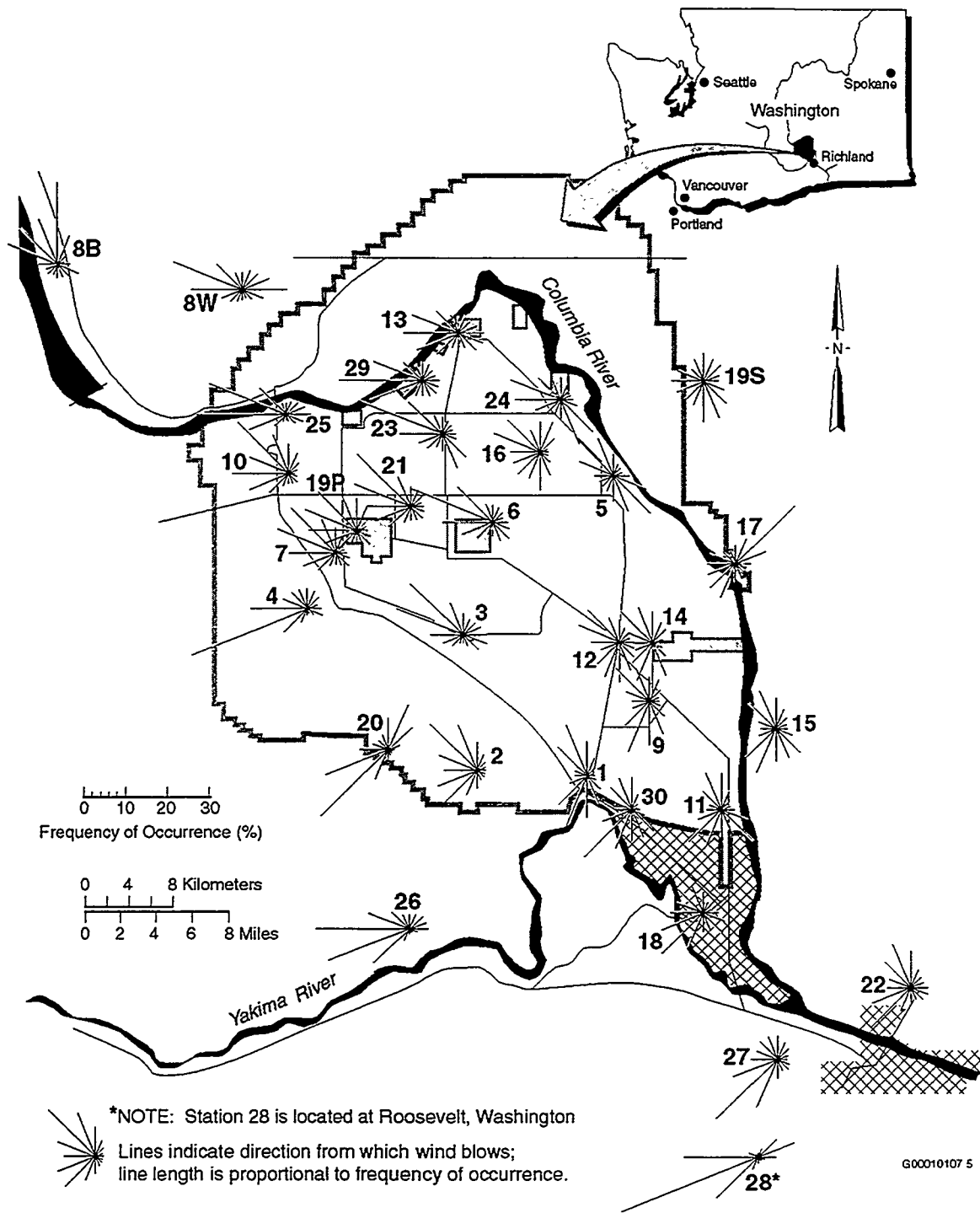


Figure 5.1. Hanford Meteorological Monitoring Network Wind Roses at 10-Meter Level, 1982 Through 1999

**Table 5.4. Joint Frequency Distributions (%) for Hanford Meteorological Monitoring Network Wind Stations at 10-Meter Level, 1982 Through 1999**

**Station: (1) PROS**

|       | Begin: 1/82 |     |     |     |     |     |     |     |     |      |     |     |     |     |     |      | End: 12/99 |       | Total Hours: 153237 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|------------|-------|---------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |      |     |     |     |     |     |      |            |       |                     |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW  | WSW | W   | WNW | NW  | NNW  | CALM       | TOTAL |                     |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 1.2        | 1.2   |                     |
| 1-3   | 2.2         | 1.5 | 1.3 | 0.9 | 1.0 | 1.2 | 1.7 | 2.2 | 2.4 | 2.2  | 1.7 | 1.2 | 1.1 | 1.4 | 2.1 | 2.6  | 0.0        | 26.8  |                     |
| 4-7   | 3.3         | 1.9 | 1.1 | 0.7 | 0.8 | 1.0 | 2.1 | 4.0 | 4.6 | 3.6  | 2.0 | 0.8 | 0.7 | 1.0 | 3.0 | 5.0  | 0.0        | 35.5  |                     |
| 8-12  | 1.9         | 0.9 | 0.3 | 0.1 | 0.1 | 0.2 | 0.5 | 1.0 | 2.4 | 4.4  | 2.5 | 0.8 | 0.5 | 0.5 | 2.6 | 4.0  | 0.0        | 22.8  |                     |
| 13-18 | 0.6         | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 2.5  | 2.0 | 0.9 | 0.4 | 0.2 | 1.5 | 1.3  | 0.0        | 10.3  |                     |
| 19-24 | 0.1         | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4  | 0.7 | 0.4 | 0.2 | 0.0 | 0.4 | 0.2  | 0.0        | 2.6   |                     |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.3 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0  | 0.0        | 0.7   |                     |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0        | 0.1   |                     |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0        | 0.0   |                     |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0        | 0.0   |                     |
| TOTAL | 8.1         | 4.6 | 2.8 | 1.8 | 1.9 | 2.5 | 4.3 | 7.2 | 9.8 | 13.2 | 9.4 | 4.3 | 3.0 | 3.2 | 9.7 | 13.1 | 1.2        | 100.0 |                     |

**Station: (2) EOC**

|       | Begin: 1/82 |     |     |     |     |     |     |     |     |     |      |     |     |     |      |      | End: 12/99 |       | Total Hours: 154098 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|------|------|------------|-------|---------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |      |     |     |     |      |      |            |       |                     |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW | W   | WNW | NW   | NNW  | CALM       | TOTAL |                     |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 1.0        | 1.0   |                     |
| 1-3   | 1.3         | 1.2 | 1.2 | 1.0 | 0.9 | 0.9 | 0.8 | 0.9 | 1.2 | 1.2 | 1.2  | 1.2 | 1.6 | 1.8 | 1.8  | 1.4  | 0.0        | 19.6  |                     |
| 4-7   | 2.8         | 1.9 | 1.2 | 0.9 | 1.0 | 1.1 | 1.1 | 1.2 | 1.9 | 2.0 | 1.5  | 1.2 | 2.0 | 3.6 | 4.1  | 3.3  | 0.0        | 30.8  |                     |
| 8-12  | 1.8         | 0.6 | 0.2 | 0.1 | 0.0 | 0.1 | 0.2 | 0.4 | 1.0 | 2.2 | 2.7  | 1.9 | 1.5 | 3.2 | 5.9  | 4.0  | 0.0        | 25.6  |                     |
| 13-18 | 0.6         | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.6 | 2.2  | 2.3 | 1.4 | 0.7 | 3.1  | 2.4  | 0.0        | 13.7  |                     |
| 19-24 | 0.1         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.6  | 2.0 | 0.8 | 0.2 | 0.5  | 0.4  | 0.0        | 5.9   |                     |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1  | 1.0 | 0.3 | 0.1 | 0.1  | 0.0  | 0.0        | 2.6   |                     |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3  | 0.2 | 0.1 | 0.0 | 0.0  | 0.0  | 0.0        | 0.6   |                     |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0        | 0.1   |                     |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0        | 0.0   |                     |
| TOTAL | 6.6         | 3.9 | 2.7 | 2.0 | 2.0 | 2.0 | 2.2 | 2.5 | 4.3 | 6.3 | 10.5 | 9.8 | 7.7 | 9.5 | 15.5 | 11.5 | 1.0        | 100.0 |                     |

**Station: (3) ARMY**

|       | Begin: 1/82 |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     | End: 12/99 |       | Total Hours: 153884 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------------|-------|---------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     |            |       |                     |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW | CALM       | TOTAL |                     |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 1.0        | 1.0   |                     |
| 1-3   | 1.9         | 1.7 | 2.0 | 2.3 | 2.6 | 2.4 | 1.8 | 1.2 | 0.9 | 0.8 | 0.9 | 1.2 | 2.2 | 3.2  | 3.2  | 2.4 | 0.0        | 30.5  |                     |
| 4-7   | 2.1         | 1.4 | 1.5 | 1.9 | 2.5 | 2.8 | 2.1 | 0.9 | 0.6 | 0.5 | 0.6 | 0.9 | 2.4 | 7.2  | 7.6  | 3.4 | 0.0        | 38.4  |                     |
| 8-12  | 0.9         | 0.5 | 0.3 | 0.2 | 0.4 | 0.7 | 0.9 | 0.6 | 0.4 | 0.4 | 0.6 | 1.1 | 1.9 | 4.6  | 4.0  | 1.5 | 0.0        | 19.0  |                     |
| 13-18 | 0.2         | 0.2 | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.2 | 0.3 | 0.6 | 1.1 | 1.0 | 1.1  | 1.5  | 0.4 | 0.0        | 7.2   |                     |
| 19-24 | 0.0         | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.6 | 0.3 | 0.2  | 0.6  | 0.1 | 0.0        | 2.6   |                     |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.2 | 0.1 | 0.0  | 0.1  | 0.0 | 0.0        | 0.9   |                     |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.2   |                     |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.0   |                     |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.0   |                     |
| TOTAL | 5.1         | 3.8 | 3.9 | 4.4 | 5.5 | 6.0 | 5.1 | 2.9 | 2.1 | 2.2 | 3.7 | 5.1 | 7.8 | 16.2 | 17.1 | 7.9 | 1.0        | 100.0 |                     |

**Station: (4) RSPG**

|       | Begin: 1/82 |     |     |     |     |     |     |     |     |     |     |      |      |     |     |     | End: 12/99 |       | Total Hours: 153037 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|------------|-------|---------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |     |      |      |     |     |     |            |       |                     |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW | NW  | NNW | CALM       | TOTAL |                     |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 1.1        | 1.1   |                     |
| 1-3   | 1.7         | 1.9 | 2.0 | 1.7 | 1.8 | 1.7 | 1.2 | 0.8 | 0.8 | 1.0 | 1.9 | 2.8  | 1.9  | 1.2 | 1.1 | 1.3 | 0.0        | 24.7  |                     |
| 4-7   | 2.6         | 2.2 | 1.5 | 1.0 | 1.6 | 2.1 | 0.9 | 0.4 | 0.5 | 0.7 | 2.4 | 10.0 | 4.5  | 1.8 | 1.8 | 2.2 | 0.0        | 36.0  |                     |
| 8-12  | 0.5         | 0.4 | 0.2 | 0.1 | 0.1 | 0.3 | 0.1 | 0.1 | 0.2 | 0.7 | 1.7 | 13.9 | 5.1  | 2.3 | 1.5 | 1.1 | 0.0        | 28.3  |                     |
| 13-18 | 0.0         | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 1.0 | 2.0  | 1.8  | 0.9 | 0.7 | 0.4 | 0.0        | 7.7   |                     |
| 19-24 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.5 | 0.4  | 0.2  | 0.1 | 0.1 | 0.1 | 0.0        | 1.7   |                     |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.4   |                     |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.1   |                     |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.0   |                     |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.0   |                     |
| TOTAL | 4.8         | 4.6 | 3.8 | 2.7 | 3.6 | 4.1 | 2.1 | 1.2 | 1.6 | 3.4 | 7.7 | 29.2 | 13.5 | 6.2 | 5.2 | 5.1 | 1.1        | 100.0 |                     |

Table 5.4. (contd)

Station: (5) EDNA

Begin: 1/82

End: 12/99

Total Hours: 154273

|       | DIRECTION |     |     |     |     |     |      |     |     |     |     |     |     |     |      |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE   | SSE | S   | SSW | SW  | WSW | W   | WNW | NW   | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 1.3   | 1.3   |
| 1-3   | 1.3       | 0.8 | 0.7 | 0.8 | 1.2 | 2.1 | 3.6  | 3.9 | 3.1 | 1.9 | 1.4 | 1.2 | 1.7 | 2.8 | 3.3  | 2.3 | 0.0  | 32.2  | 32.2  |
| 4-7   | 2.3       | 1.1 | 0.9 | 1.0 | 2.0 | 4.5 | 7.1  | 3.7 | 1.6 | 0.8 | 0.7 | 0.7 | 1.0 | 2.4 | 5.9  | 4.8 | 0.0  | 40.7  | 40.7  |
| 8-12  | 1.2       | 0.6 | 0.4 | 0.2 | 0.7 | 1.7 | 1.4  | 1.1 | 0.9 | 0.6 | 0.6 | 0.9 | 1.1 | 1.7 | 2.2  | 1.9 | 0.0  | 17.0  | 17.0  |
| 13-18 | 0.2       | 0.2 | 0.2 | 0.1 | 0.0 | 0.1 | 0.2  | 0.3 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 1.3 | 1.0  | 0.2 | 0.0  | 6.4   | 6.4   |
| 19-24 | 0.0       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.1 | 0.2 | 0.2 | 0.3 | 0.2 | 0.5 | 0.3  | 0.0 | 0.0  | 1.9   | 1.9   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0  | 0.0 | 0.0  | 0.4   | 0.4   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 5.0       | 2.8 | 2.3 | 2.2 | 3.9 | 8.4 | 12.3 | 9.0 | 6.2 | 3.9 | 3.5 | 3.8 | 4.6 | 8.8 | 12.7 | 9.2 | 1.3  | 100.0 | 100.0 |

Station: (6) 200E

Begin: 1/82

End: 12/99

Total Hours: 153782

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |      |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW   | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.9   | 0.9   |
| 1-3   | 1.5       | 1.4 | 1.5 | 1.5 | 1.7 | 1.7 | 1.7 | 1.3 | 1.1 | 1.0 | 1.0 | 1.1 | 1.4  | 1.8  | 1.9  | 1.7 | 0.0  | 23.4  | 23.4  |
| 4-7   | 1.6       | 1.4 | 1.0 | 1.0 | 1.5 | 2.1 | 2.9 | 2.4 | 1.5 | 1.1 | 1.5 | 2.3 | 4.3  | 6.2  | 4.4  | 2.2 | 0.0  | 37.4  | 37.4  |
| 8-12  | 0.7       | 0.7 | 0.3 | 0.1 | 0.2 | 0.4 | 0.8 | 1.1 | 0.7 | 0.5 | 1.0 | 2.1 | 4.3  | 7.6  | 2.8  | 0.7 | 0.0  | 24.1  | 24.1  |
| 13-18 | 0.2       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.3 | 0.8 | 1.2 | 1.3  | 3.5  | 1.4  | 0.1 | 0.0  | 9.9   | 9.9   |
| 19-24 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.6 | 0.2  | 1.0  | 0.7  | 0.0 | 0.0  | 3.4   | 3.4   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.1  | 0.2  | 0.2  | 0.0 | 0.0  | 0.8   | 0.8   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 4.0       | 3.8 | 3.1 | 2.7 | 3.5 | 4.2 | 5.5 | 5.0 | 3.6 | 3.1 | 5.1 | 7.7 | 11.7 | 20.1 | 11.5 | 4.6 | 0.9  | 100.0 | 100.0 |

Station: (7) 200W

Begin: 1/82

End: 12/99

Total Hours: 140096

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |      |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW   | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 1.7   | 1.7   |
| 1-3   | 2.2       | 1.8 | 1.5 | 1.4 | 1.6 | 1.7 | 2.2 | 2.0 | 1.8 | 1.7 | 2.0 | 2.6 | 3.6  | 4.4  | 3.7  | 2.6 | 0.0  | 36.8  | 36.8  |
| 4-7   | 3.0       | 1.6 | 1.0 | 0.8 | 0.9 | 1.5 | 1.7 | 1.0 | 0.7 | 0.8 | 1.2 | 1.9 | 4.0  | 6.8  | 5.2  | 3.4 | 0.0  | 35.4  | 35.4  |
| 8-12  | 0.7       | 0.5 | 0.2 | 0.1 | 0.1 | 0.3 | 0.4 | 0.2 | 0.2 | 0.6 | 1.1 | 1.7 | 2.5  | 2.9  | 3.2  | 1.8 | 0.0  | 16.4  | 16.4  |
| 13-18 | 0.1       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 1.0 | 1.4 | 0.7  | 0.7  | 2.0  | 0.4 | 0.0  | 7.1   | 7.1   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.5 | 0.2  | 0.1  | 0.8  | 0.1 | 0.0  | 2.2   | 2.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0  | 0.0  | 0.1  | 0.0 | 0.0  | 0.4   | 0.4   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 6.0       | 4.1 | 2.9 | 2.2 | 2.6 | 3.5 | 4.2 | 3.2 | 2.9 | 3.5 | 5.9 | 8.2 | 11.0 | 14.9 | 14.9 | 8.3 | 1.7  | 100.0 | 100.0 |

Station: (8) BVLY

Begin: 8/91

End: 12/99

Total Hours: 73038

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW  |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 1.0   | 1.0   |
| 1-3   | 2.7       | 2.1 | 1.6 | 1.3 | 1.6 | 1.8 | 1.9 | 1.7 | 1.7 | 1.3 | 1.1 | 1.1 | 1.2 | 1.5  | 2.0  | 2.4  | 0.0  | 27.0  | 27.0  |
| 4-7   | 8.4       | 3.0 | 0.6 | 0.4 | 1.2 | 2.9 | 1.8 | 1.2 | 1.1 | 0.8 | 0.7 | 0.8 | 1.4 | 2.5  | 4.5  | 6.7  | 0.0  | 38.0  | 38.0  |
| 8-12  | 7.3       | 1.9 | 0.2 | 0.0 | 0.3 | 0.8 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 1.2 | 3.3  | 2.9  | 2.2  | 0.0  | 22.1  | 22.1  |
| 13-18 | 0.5       | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.5 | 0.3 | 0.5 | 3.4  | 2.1  | 0.1  | 0.0  | 8.3   | 8.3   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 1.4  | 0.8  | 0.0  | 0.0  | 2.8   | 2.8   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.4  | 0.2  | 0.0  | 0.0  | 0.7   | 0.7   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.1   | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   | 0.0   |
| TOTAL | 19.0      | 7.3 | 2.5 | 1.8 | 3.1 | 5.6 | 4.0 | 3.3 | 3.2 | 2.6 | 3.1 | 2.7 | 4.4 | 12.5 | 12.5 | 11.4 | 1.0  | 100.0 | 100.0 |

Table 5.4. (contd)

Station: (9) FFTF

Begin: 1/82

End: 12/99

Total Hours: 153413

|       | DIRECTION |     |     |     |     |     |     |     |      |      |     |     |     |     |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S    | SSW  | SW  | WSW | W   | WNW | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.5   | 0.5 |
| 1-3   | 1.2       | 1.1 | 0.9 | 0.8 | 0.9 | 1.0 | 1.1 | 1.0 | 1.2  | 1.2  | 1.2 | 1.0 | 1.0 | 1.1 | 1.3  | 1.3 | 0.0  | 17.2  |     |
| 4-7   | 2.8       | 2.6 | 1.9 | 1.1 | 1.1 | 1.4 | 2.6 | 3.7 | 4.1  | 3.6  | 2.0 | 1.3 | 1.4 | 2.1 | 3.6  | 3.3 | 0.0  | 38.6  |     |
| 8-12  | 1.4       | 1.3 | 0.7 | 0.2 | 0.2 | 0.2 | 1.1 | 3.2 | 3.9  | 4.4  | 1.8 | 0.8 | 0.9 | 1.8 | 3.9  | 2.6 | 0.0  | 28.4  |     |
| 13-18 | 0.3       | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.9  | 3.0  | 1.8 | 0.7 | 0.5 | 0.8 | 1.6  | 0.5 | 0.0  | 11.2  |     |
| 19-24 | 0.0       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.6  | 0.9 | 0.4 | 0.2 | 0.2 | 0.5  | 0.1 | 0.0  | 3.0   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.3 | 0.1 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.2   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 5.7       | 5.5 | 3.8 | 2.2 | 2.2 | 2.6 | 4.9 | 8.3 | 10.2 | 13.0 | 8.1 | 4.3 | 4.0 | 6.1 | 10.9 | 7.7 | 0.6  | 100.0 |     |

Station: (10) YAKB

Begin: 1/82

End: 12/99

Total Hours: 154089

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |      |      |      |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW  | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.6   | 0.6 |
| 1-3   | 1.7       | 1.6 | 1.5 | 1.1 | 0.9 | 1.0 | 1.1 | 1.3 | 1.2 | 1.2 | 1.5 | 2.0  | 2.5  | 2.0  | 1.7  | 1.6 | 0.0  | 24.0  |     |
| 4-7   | 3.7       | 2.8 | 1.6 | 0.9 | 0.8 | 1.0 | 1.4 | 1.2 | 0.9 | 1.0 | 1.6 | 3.6  | 7.0  | 4.4  | 3.8  | 3.6 | 0.0  | 39.2  |     |
| 8-12  | 1.3       | 0.5 | 0.2 | 0.1 | 0.1 | 0.1 | 0.3 | 0.2 | 0.3 | 0.6 | 1.5 | 2.6  | 3.1  | 2.4  | 5.5  | 3.2 | 0.0  | 22.0  |     |
| 13-18 | 0.2       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 1.2 | 1.4  | 0.6  | 0.9  | 3.9  | 1.0 | 0.0  | 9.8   |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.6 | 0.4  | 0.1  | 0.2  | 1.8  | 0.1 | 0.0  | 3.5   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1  | 0.0  | 0.0  | 0.3  | 0.0 | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 6.9       | 5.2 | 3.4 | 2.1 | 1.8 | 2.1 | 2.8 | 2.7 | 2.6 | 3.3 | 6.5 | 10.0 | 13.4 | 10.0 | 17.0 | 9.5 | 0.6  | 100.0 |     |

Station: (11) 300A

Begin: 1/82

End: 12/99

Total Hours: 140865

|       | DIRECTION |     |     |     |     |     |      |     |     |     |      |     |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE   | SSE | S   | SSW | SW   | WSW | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.6   | 0.6 |
| 1-3   | 1.2       | 0.7 | 0.6 | 0.6 | 0.8 | 1.2 | 1.7  | 1.8 | 1.7 | 1.4 | 1.4  | 1.2 | 1.3 | 1.4 | 1.8 | 1.7 | 0.0  | 20.5  |     |
| 4-7   | 3.5       | 1.6 | 1.1 | 1.1 | 1.9 | 4.2 | 6.8  | 3.7 | 3.1 | 2.5 | 1.9  | 1.2 | 0.9 | 1.0 | 2.1 | 4.0 | 0.0  | 40.7  |     |
| 8-12  | 3.5       | 1.9 | 0.8 | 0.3 | 0.4 | 1.2 | 1.6  | 0.8 | 1.6 | 3.1 | 3.3  | 1.7 | 0.6 | 0.4 | 1.1 | 2.6 | 0.0  | 24.9  |     |
| 13-18 | 0.6       | 0.5 | 0.2 | 0.1 | 0.0 | 0.0 | 0.1  | 0.1 | 0.4 | 1.5 | 2.5  | 1.3 | 0.4 | 0.2 | 0.8 | 0.9 | 0.0  | 9.5   |     |
| 19-24 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.1 | 0.4 | 0.9  | 0.4 | 0.2 | 0.0 | 0.3 | 0.2 | 0.0  | 2.8   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.1 | 0.4  | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.2   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 8.8       | 4.8 | 2.7 | 2.1 | 3.0 | 6.7 | 10.3 | 6.5 | 6.8 | 9.2 | 10.6 | 6.0 | 3.4 | 3.0 | 6.2 | 9.4 | 0.6  | 100.0 |     |

Station: (12) WYEB

Begin: 1/82

End: 12/99

Total Hours: 153413

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.4   | 0.4 |
| 1-3   | 1.3       | 1.1 | 1.2 | 1.2 | 1.4 | 1.5 | 1.4 | 1.5 | 1.5 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2  | 1.4  | 1.3 | 0.0  | 20.8  |     |
| 4-7   | 2.5       | 1.6 | 1.3 | 1.3 | 2.0 | 2.0 | 2.7 | 3.4 | 3.9 | 2.9 | 2.4 | 2.2 | 2.5 | 3.1  | 3.8  | 3.0 | 0.0  | 40.7  |     |
| 8-12  | 1.2       | 0.6 | 0.4 | 0.2 | 0.3 | 0.3 | 0.8 | 1.8 | 2.9 | 2.5 | 1.6 | 1.3 | 2.0 | 4.1  | 3.2  | 1.5 | 0.0  | 24.6  |     |
| 13-18 | 0.3       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 1.0 | 1.5 | 1.1 | 0.7 | 0.8 | 1.5  | 1.4  | 0.3 | 0.0  | 9.5   |     |
| 19-24 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.6 | 0.3 | 0.2 | 0.3  | 0.6  | 0.1 | 0.0  | 3.0   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1  | 0.2  | 0.0 | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 5.3       | 3.7 | 3.0 | 2.7 | 3.7 | 3.8 | 5.0 | 7.0 | 9.3 | 8.9 | 7.3 | 5.9 | 6.8 | 10.4 | 10.6 | 6.3 | 0.4  | 100.0 |     |



Table 5.4. (contd)

Station: (13) 100N

Begin: 1/82

End: 12/99

Total Hours: 153625

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |      |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.9   | 0.9   |
| 1-3   | 2.1       | 1.8 | 2.0 | 2.3 | 3.1 | 3.1 | 2.6 | 1.9 | 1.7 | 1.7 | 2.2 | 2.7  | 3.2  | 3.3  | 3.1 | 2.5 | 0.0 | 39.3  |       |
| 4-7   | 1.4       | 1.6 | 1.6 | 1.9 | 2.7 | 2.6 | 2.3 | 1.3 | 0.9 | 1.0 | 2.3 | 4.4  | 4.8  | 3.1  | 2.1 | 1.5 | 0.0 | 35.6  |       |
| 8-12  | 0.4       | 0.8 | 0.6 | 0.2 | 0.3 | 0.4 | 0.8 | 0.5 | 0.3 | 0.5 | 1.2 | 2.1  | 3.2  | 2.2  | 0.7 | 0.4 | 0.0 | 14.5  |       |
| 13-18 | 0.2       | 0.4 | 0.3 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.3 | 0.8 | 0.6  | 1.2  | 1.9  | 0.6 | 0.1 | 0.0 | 6.9   |       |
| 19-24 | 0.0       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.2  | 0.2  | 0.7  | 0.4 | 0.0 | 0.0 | 2.3   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0  | 0.0  | 0.2  | 0.1 | 0.0 | 0.0 | 0.5   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 4.1       | 4.7 | 4.6 | 4.6 | 6.0 | 6.2 | 5.8 | 3.7 | 3.1 | 3.7 | 6.9 | 10.1 | 12.7 | 11.4 | 7.0 | 4.5 | 0.9 | 100.0 |       |

Station: (14) WPPS

Begin: 1/82

End: 12/99

Total Hours: 154121

|       | DIRECTION |     |     |     |     |     |     |     |      |     |     |     |     |     |      |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S    | SSW | SW  | WSW | W   | WNW | NW   | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.9   | 0.9   |
| 1-3   | 2.5       | 2.1 | 1.9 | 1.3 | 1.1 | 1.1 | 1.4 | 1.9 | 2.2  | 2.0 | 1.7 | 1.4 | 1.6 | 1.8 | 2.7  | 2.8 | 0.0 | 29.7  |       |
| 4-7   | 3.4       | 2.3 | 2.1 | 1.2 | 0.7 | 0.9 | 1.9 | 4.2 | 5.2  | 3.0 | 1.7 | 1.2 | 1.3 | 1.9 | 3.8  | 4.4 | 0.0 | 39.1  |       |
| 8-12  | 1.2       | 0.7 | 0.5 | 0.2 | 0.1 | 0.2 | 0.7 | 1.9 | 3.3  | 2.6 | 1.4 | 0.8 | 0.9 | 1.6 | 2.3  | 1.4 | 0.0 | 19.9  |       |
| 13-18 | 0.3       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.7  | 1.6 | 1.2 | 0.5 | 0.4 | 0.7 | 1.3  | 0.3 | 0.0 | 7.7   |       |
| 19-24 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.4 | 0.6 | 0.2 | 0.1 | 0.1 | 0.5  | 0.0 | 0.0 | 2.2   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1 | 0.2 | 0.1 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0 | 0.5   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.1   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 7.4       | 5.4 | 4.6 | 2.7 | 1.9 | 2.2 | 4.1 | 8.2 | 11.4 | 9.8 | 6.8 | 4.2 | 4.4 | 6.3 | 10.6 | 9.0 | 0.9 | 100.0 |       |

Station: (15) FRNK

Begin: 1/82

End: 12/99

Total Hours: 153691

|       | DIRECTION |     |     |     |     |     |     |     |     |      |     |     |     |     |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW  | WSW | W   | WNW | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8   | 0.8   |
| 1-3   | 1.2       | 1.0 | 1.0 | 0.8 | 0.9 | 1.1 | 1.5 | 1.5 | 1.3 | 1.1  | 1.2 | 1.1 | 1.3 | 1.4 | 1.6 | 1.4 | 0.0 | 19.3  |       |
| 4-7   | 4.1       | 2.7 | 1.7 | 1.1 | 1.5 | 2.3 | 4.8 | 4.2 | 3.5 | 3.0  | 2.5 | 1.3 | 1.4 | 2.0 | 4.6 | 5.4 | 0.0 | 46.0  |       |
| 8-12  | 1.6       | 0.9 | 0.6 | 0.3 | 0.3 | 0.6 | 1.6 | 1.5 | 2.5 | 4.8  | 3.5 | 1.0 | 0.5 | 0.6 | 2.1 | 2.5 | 0.0 | 24.9  |       |
| 13-18 | 0.1       | 0.2 | 0.2 | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 0.4 | 2.0  | 2.0 | 0.6 | 0.2 | 0.2 | 0.5 | 0.2 | 0.0 | 7.1   |       |
| 19-24 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3  | 0.5 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 1.4   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 7.1       | 4.9 | 3.5 | 2.4 | 2.7 | 4.1 | 8.0 | 7.4 | 7.7 | 11.3 | 9.8 | 4.3 | 3.5 | 4.2 | 8.8 | 9.5 | 0.8 | 100.0 |       |

Station: (16) GABL

Begin: 1/82

End: 12/99

Total Hours: 153183

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.7   | 0.7   |
| 1-3   | 1.0       | 0.9 | 0.9 | 0.7 | 0.6 | 0.6 | 0.7 | 0.8 | 1.0 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7  | 0.8  | 0.9 | 0.0 | 13.1  |       |
| 4-7   | 2.3       | 2.3 | 1.6 | 0.9 | 0.9 | 0.9 | 1.3 | 2.1 | 3.2 | 2.4 | 1.8 | 1.5 | 1.5 | 1.7  | 2.2  | 2.1 | 0.0 | 28.8  |       |
| 8-12  | 2.0       | 2.2 | 1.0 | 0.3 | 0.4 | 0.5 | 0.9 | 1.7 | 2.4 | 1.5 | 1.5 | 1.6 | 1.7 | 2.2  | 2.9  | 1.8 | 0.0 | 24.6  |       |
| 13-18 | 1.3       | 1.4 | 0.5 | 0.1 | 0.1 | 0.1 | 0.3 | 1.0 | 1.4 | 0.9 | 1.3 | 1.5 | 1.8 | 2.9  | 2.5  | 0.7 | 0.0 | 17.6  |       |
| 19-24 | 0.4       | 0.5 | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.6 | 0.5 | 0.9 | 0.9 | 0.9 | 0.9 | 2.7  | 1.6  | 0.2 | 0.0 | 9.8   |       |
| 25-31 | 0.1       | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.6 | 0.4 | 0.2 | 1.2 | 0.5  | 0.0  | 0.0 | 0.0 | 4.0   |       |
| 32-38 | 0.0       | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.1 | 0.0 | 0.2  | 0.0  | 0.0 | 0.0 | 1.0   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.3   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 7.1       | 7.5 | 4.6 | 2.0 | 2.0 | 2.1 | 3.2 | 6.0 | 8.9 | 6.8 | 7.4 | 6.8 | 7.0 | 11.6 | 10.6 | 5.8 | 0.8 | 100.0 |       |

Table 5.4. (contd)

Station: (17) RING

Begin: 1/82

End: 12/99

Total Hours: 153325

|       | DIRECTION |     |      |     |     |     |     |     |     |     |     |     |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE | NE   | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 1.1   | 1.1 |
| 1-3   | 2.2       | 3.6 | 7.5  | 3.7 | 2.3 | 1.8 | 1.5 | 1.4 | 1.6 | 1.7 | 2.1 | 2.5 | 2.2 | 1.5 | 1.5 | 1.8 | 0.0  | 38.7  |     |
| 4-7   | 1.6       | 2.1 | 10.5 | 3.2 | 1.1 | 0.9 | 1.1 | 1.4 | 1.8 | 2.9 | 2.5 | 2.7 | 2.3 | 1.3 | 1.2 | 1.2 | 0.0  | 37.8  |     |
| 8-12  | 0.6       | 0.6 | 0.8  | 0.4 | 0.1 | 0.1 | 0.2 | 0.5 | 1.1 | 3.3 | 2.1 | 1.1 | 1.5 | 1.9 | 0.9 | 0.2 | 0.0  | 15.2  |     |
| 13-18 | 0.1       | 0.2 | 0.2  | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 1.0 | 1.0 | 0.5 | 0.5 | 1.4 | 0.4 | 0.0 | 0.0  | 5.6   |     |
| 19-24 | 0.0       | 0.1 | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.2 | 0.1 | 0.4 | 0.1 | 0.0 | 0.0  | 1.3   |     |
| 25-31 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3   |     |
| 32-38 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 4.5       | 6.5 | 19.2 | 7.3 | 3.5 | 2.7 | 2.9 | 3.3 | 4.7 | 8.9 | 8.1 | 6.9 | 6.6 | 6.5 | 4.1 | 3.2 | 1.2  | 100.0 |     |

Station: (18) RICH

Begin: 1/82

End: 12/99

Total Hours: 154380

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |      |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 1.1   | 1.1 |
| 1-3   | 1.3       | 0.9 | 0.9 | 1.0 | 1.6 | 2.6 | 3.0 | 2.5 | 2.1 | 2.1 | 2.4  | 2.5  | 2.6 | 2.7 | 2.5 | 1.9 | 0.0  | 32.5  |     |
| 4-7   | 1.9       | 0.9 | 0.9 | 0.9 | 1.8 | 2.8 | 3.1 | 1.7 | 1.6 | 2.9 | 4.2  | 3.2  | 2.5 | 2.8 | 3.0 | 2.6 | 0.0  | 36.8  |     |
| 8-12  | 1.3       | 0.7 | 0.4 | 0.3 | 0.2 | 0.2 | 0.3 | 0.2 | 0.6 | 2.6 | 4.0  | 2.8  | 1.5 | 0.9 | 1.3 | 1.5 | 0.0  | 18.6  |     |
| 13-18 | 0.4       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.2 | 2.4  | 1.3  | 0.9 | 0.3 | 0.8 | 0.7 | 0.0  | 8.5   |     |
| 19-24 | 0.1       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.7  | 0.3  | 0.2 | 0.1 | 0.2 | 0.2 | 0.0  | 2.1   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2  | 0.1  | 0.0 | 0.0 | 0.1 | 0.0 | 0.0  | 0.4   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 4.9       | 2.7 | 2.3 | 2.3 | 3.6 | 5.5 | 6.4 | 4.4 | 4.5 | 9.0 | 13.8 | 10.3 | 7.7 | 6.8 | 7.9 | 6.8 | 1.1  | 100.0 |     |

Station: (19) PFP

Begin: 2/94

End: 12/99

Total Hours: 51496

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 2.2   | 2.2 |
| 1-3   | 3.5       | 3.2 | 2.1 | 1.4 | 1.5 | 1.7 | 2.2 | 1.9 | 1.9 | 1.8 | 2.4 | 3.4 | 5.3  | 5.2  | 3.7  | 3.1 | 0.0  | 44.4  |     |
| 4-7   | 3.7       | 2.3 | 1.1 | 0.7 | 0.8 | 1.4 | 1.7 | 0.7 | 0.6 | 0.7 | 1.3 | 2.0 | 4.1  | 6.3  | 4.9  | 3.6 | 0.0  | 35.8  |     |
| 8-12  | 0.4       | 0.5 | 0.3 | 0.1 | 0.1 | 0.2 | 0.3 | 0.2 | 0.3 | 0.6 | 1.4 | 1.9 | 1.4  | 1.4  | 3.1  | 1.1 | 0.0  | 13.1  |     |
| 13-18 | 0.0       | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.8 | 0.9 | 0.3  | 0.1  | 1.1  | 0.2 | 0.0  | 4.0   |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.5   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 7.5       | 6.1 | 3.6 | 2.1 | 2.4 | 3.3 | 4.2 | 2.9 | 2.9 | 3.5 | 6.1 | 8.3 | 11.2 | 13.1 | 12.8 | 8.1 | 2.2  | 100.0 |     |

Station: (20) RMTN

Begin: 1/82

End: 12/99

Total Hours: 151784

|       | DIRECTION |      |     |     |     |     |     |     |     |     |      |      |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE  | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.7   | 0.7 |
| 1-3   | 0.5       | 0.5  | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.7  | 0.5  | 0.4 | 0.4 | 0.4 | 0.4 | 0.0  | 7.5   |     |
| 4-7   | 1.4       | 1.5  | 1.4 | 1.0 | 0.7 | 0.5 | 0.4 | 0.5 | 0.8 | 1.4 | 2.1  | 1.4  | 1.0 | 0.7 | 0.7 | 0.9 | 0.0  | 16.2  |     |
| 8-12  | 2.2       | 2.5  | 1.8 | 0.8 | 0.4 | 0.2 | 0.2 | 0.3 | 0.7 | 1.7 | 3.5  | 2.3  | 1.4 | 0.9 | 0.8 | 1.1 | 0.0  | 20.7  |     |
| 13-18 | 1.8       | 2.7  | 1.3 | 0.3 | 0.1 | 0.0 | 0.1 | 0.1 | 0.4 | 1.5 | 4.5  | 3.0  | 1.6 | 0.9 | 0.7 | 0.9 | 0.0  | 19.9  |     |
| 19-24 | 0.9       | 2.0  | 0.9 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.8 | 3.4  | 2.8  | 1.2 | 0.5 | 0.3 | 0.2 | 0.0  | 13.3  |     |
| 25-31 | 0.4       | 1.3  | 0.7 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.6 | 3.1  | 2.6  | 0.7 | 0.2 | 0.1 | 0.0 | 0.0  | 9.9   |     |
| 32-38 | 0.1       | 0.6  | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 2.4  | 1.8  | 0.3 | 0.0 | 0.0 | 0.0 | 0.0  | 6.0   |     |
| 39-46 | 0.0       | 0.3  | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.6  | 1.0  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 3.6   |     |
| >46   | 0.0       | 0.1  | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.0  | 0.5  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 2.1   |     |
| TOTAL | 7.3       | 11.4 | 7.4 | 2.8 | 1.5 | 1.1 | 1.1 | 1.3 | 2.7 | 7.4 | 22.3 | 15.9 | 6.8 | 3.6 | 3.0 | 3.6 | 0.7  | 100.0 |     |

Table 5.4. (contd)

Station: (21) HMS      Begin: 1/82      End: 12/99      Total Hours: 156491

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     | CALM | TOTAL |      |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------|-------|------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW |      |       |      |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 1.2   | 1.2  |
| 1-3   | 2.1       | 1.8 | 1.8 | 1.4 | 1.5 | 1.6 | 1.7 | 1.3 | 1.2 | 1.2 | 1.4 | 1.4 | 1.7 | 1.9  | 2.2  | 2.2 | 0.0  | 0.0   | 26.3 |
| 4-7   | 2.2       | 1.4 | 1.1 | 1.0 | 1.2 | 1.3 | 1.7 | 1.5 | 1.3 | 1.4 | 2.3 | 3.6 | 5.0 | 6.3  | 6.7  | 3.9 | 0.0  | 0.0   | 41.9 |
| 8-12  | 0.5       | 0.5 | 0.3 | 0.1 | 0.1 | 0.1 | 0.2 | 0.4 | 0.4 | 0.6 | 1.3 | 2.3 | 2.5 | 4.3  | 5.2  | 1.1 | 0.0  | 0.0   | 20.1 |
| 13-18 | 0.1       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.5 | 1.1 | 1.1 | 0.6 | 1.4  | 2.4  | 0.3 | 0.0  | 0.0   | 8.1  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.3 | 0.1 | 0.2  | 0.7  | 0.0 | 0.0  | 0.0   | 2.1  |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0  | 0.1  | 0.0 | 0.0  | 0.0   | 0.3  |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0  |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0  |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0  |
| TOTAL | 4.8       | 4.0 | 3.3 | 2.6 | 2.8 | 3.0 | 3.6 | 3.3 | 3.2 | 4.0 | 6.6 | 8.9 | 9.9 | 14.1 | 17.3 | 7.5 | 1.2  | 100.0 |      |

Station: (22) PASC      Begin: 10/87      End: 12/99      Total Hours: 102207

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |     |     |     |     |      | CALM | TOTAL |      |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|-------|------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW | W   | WNW | NW  | NNW  |      |       |      |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 1.1  | 1.1   |      |
| 1-3   | 4.3       | 2.7 | 2.4 | 2.4 | 2.5 | 2.2 | 1.8 | 1.3 | 1.3 | 1.2 | 1.1  | 1.2 | 1.5 | 2.0 | 3.2 | 4.6  | 0.0  | 0.0   | 35.7 |
| 4-7   | 2.9       | 1.3 | 0.7 | 0.9 | 1.4 | 2.0 | 1.9 | 1.4 | 1.6 | 2.4 | 2.9  | 2.0 | 2.1 | 2.3 | 3.5 | 4.3  | 0.0  | 0.0   | 33.8 |
| 8-12  | 1.1       | 0.4 | 0.2 | 0.1 | 0.1 | 0.2 | 0.3 | 0.3 | 0.5 | 2.0 | 4.5  | 2.3 | 1.0 | 0.7 | 1.2 | 1.6  | 0.0  | 0.0   | 16.6 |
| 13-18 | 0.2       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.6 | 3.1  | 2.1 | 0.6 | 0.3 | 0.4 | 0.4  | 0.0  | 0.0   | 8.2  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.1  | 1.2 | 0.3 | 0.1 | 0.1 | 0.0  | 0.0  | 0.0   | 3.0  |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4  | 0.6 | 0.1 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0   | 1.2  |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.2 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0   | 0.3  |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0   | 0.1  |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0   | 0.0  |
| TOTAL | 8.5       | 4.7 | 3.4 | 3.4 | 4.0 | 4.4 | 4.1 | 3.1 | 3.5 | 6.2 | 13.3 | 9.7 | 5.6 | 5.4 | 8.5 | 11.0 | 1.1  | 100.0 |      |

Station: (23) GABW      Begin: 3/86      End: 12/99      Total Hours: 118409

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     | CALM | TOTAL |      |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------|-------|------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW |      |       |      |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 1.2  | 1.2   |      |
| 1-3   | 1.6       | 1.3 | 1.2 | 1.3 | 1.5 | 1.7 | 2.3 | 2.5 | 2.1 | 1.6 | 1.6 | 1.7 | 2.6 | 3.6  | 3.2  | 2.0 | 0.0  | 0.0   | 31.9 |
| 4-7   | 1.6       | 1.1 | 1.0 | 1.0 | 1.4 | 1.3 | 4.0 | 4.9 | 1.6 | 0.8 | 1.0 | 1.5 | 3.0 | 7.2  | 4.0  | 2.0 | 0.0  | 0.0   | 37.3 |
| 8-12  | 0.6       | 0.5 | 0.3 | 0.2 | 0.2 | 0.3 | 1.2 | 1.0 | 0.3 | 0.5 | 1.0 | 1.5 | 2.7 | 5.2  | 1.8  | 0.6 | 0.0  | 0.0   | 17.9 |
| 13-18 | 0.2       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.8 | 0.9 | 1.0 | 3.3  | 1.1  | 0.2 | 0.0  | 0.0   | 8.5  |
| 19-24 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.3 | 0.2 | 1.0  | 0.4  | 0.0 | 0.0  | 0.0   | 2.6  |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.2  | 0.1  | 0.0 | 0.0  | 0.0   | 0.5  |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0  |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0  |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0  |
| TOTAL | 3.9       | 3.2 | 2.7 | 2.5 | 3.1 | 3.4 | 7.7 | 8.6 | 4.2 | 3.5 | 4.9 | 5.9 | 9.5 | 20.4 | 10.5 | 4.8 | 1.2  | 100.0 |      |

Station: (24) 100F      Begin: 3/86      End: 12/99      Total Hours: 118503

|       | DIRECTION |     |     |     |     |     |      |      |     |     |     |     |      |      |     |     | CALM | TOTAL |      |
|-------|-----------|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|------|-----|-----|------|-------|------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE   | SSE  | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |      |       |      |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 1.2  | 1.2   |      |
| 1-3   | 1.8       | 1.4 | 1.2 | 1.1 | 1.4 | 1.9 | 2.8  | 2.8  | 2.2 | 1.8 | 1.8 | 2.4 | 3.6  | 4.1  | 3.5 | 2.4 | 0.0  | 0.0   | 36.3 |
| 4-7   | 2.0       | 1.4 | 1.1 | 1.2 | 1.3 | 1.7 | 5.3  | 5.8  | 1.5 | 0.9 | 1.0 | 1.6 | 3.4  | 3.7  | 2.6 | 1.9 | 0.0  | 0.0   | 36.1 |
| 8-12  | 1.0       | 0.7 | 0.3 | 0.3 | 0.2 | 0.6 | 2.5  | 2.5  | 0.6 | 0.5 | 0.8 | 1.2 | 2.5  | 2.5  | 0.6 | 0.5 | 0.0  | 0.0   | 17.3 |
| 13-18 | 0.2       | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.3  | 0.3  | 0.3 | 0.3 | 0.6 | 0.8 | 1.0  | 1.8  | 0.4 | 0.1 | 0.0  | 0.0   | 6.6  |
| 19-24 | 0.0       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.1 | 0.2 | 0.3 | 0.3 | 0.2  | 0.6  | 0.2 | 0.0 | 0.0  | 0.0   | 2.0  |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.1 | 0.1 | 0.1 | 0.0  | 0.1  | 0.0 | 0.0 | 0.0  | 0.0   | 0.4  |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   | 0.0  |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   | 0.0  |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   | 0.0  |
| TOTAL | 5.0       | 3.7 | 2.8 | 2.7 | 3.0 | 4.2 | 10.8 | 11.4 | 4.8 | 3.7 | 4.6 | 6.4 | 10.7 | 12.8 | 7.3 | 5.0 | 1.2  | 100.0 |      |

Table 5.4. (contd)

Station: (25) VERN

Begin: 2/88

End: 12/99

Total Hours: 102617

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 1.0   | 1.0   |
| 1-3   | 1.1       | 1.2 | 1.3 | 1.6 | 2.1 | 2.0 | 1.8 | 1.2 | 0.9 | 0.9 | 1.2 | 2.3 | 2.7  | 1.7  | 1.2 | 1.0 | 0.0  | 24.2  | 24.2  |
| 4-7   | 0.8       | 1.3 | 2.1 | 2.7 | 3.5 | 2.1 | 1.0 | 0.5 | 0.4 | 0.4 | 0.6 | 4.1 | 7.6  | 4.0  | 1.9 | 1.0 | 0.0  | 33.9  | 33.9  |
| 8-12  | 0.5       | 0.4 | 0.4 | 0.5 | 0.4 | 0.2 | 0.1 | 0.1 | 0.2 | 0.4 | 0.7 | 2.0 | 7.8  | 7.2  | 2.6 | 0.6 | 0.0  | 24.2  | 24.2  |
| 13-18 | 0.2       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.7 | 0.7 | 2.4  | 5.2  | 2.2 | 0.3 | 0.0  | 12.5  | 12.5  |
| 19-24 | 0.1       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.2 | 0.4  | 1.4  | 0.7 | 0.1 | 0.0  | 3.5   | 3.5   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.0  | 0.2  | 0.1 | 0.0 | 0.0  | 0.6   | 0.6   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.1   | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 2.7       | 3.1 | 4.0 | 4.9 | 6.0 | 4.3 | 2.9 | 1.8 | 1.6 | 2.1 | 3.8 | 9.4 | 21.1 | 19.6 | 8.7 | 2.9 | 1.0  | 100.0 | 100.0 |

Station: (26) BENT

Begin: 2/95

End: 12/99

Total Hours: 42850

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |      |      |     |     |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W    | WNW | NW  | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.2   | 0.2   |
| 1-3   | 1.1       | 1.1 | 0.9 | 0.8 | 0.8 | 0.6 | 0.5 | 0.4 | 0.5 | 0.6 | 1.1  | 1.7  | 2.4  | 1.9 | 1.5 | 1.1 | 0.0  | 16.9  | 16.9  |
| 4-7   | 1.4       | 1.2 | 1.7 | 2.2 | 2.4 | 1.1 | 0.3 | 0.2 | 0.5 | 1.2 | 4.8  | 11.5 | 13.9 | 5.6 | 2.7 | 1.9 | 0.0  | 52.6  | 52.6  |
| 8-12  | 0.5       | 0.7 | 1.2 | 1.1 | 1.1 | 0.3 | 0.0 | 0.0 | 0.2 | 0.8 | 3.1  | 6.0  | 5.0  | 2.0 | 1.2 | 0.4 | 0.0  | 23.5  | 23.5  |
| 13-18 | 0.3       | 0.7 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 1.6  | 1.0  | 0.4  | 0.2 | 0.1 | 0.1 | 0.0  | 5.4   | 5.4   |
| 19-24 | 0.1       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5  | 0.1  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0  | 1.2   | 1.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.2   | 0.2   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 3.4       | 3.8 | 4.2 | 4.0 | 4.3 | 2.0 | 0.9 | 0.7 | 1.3 | 3.1 | 11.2 | 20.3 | 21.8 | 9.8 | 5.5 | 3.6 | 0.2  | 100.0 | 100.0 |

Station: (27) VSTA

Begin: 2/91

End: 12/99

Total Hours: 76598

|       | DIRECTION |     |     |     |     |     |     |     |     |      |      |      |     |     |     |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW  | W   | WNW | NW  | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.8   | 0.8   |
| 1-3   | 2.2       | 2.2 | 2.0 | 1.6 | 1.6 | 1.8 | 2.0 | 1.7 | 1.9 | 2.4  | 2.7  | 2.5  | 2.3 | 1.8 | 1.8 | 1.6 | 0.0  | 32.1  | 32.1  |
| 4-7   | 3.0       | 2.0 | 1.5 | 1.2 | 0.8 | 1.1 | 1.2 | 1.2 | 1.9 | 4.1  | 5.9  | 4.2  | 2.6 | 2.6 | 3.1 | 2.9 | 0.0  | 39.2  | 39.2  |
| 8-12  | 0.6       | 0.2 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.6 | 3.8  | 6.1  | 2.7  | 0.8 | 0.4 | 0.9 | 1.2 | 0.0  | 18.0  | 18.0  |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.7  | 4.0  | 1.1  | 0.4 | 0.2 | 0.1 | 0.2 | 0.0  | 8.0   | 8.0   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2  | 1.1  | 0.3  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 1.7   | 1.7   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.2   | 0.2   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 5.8       | 4.5 | 3.7 | 2.8 | 2.4 | 3.0 | 3.3 | 3.1 | 4.6 | 12.2 | 19.9 | 10.9 | 6.1 | 5.0 | 5.9 | 5.9 | 0.8  | 100.0 | 100.0 |

Station: (28) SURF

Begin: 9/94

End: 12/99

Total Hours: 46370

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |      |      |     |     |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W    | WNW | NW  | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.8   | 0.8   |
| 1-3   | 0.3       | 0.6 | 1.2 | 1.3 | 1.2 | 0.8 | 0.7 | 0.7 | 1.1 | 2.2 | 3.6  | 3.8  | 1.8  | 0.7 | 0.4 | 0.3 | 0.0  | 20.5  | 20.5  |
| 4-7   | 0.1       | 0.4 | 2.4 | 3.8 | 2.0 | 0.7 | 0.3 | 0.2 | 0.4 | 1.0 | 3.9  | 6.2  | 1.7  | 0.2 | 0.1 | 0.1 | 0.0  | 23.4  | 23.4  |
| 8-12  | 0.2       | 0.6 | 2.0 | 3.1 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 4.1  | 10.3 | 3.7  | 0.3 | 0.1 | 0.0 | 0.0  | 25.3  | 25.3  |
| 13-18 | 0.2       | 0.3 | 0.2 | 0.5 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9  | 8.9  | 6.0  | 0.6 | 0.0 | 0.0 | 0.0  | 19.0  | 19.0  |
| 19-24 | 0.1       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4  | 4.3  | 3.1  | 0.3 | 0.0 | 0.0 | 0.0  | 8.3   | 8.3   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 1.2  | 0.9  | 0.1 | 0.0 | 0.0 | 0.0  | 2.4   | 2.4   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.1  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0  | 0.2   | 0.2   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 1.0       | 2.1 | 5.9 | 8.7 | 4.1 | 1.5 | 1.0 | 0.9 | 1.5 | 3.2 | 13.9 | 34.8 | 17.3 | 2.3 | 0.6 | 0.5 | 0.8  | 100.0 | 100.0 |

Table 5.4. (contd)

Station: (29) 100K

Begin: 3/96

End: 12/99

Total Hours: 33143

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |      |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 1.4   | 1.4   |
| 1-3   | 2.1       | 1.7 | 1.6 | 1.9 | 2.2 | 2.1 | 2.1 | 1.8 | 1.7 | 1.7 | 2.2 | 3.4  | 4.4  | 3.0  | 2.5 | 2.0 | 0.0 | 0.0   | 36.4  |
| 4-7   | 1.7       | 1.3 | 0.9 | 1.0 | 1.5 | 1.6 | 1.7 | 1.5 | 1.1 | 0.9 | 1.6 | 4.9  | 6.8  | 3.4  | 2.0 | 1.6 | 0.0 | 0.0   | 33.6  |
| 8-12  | 0.4       | 0.6 | 0.4 | 0.1 | 0.2 | 0.4 | 0.7 | 0.7 | 0.5 | 0.6 | 1.1 | 3.2  | 5.7  | 2.4  | 0.6 | 0.3 | 0.0 | 0.0   | 18.0  |
| 13-18 | 0.1       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.4 | 1.0 | 0.9  | 1.9  | 2.1  | 0.6 | 0.1 | 0.0 | 0.0   | 7.9   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.2  | 0.3  | 0.8  | 0.2 | 0.0 | 0.0 | 0.0   | 2.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.2  | 0.0 | 0.0 | 0.0 | 0.0   | 0.3   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| TOTAL | 4.4       | 3.9 | 3.0 | 3.0 | 4.0 | 4.0 | 4.6 | 4.2 | 3.6 | 3.9 | 6.3 | 12.7 | 19.2 | 11.8 | 6.0 | 4.1 | 1.4 | 100.0 |       |

Station: (30) HAMR

Begin: 1/98

End: 12/99

Total Hours: 17459

|       | DIRECTION |     |     |     |     |     |     |     |     |      |      |     |     |     |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW | W   | WNW | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9   | 0.9   |
| 1-3   | 1.2       | 0.8 | 0.8 | 0.5 | 0.7 | 1.0 | 1.8 | 2.0 | 2.0 | 1.5  | 1.3  | 1.1 | 1.2 | 1.2 | 1.3 | 1.2 | 0.0 | 0.0   | 19.6  |
| 4-7   | 3.6       | 1.7 | 0.8 | 0.8 | 1.0 | 2.0 | 4.9 | 4.4 | 3.9 | 3.6  | 4.1  | 2.1 | 1.6 | 2.0 | 3.0 | 3.8 | 0.0 | 0.0   | 43.3  |
| 8-12  | 2.3       | 1.1 | 0.3 | 0.1 | 0.2 | 0.3 | 0.5 | 0.5 | 1.2 | 3.1  | 6.8  | 2.7 | 0.8 | 0.6 | 1.5 | 2.2 | 0.0 | 0.0   | 24.2  |
| 13-18 | 0.6       | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 1.4  | 2.7  | 1.2 | 0.4 | 0.2 | 1.0 | 0.8 | 0.0 | 0.0   | 9.2   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3  | 0.8  | 0.3 | 0.1 | 0.1 | 0.3 | 0.1 | 0.0 | 0.0   | 2.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.3  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.5   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| TOTAL | 7.7       | 3.9 | 2.0 | 1.4 | 2.0 | 3.3 | 7.2 | 7.0 | 7.6 | 10.0 | 16.1 | 7.5 | 4.0 | 4.1 | 7.2 | 8.0 | 0.9 | 100.0 |       |

Station: (8W) WAHL

Begin: 1/82

End: 7/91

Total Hours: 79579

|       | DIRECTION |     |     |     |      |     |     |     |     |     |     |     |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E    | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 1.3   | 1.3   |
| 1-3   | 1.9       | 2.0 | 2.9 | 3.4 | 4.6  | 3.1 | 2.2 | 1.6 | 1.7 | 1.7 | 1.8 | 2.1 | 2.8  | 2.7  | 2.4 | 2.1 | 0.0 | 0.0   | 39.2  |
| 4-7   | 1.3       | 1.7 | 1.8 | 2.8 | 5.2  | 1.9 | 0.8 | 0.5 | 0.6 | 0.8 | 0.9 | 1.8 | 4.7  | 5.3  | 2.7 | 1.2 | 0.0 | 0.0   | 33.8  |
| 8-12  | 0.6       | 0.9 | 0.5 | 0.5 | 0.8  | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.5 | 0.7 | 2.9  | 4.4  | 1.5 | 0.5 | 0.0 | 0.0   | 14.5  |
| 13-18 | 0.3       | 0.3 | 0.2 | 0.1 | 0.1  | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.5 | 0.4 | 1.2  | 3.3  | 1.2 | 0.2 | 0.0 | 0.0   | 7.8   |
| 19-24 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.2  | 1.2  | 0.5 | 0.1 | 0.0 | 0.0   | 2.6   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0  | 0.3  | 0.1 | 0.0 | 0.0 | 0.0   | 0.6   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| TOTAL | 4.0       | 5.0 | 5.3 | 6.7 | 10.7 | 5.2 | 3.1 | 2.2 | 2.5 | 3.0 | 4.0 | 5.2 | 11.9 | 17.2 | 8.4 | 4.1 | 1.3 | 100.0 |       |

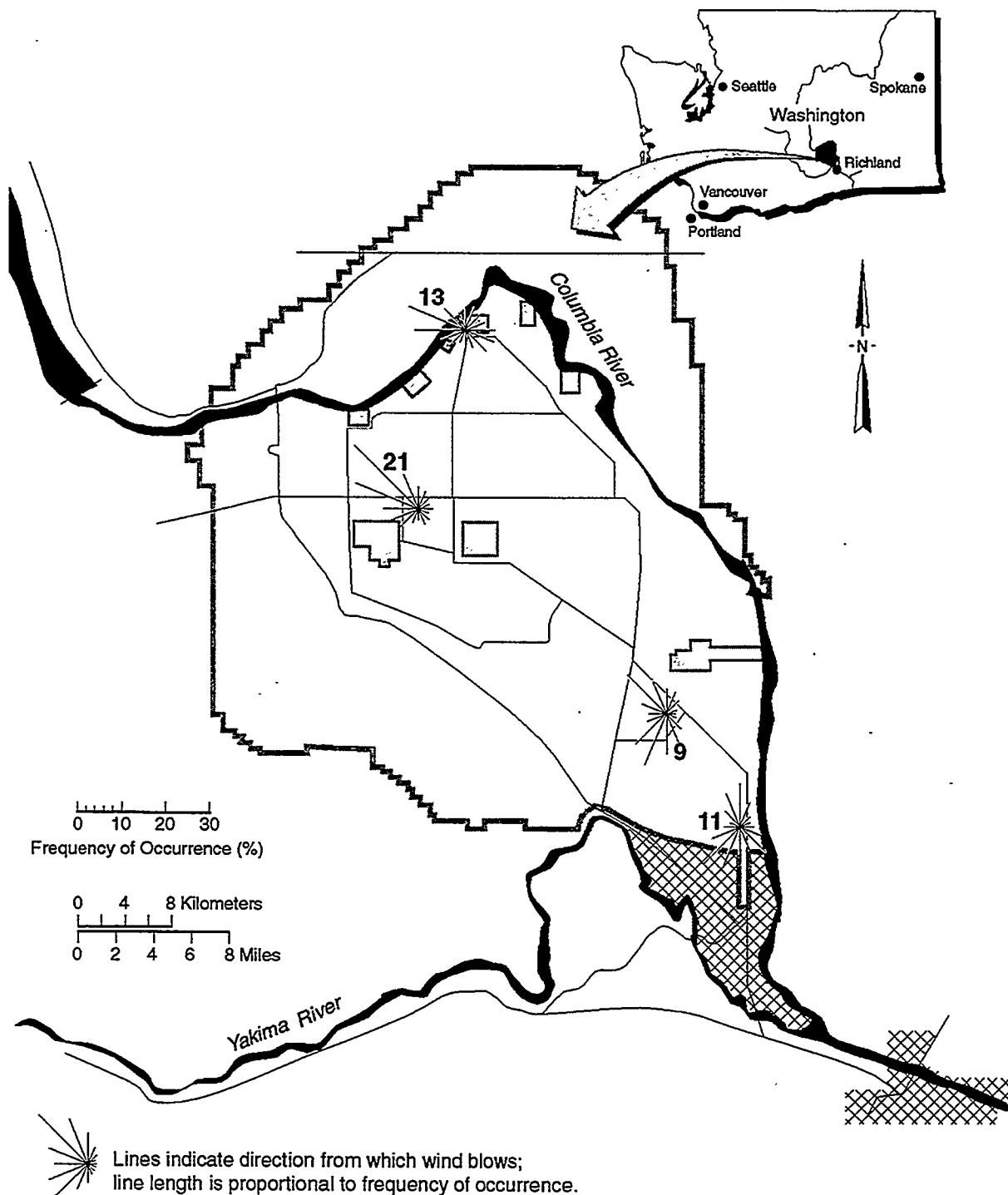
Station: (19S) SAGE

Begin: 3/82

End: 12/92

Total Hours: 91756

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7   | 0.7   |
| 1-3   | 1.3       | 1.1 | 1.2 | 1.0 | 1.1 | 1.4 | 1.7 | 1.9 | 1.8 | 1.6 | 1.7 | 1.5 | 1.5 | 1.3 | 1.6 | 1.6 | 0.0 | 0.0   | 23.3  |
| 4-7   | 3.6       | 2.9 | 3.3 | 2.5 | 2.1 | 3.2 | 4.2 | 4.9 | 4.3 | 2.4 | 2.2 | 3.4 | 4.4 | 2.5 | 1.9 | 3.4 | 0.0 | 0.0   | 51.2  |
| 8-12  | 1.4       | 1.3 | 0.9 | 0.4 | 0.4 | 0.5 | 1.3 | 2.3 | 2.7 | 1.3 | 1.1 | 1.3 | 1.5 | 1.8 | 0.4 | 0.6 | 0.0 | 0.0   | 19.1  |
| 13-18 | 0.2       | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.7 | 0.6 | 0.5 | 0.5 | 0.2 | 0.8 | 0.2 | 0.1 | 0.0 | 0.0   | 4.5   |
| 19-24 | 0.0       | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0   | 0.9   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.2   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   | 0.0   |
| TOTAL | 6.6       | 5.7 | 5.6 | 3.9 | 3.6 | 5.2 | 7.2 | 9.3 | 9.6 | 6.1 | 5.9 | 6.8 | 7.5 | 6.5 | 4.1 | 5.7 | 0.7 | 100.0 |       |



G00010107.3

**Figure 5.2.** Hanford Meteorological Monitoring Network Wind Roses at 60-Meter Level, 1986 Through 1999

**Table 5.5. Joint Frequency Distributions (%) for Hanford Meteorological Monitoring Network Wind Stations at 60-Meter Level, 1986 Through 1999**

**Tower: 100 Area**

Begin: 1/86

End: 12/99

Total Hours: 117014

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     |      | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW | CALM |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.7  | 0.7   |
| 1-3   | 1.7       | 1.6 | 1.8 | 2.2 | 3.1 | 2.9 | 2.3 | 1.6 | 1.3 | 1.2 | 1.3 | 1.5 | 1.8  | 1.9  | 1.9 | 1.8 | 0.0  | 29.9  |
| 4-7   | 1.8       | 1.9 | 1.6 | 1.7 | 3.0 | 3.1 | 2.6 | 1.5 | 0.9 | 0.7 | 1.2 | 1.9 | 3.0  | 3.2  | 2.2 | 1.5 | 0.0  | 31.8  |
| 8-12  | 0.7       | 1.1 | 0.8 | 0.5 | 0.5 | 0.7 | 1.2 | 0.6 | 0.4 | 0.4 | 0.9 | 1.3 | 2.7  | 2.6  | 1.0 | 0.6 | 0.0  | 16.0  |
| 13-18 | 0.4       | 0.6 | 0.4 | 0.2 | 0.2 | 0.2 | 0.5 | 0.4 | 0.2 | 0.3 | 0.8 | 0.8 | 2.6  | 3.2  | 0.7 | 0.2 | 0.0  | 11.7  |
| 19-24 | 0.2       | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.5 | 0.4 | 1.0  | 2.1  | 0.6 | 0.1 | 0.0  | 6.4   |
| 25-31 | 0.1       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 0.3 | 0.2 | 0.3  | 0.8  | 0.4 | 0.0 | 0.0  | 2.7   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1  | 0.2  | 0.1 | 0.0 | 0.0  | 0.6   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.1   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |
| TOTAL | 5.0       | 5.8 | 4.9 | 4.8 | 6.9 | 7.0 | 6.8 | 4.3 | 3.1 | 3.2 | 5.1 | 6.1 | 11.5 | 14.0 | 6.7 | 4.1 | 0.7  | 100.0 |

**Tower: 200 Area**

Begin: 1/86

End: 12/99

Total Hours: 122608

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     |      | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW | CALM |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.4  | 0.4   |
| 1-3   | 1.3       | 1.1 | 1.1 | 1.0 | 1.1 | 1.0 | 1.2 | 0.9 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.9  | 1.1  | 1.3 | 0.0  | 15.1  |
| 4-7   | 2.6       | 2.0 | 1.5 | 1.4 | 1.7 | 1.3 | 1.7 | 1.6 | 1.0 | 1.0 | 1.2 | 1.3 | 1.9 | 2.9  | 4.2  | 3.8 | 0.0  | 31.0  |
| 8-12  | 1.0       | 0.7 | 0.5 | 0.3 | 0.4 | 0.3 | 0.4 | 0.7 | 0.5 | 0.6 | 1.2 | 1.9 | 2.7 | 4.8  | 6.2  | 2.3 | 0.0  | 24.6  |
| 13-18 | 0.3       | 0.3 | 0.2 | 0.1 | 0.1 | 0.0 | 0.1 | 0.3 | 0.3 | 0.5 | 1.1 | 1.9 | 2.0 | 4.5  | 5.5  | 0.6 | 0.0  | 17.7  |
| 19-24 | 0.0       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.9 | 0.9 | 0.5 | 1.7  | 2.3  | 0.1 | 0.0  | 7.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.6 | 0.4 | 0.1 | 0.5  | 1.0  | 0.0 | 0.0  | 3.1   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0 | 0.1  | 0.1  | 0.0 | 0.0  | 0.6   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |
| TOTAL | 5.2       | 4.3 | 3.5 | 2.7 | 3.2 | 2.5 | 3.4 | 3.7 | 2.6 | 3.5 | 5.9 | 7.1 | 7.9 | 15.3 | 20.6 | 8.3 | 0.4  | 100.0 |

**Tower: 300 Area**

Begin: 1/86

End: 12/99

Total Hours: 117155

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     |      | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW | W   | WNW | NW  | NNW | CALM |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5  | 0.5   |
| 1-3   | 1.0       | 0.8 | 0.7 | 0.6 | 0.8 | 1.0 | 1.2 | 1.2 | 1.1 | 0.9 | 0.8  | 0.6 | 0.7 | 0.7 | 0.9 | 1.0 | 0.0  | 14.3  |
| 4-7   | 3.0       | 1.8 | 1.2 | 1.2 | 1.8 | 2.8 | 4.1 | 3.1 | 2.7 | 2.4 | 1.9  | 1.2 | 0.9 | 0.8 | 1.2 | 2.4 | 0.0  | 32.8  |
| 8-12  | 3.5       | 2.1 | 0.9 | 0.4 | 0.4 | 1.3 | 2.6 | 1.4 | 1.8 | 3.3 | 3.2  | 1.7 | 0.8 | 0.5 | 1.0 | 2.5 | 0.0  | 27.8  |
| 13-18 | 2.0       | 0.9 | 0.2 | 0.1 | 0.0 | 0.2 | 0.4 | 0.3 | 0.5 | 2.0 | 3.2  | 2.0 | 0.6 | 0.4 | 1.0 | 1.8 | 0.0  | 15.8  |
| 19-24 | 0.3       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.7 | 1.5  | 0.9 | 0.4 | 0.1 | 0.7 | 0.5 | 0.0  | 5.6   |
| 25-31 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.8  | 0.3 | 0.2 | 0.0 | 0.2 | 0.1 | 0.0  | 2.2   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.6   |
| 39-46 | 0.0       | 0.0 | 0.0 | 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  | 0.2   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |
| TOTAL | 9.8       | 5.9 | 3.1 | 2.4 | 3.0 | 5.3 | 8.4 | 6.1 | 6.4 | 9.5 | 12.0 | 6.9 | 3.5 | 2.6 | 5.0 | 8.2 | 0.5  | 100.0 |

**Tower: 400 Area**

Begin: 1/86

End: 12/99

Total Hours: 117460

|       | DIRECTION |     |     |     |     |     |     |     |     |      |     |     |     |     |      |     |      | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW  | WSW | W   | WNW | NW   | NNW | CALM |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.3  | 0.3   |
| 1-3   | 0.8       | 0.8 | 0.7 | 0.6 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 0.8  | 0.8 | 0.6 | 0.7 | 0.6 | 0.7  | 0.8 | 0.0  | 12.2  |
| 4-7   | 2.1       | 2.0 | 1.7 | 1.1 | 1.1 | 1.3 | 1.9 | 2.7 | 2.9 | 2.3  | 1.6 | 1.2 | 1.2 | 1.4 | 2.1  | 2.2 | 0.0  | 28.8  |
| 8-12  | 1.9       | 1.8 | 1.1 | 0.4 | 0.3 | 0.3 | 1.3 | 2.3 | 3.4 | 3.6  | 2.1 | 0.9 | 0.9 | 1.4 | 3.0  | 2.6 | 0.0  | 27.1  |
| 13-18 | 0.7       | 0.6 | 0.3 | 0.1 | 0.0 | 0.0 | 0.5 | 0.8 | 1.6 | 3.8  | 2.4 | 0.8 | 0.6 | 1.5 | 3.6  | 1.8 | 0.0  | 19.1  |
| 19-24 | 0.1       | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 1.4  | 1.5 | 0.6 | 0.3 | 0.9 | 2.2  | 0.4 | 0.0  | 8.4   |
| 25-31 | 0.0       | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4  | 0.8 | 0.3 | 0.1 | 0.2 | 0.6  | 0.1 | 0.0  | 2.9   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2  | 0.3 | 0.1 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0  | 0.8   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.2   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.1   |
| TOTAL | 5.7       | 5.4 | 4.0 | 2.3 | 2.2 | 2.5 | 4.8 | 6.9 | 9.1 | 12.5 | 9.7 | 4.6 | 3.9 | 6.0 | 12.3 | 7.8 | 0.3  | 100.0 |

---

## 6.0 Miscellaneous Climatological Statistics

### 6.1 Sky Cover

The term sky cover is used to express the portion of the celestial dome that is 1) covered, but not necessarily hidden, by clouds or obscuring phenomena aloft; 2) hidden by an obscuring phenomenon on the ground (such as fog or smoke); or 3) a combination of both 1 and 2. The sky cover is determined hourly by scanning the sky and estimating the number of tenths that are covered (0 denotes clear and 10 denotes overcast). Average monthly sunrise-to-sunset sky covers for the period 1946 through 1999 are shown in Table 6.1. Also shown in Table 6.1 are the number of clear, partly cloudy, and cloudy days for the period 1954 through 1999. The number of clear, partly cloudy, and cloudy days is the result of assigning each day to one of the following categories based on its average sky cover for that day:

| <u>Category</u> | <u>Average<br/>Sky Cover</u> |
|-----------------|------------------------------|
| Clear           | 0 - 3 tenths                 |
| Partly cloudy   | 4 - 7 tenths                 |
| Cloudy          | 8 - 10 tenths                |

During the period of record (1954 through 1999), an average of 200 sunny days (the sum of the clear and partly cloudy days) was recorded per year at the Hanford Meteorology Station.

### 6.2 Fog and Dense Fog

Table 6.2 shows the average monthly and annual number of days with fog and dense fog. Fog is reported any time horizontal visibility is reduced to 6 miles or less because of the suspension of water droplets in the surface layer of the atmosphere. Dense fog is reported when horizontal visibility is reduced to 0.25 mile or less. Most fog at the Hanford Meteorology Station is radiation fog, a common type of fog that forms on nights characterized by light wind, clear sky, and moist air in the lower levels of the atmosphere. Nearly 90% of both fog and dense fog at the Hanford Meteorology Station occurs during the late autumn and winter months, though fog is observed every month of the year.

### 6.3 Psychrometric Data

Psychrometric data include observations of dry bulb, wet bulb, dew point temperatures, and relative humidity. The dry bulb temperature is the temperature of the ambient air; the wet bulb temperature is the lowest temperature to which a parcel of air, under constant pressure, can be cooled by evaporating water into it. The dew point temperature is the temperature to which a given parcel of air, under constant water-vapor content, must be cooled to attain saturation. Relative humidity is the ratio of the actual water-vapor content of the air to the one where saturation would occur if the pressure and temperature remained unchanged.



**Table 6.1. Average Sky Cover (sunrise to sunset), 1946 Through 1999, and Number of Days Clear, Partly Cloudy, and Cloudy, 1954 Through 1999**

| Month  | Sky Cover (Scale 0-10) |     |                     |     | Number of Clear Days |     |                     |     | Number of Partly Cloudy Days |      |     | Number of Cloudy Days |       |     |                     |
|--------|------------------------|-----|---------------------|-----|----------------------|-----|---------------------|-----|------------------------------|------|-----|-----------------------|-------|-----|---------------------|
|        | Avg                    | Max | Year                | Min | Year                 | Max | Year                | Min | Year                         | Avg  | Max | Year                  | Avg   | Max | Year                |
| Jan    | 7.9                    | 9.2 | 1978                | 4.3 | 1949                 | 9   | 1984                | 0   | 1955 <sup>(a)</sup>          | 5.2  | 28  | 1978                  | 22.4  | 28  | 1978                |
| Feb    | 7.5                    | 9.3 | 1980                | 5.9 | 1996                 | 9   | 1991 <sup>(a)</sup> | 0   | 1984 <sup>(a)</sup>          | 5.3  | 26  | 1980 <sup>(a)</sup>   | 18.7  | 26  | 1980 <sup>(a)</sup> |
| Mar    | 6.8                    | 8.5 | 1978                | 4.9 | 1965                 | 12  | 1979 <sup>(a)</sup> | 1   | 1978 <sup>(a)</sup>          | 8.2  | 24  | 1993                  | 16.5  | 24  | 1979 <sup>(a)</sup> |
| Apr    | 6.4                    | 8.1 | 1963                | 3.7 | 1951                 | 12  | 1962                | 1   | 1963                         | 9.1  | 21  | 1979 <sup>(a)</sup>   | 14.4  | 21  | 1979 <sup>(a)</sup> |
| May    | 5.9                    | 8.1 | 1993                | 3.6 | 1992                 | 18  | 1992                | 1   | 1977                         | 10.4 | 19  | 1977 <sup>(a)</sup>   | 12.1  | 19  | 1977 <sup>(a)</sup> |
| Jun    | 5.2                    | 7.0 | 1950                | 2.8 | 1961                 | 21  | 1961                | 5   | 1972 <sup>(a)</sup>          | 10.0 | 15  | 1983 <sup>(a)</sup>   | 9.7   | 15  | 1983 <sup>(a)</sup> |
| Jul    | 3.0                    | 5.0 | 1983                | 0.9 | 1953                 | 26  | 1960                | 12  | 1987 <sup>(a)</sup>          | 7.6  | 12  | 1976                  | 4.5   | 12  | 1976                |
| Aug    | 3.3                    | 5.9 | 1968                | 0.6 | 1955                 | 30  | 1955                | 9   | 1978                         | 7.7  | 13  | 1983 <sup>(a)</sup>   | 5.0   | 13  | 1983 <sup>(a)</sup> |
| Sep    | 3.9                    | 6.7 | 1978                | 1.4 | 1990 <sup>(a)</sup>  | 27  | 1975                | 6   | 1978                         | 7.4  | 16  | 1977                  | 6.9   | 16  | 1977                |
| Oct    | 5.6                    | 8.0 | 1975                | 3.3 | 1987                 | 20  | 1987                | 1   | 1975                         | 8.0  | 22  | 1973                  | 12.8  | 22  | 1973                |
| Nov    | 7.5                    | 9.1 | 1972                | 5.2 | 1993                 | 12  | 1993                | 1   | 1973 <sup>(a)</sup>          | 5.7  | 25  | 1973 <sup>(a)</sup>   | 19.6  | 25  | 1973 <sup>(a)</sup> |
| Dec    | 8.0                    | 9.3 | 1985                | 6.4 | 1978                 | 9   | 1978                | 1   | 1985 <sup>(a)</sup>          | 4.5  | 29  | 1985                  | 22.7  | 29  | 1985                |
| Annual | 5.9                    | 6.6 | 1978 <sup>(a)</sup> | 5.1 | 1949                 | 144 | 1998                | 80  | 1977                         | 89.1 | 193 | 1978                  | 164.9 | 193 | 1978                |

(a) Most recent of multiple occurrences.

**Table 6.2.** Monthly and Annual Number of Days with Fog and Dense Fog, 1945 Through 1999

| Month  | Days with Fog (Visibility $\leq 6$ miles) |     |                     |     |                     | Days with Dense Fog (Visibility $\leq 0.25$ mile) |     |                     |     |                     |
|--------|---|-----|---------------------|-----|---------------------|---|-----|---------------------|-----|---------------------|
|        | Avg                                       | Max | Year                | Min | Year                | Avg   | Max | Year                | Min | Year                |
| Jan    | 11.5                                      | 25  | 1979                | 0   | 1949                | 6.2   | 15  | 1994 <sup>(a)</sup> | 0   | 1949                |
| Feb    | 6.5                                       | 20  | 1963                | 0   | 1988 <sup>(a)</sup> | 3.2   | 11  | 1963                | 0   | 1999 <sup>(a)</sup> |
| Mar    | 2.1                                       | 10  | 1993                | 0   | 1999 <sup>(a)</sup> | 0.8   | 5   | 1993 <sup>(a)</sup> | 0   | 1999 <sup>(a)</sup> |
| Apr    | 0.5                                       | 3   | 1992                | 0   | 1999 <sup>(a)</sup> | 0.1   | 1   | 1993 <sup>(a)</sup> | 0   | 1999 <sup>(a)</sup> |
| May    | 0.2                                       | 3   | 1948                | 0   | 1999 <sup>(a)</sup> | <0.1  | 1   | 1958                | 0   | 1999 <sup>(a)</sup> |
| Jun    | 0.1                                       | 2   | 1971                | 0   | 1999 <sup>(a)</sup> | <0.1  | 1   | 1971                | 0   | 1999 <sup>(a)</sup> |
| Jul    | <0.1                                      | 1   | 1966                | 0   | 1999 <sup>(a)</sup> | 0   | 0   | 0                   |     |                     |
| Aug    | 0.1                                       | 1   | 1985 <sup>(a)</sup> | 0   | 1999 <sup>(a)</sup> | <0.1  | 1   | 1985 <sup>(a)</sup> | 0   | 1999 <sup>(a)</sup> |
| Sep    | 0.3                                       | 2   | 1985 <sup>(a)</sup> | 0   | 1999 <sup>(a)</sup> | 0.1   | 1   | 1995 <sup>(a)</sup> | 0   | 1999 <sup>(a)</sup> |
| Oct    | 2.0                                       | 9   | 1962                | 0   | 1989 <sup>(a)</sup> | 1.0   | 7   | 1980                | 0   | 1998 <sup>(a)</sup> |
| Nov    | 9.7                                       | 19  | 1985 <sup>(a)</sup> | 0   | 1990                | 5.5   | 13  | 1965                | 0   | 1990 <sup>(a)</sup> |
| Dec    | 14.0                                      | 25  | 1989 <sup>(a)</sup> | 2   | 1968                | 7.5   | 17  | 1950                | 2   | 1996 <sup>(a)</sup> |
| Annual | 47.0                                      | 84  | 1985-86             | 22  | 1948-49             | 24.5  | 42  | 1950-51             | 9   | 1948-49             |

(a) Most recent of multiple occurrences.

Longest duration of fog: 113.7 hours, December 16-20, 1985.

Longest duration of dense fog: 47.0 hours, December 1957.

Table 6.3 presents monthly averages and extremes of dry bulb, wet bulb, dew point temperatures, and relative humidity from the Hanford Meteorology Station for the period 1950 through 1999. These parameters are collected hourly and are averaged on a monthly (as opposed to a daily) basis. Prior to 1975, wet bulb temperatures  $\geq 75^\circ\text{F}$  had never been observed at the Hanford Meteorology Station. On July 8, 9, and 10, 1975, 7 hourly observations were made of wet bulb temperatures  $\geq 75^\circ\text{F}$ .

## 6.4 Solar Radiation

Table 6.4 presents average and extreme daily solar radiation values by month for the period 1953 through 1999. These data are reported in langley (a langley is a unit defined as 1 gram calorie per square centimeter), and are integrated over an hour period and totaled for a daily value.

The highest daily values occur with a clear sky and clean air; the lowest commonly occur on days overcast with low stratus clouds. The lowest midday values of hourly solar radiation occurred on May 18, 1980, as the dense ash cloud from the morning eruption of Mount St. Helens passed over eastern Washington. Hourly solar radiation values dropped to 0 at 1100 hours and remained at 0 for the rest of that day.

**Table 6.3. Monthly Averages and Extremes of Psychrometric Data, 1950 Through 1999**

| Category <sup>(a)</sup>             | Monthly Averages |                     |                     |                     |      |                     |                     |                     |                     |      |                     |                     |        |
|-------------------------------------|------------------|---------------------|---------------------|---------------------|------|---------------------|---------------------|---------------------|---------------------|------|---------------------|---------------------|--------|
|                                     | Jan              | Feb                 | Mar                 | Apr                 | May  | Jun                 | Jul                 | Aug                 | Sep                 | Oct  | Nov                 | Dec                 | Annual |
| Dry bulb                            | 31.1             | 37.6                | 45.2                | 53.2                | 62.2 | 69.9                | 77.3                | 75.7                | 66.5                | 53.0 | 40.2                | 32.5                | 53.7   |
| Wet bulb                            | 29               | 34                  | 38                  | 44                  | 50   | 55                  | 58                  | 58                  | 53                  | 45   | 37                  | 30                  | 44     |
| Rel. hum.                           | 77.2             | 70.4                | 56.5                | 47.3                | 43.0 | 39.6                | 33.4                | 35.6                | 42.1                | 56.3 | 73.5                | 80.0                | 54.5   |
| Dew point                           | 24.4             | 27.8                | 28.9                | 31.6                | 37.0 | 41.6                | 43.7                | 44.0                | 40.4                | 36.0 | 31.5                | 26.5                | 34.4   |
| <b>Extremes of Monthly Averages</b> |                  |                     |                     |                     |      |                     |                     |                     |                     |      |                     |                     |        |
| <b>Dry Bulb</b>                     |                  |                     |                     |                     |      |                     |                     |                     |                     |      |                     |                     |        |
| Highest                             | 43.0             | 44.6                | 51.6                | 58.6                | 68.7 | 77.3                | 83.3                | 82.5                | 72.7                | 59.5 | 46.4                | 38.8                | 56.6   |
| Year                                | 1953             | 1991                | 1992                | 1987                | 1958 | 1992                | 1985                | 1967                | 1990                | 1988 | 1999                | 1953                | 1992   |
| Lowest                              | 12.9             | 25.8                | 39.6                | 48.3                | 57.0 | 64.2                | 71.3                | 70.6                | 58.9                | 48.1 | 25.7                | 21.9                | 50.2   |
| Year                                | 1950             | 1956                | 1955                | 1955                | 1984 | 1953                | 1986                | 1964                | 1985                | 1984 | 1985                | 1985                | 1985   |
| <b>Wet Bulb</b>                     |                  |                     |                     |                     |      |                     |                     |                     |                     |      |                     |                     |        |
| Highest                             | 39               | 41                  | 44                  | 47                  | 55   | 59                  | 63                  | 61                  | 56                  | 50   | 42                  | 36                  | 47     |
| Year                                | 1953             | 1956                | 1992                | 1992                | 1958 | 1992 <sup>(b)</sup> | 1998                | 1999 <sup>(b)</sup> | 1995 <sup>(b)</sup> | 1988 | 1999 <sup>(b)</sup> | 1991 <sup>(b)</sup> | 1992   |
| Lowest                              | 12               | 23                  | 33                  | 39                  | 45   | 51                  | 56                  | 55                  | 48                  | 40   | 24                  | 21                  | 41     |
| Year                                | 1950             | 1956                | 1955                | 1955                | 1959 | 1983 <sup>(b)</sup> | 1986 <sup>(b)</sup> | 1980 <sup>(b)</sup> | 1970                | 1984 | 1985                | 1985                | 1985   |
| <b>Relative Humidity</b>            |                  |                     |                     |                     |      |                     |                     |                     |                     |      |                     |                     |        |
| Highest                             | 88.8             | 86.9                | 69.1                | 64.5                | 61.9 | 53.5                | 45.6                | 47.8                | 55.5                | 74.2 | 88.7                | 90.5                | 58.9   |
| Year                                | 1960             | 1963                | 1993                | 1963                | 1948 | 1950                | 1993                | 1976                | 1977                | 1962 | 1979                | 1950                | 1978   |
| Lowest                              | 60.0             | 54.0                | 44.0                | 36.9                | 31.2 | 30.0                | 21.9                | 24.5                | 33.2                | 42.5 | 62.8                | 69.0                | 49.4   |
| Year                                | 1963             | 1967                | 1965                | 1966                | 1966 | 1949                | 1959                | 1967                | 1974                | 1952 | 1976                | 1968                | 1967   |
| <b>Dew Point</b>                    |                  |                     |                     |                     |      |                     |                     |                     |                     |      |                     |                     |        |
| Highest                             | 34.4             | 36.7                | 37.2                | 37.1                | 43.9 | 47.5                | 50.1                | 48.4                | 45.4                | 43.5 | 38.3                | 34.3                | 37.7   |
| Year                                | 1953             | 1992 <sup>(b)</sup> | 1986                | 1992 <sup>(b)</sup> | 1998 | 1958                | 1975                | 1976                | 1963                | 1962 | 1954                | 1950                | 1958   |
| Lowest                              | 6.5              | 17.3                | 20.8                | 26.0                | 30.4 | 37.5                | 35.4                | 38.4                | 33.8                | 30.2 | 19.4                | 15.1                | 31.5   |
| Year                                | 1950             | 1956                | 1965 <sup>(b)</sup> | 1982                | 1964 | 1954                | 1959                | 1955                | 1970                | 1984 | 1985                | 1983                | 1955   |

(a) Dry bulb, wet bulb, and dew point temperatures in °F, relative humidity in %.

(b) Most recent of multiple occurrences.

**Table 6.4. Average and Extreme Solar Radiation Daily Values (langley), 1953 Through 1999**

|         | Jan                 | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Annual   |
|---------|---------------------|------|------|------|------|------|------|------|------|------|------|------|----------|
| Average | 108                 | 185  | 321  | 450  | 550  | 607  | 630  | 537  | 405  | 254  | 125  | 85   | 355      |
| Highest | 277                 | 422  | 542  | 704  | 838  | 821  | 808  | 721  | 591  | 434  | 295  | 196  | 838      |
| Year    | 1969                | 1958 | 1968 | 1972 | 1977 | 1971 | 1974 | 1957 | 1970 | 1973 | 1971 | 1972 | May 1977 |
| Lowest  | 16                  | 11   | 44   | 75   | 67   | 92   | 118  | 104  | 61   | 33   | 14   | 8    | 8        |
| Year    | 1976 <sup>(a)</sup> | 1995 | 1979 | 1974 | 1962 | 1992 | 1972 | 1993 | 1957 | 1974 | 1969 | 1999 | Dec 1999 |

(a) Most recent of multiple occurrences.

## 6.5 Thunderstorms, Dust and Glaze

A thunderstorm day is one in which thunder is heard at the observing station one or more times during a calendar day. If a thunderstorm were to begin before midnight and continue until after midnight, it is possible to have two thunderstorm days from a single storm.

Table 6.5 shows that thunderstorms occurred in every month of the year, except January and November. The thunderstorm season is essentially from April through September. The average number of thunderstorm days per year is 10; however, the total varies from a low of 3 in 1949 to a high of 23 in 1948. The largest number of thunderstorms in any single month was 8 in July 1998, July 1983, June 1972, and August 1953.

The criterion for both dust and blowing dust is that horizontal visibility be reduced to 6 miles or less. Dust is carried into the area from a distant source and may occur without strong winds. Blowing dust occurs when dust is being picked up locally and occurs with stronger winds. Both dust and blowing dust occurred at the Hanford Meteorology Station; however, in most cases, it is blowing dust. Table 6.5 presents the average number of days per month and year of dust and blowing dust during the period 1945 through 1999. The average number of days per year with dust or blowing dust is 5. The greatest number of such days in any year was 20 in 1980; the fewest was 0 in 1987 and earlier years. The greatest number of days with dust or blowing dust in any month was 9 in May 1980. This peak in the number of days with dust or blowing dust resulted from the eruption of Mount St. Helens on May 18, 1980, and subsequent dates.

Glaze is a coating of ice formed when rain or drizzle freezes on contact with any surface having a temperature that is below freezing. Table 6.5 provides data on the number of days per month and year with glaze for the period 1945 through 1999. The average number of days with freezing rain or freezing drizzle is 6. The highest number of days with glaze in any winter season was 18 during the winter of 1969-1970; the least, 1 day during the winter of 1987-1988 and earlier winters. The greatest number of such days in any single month was 9 in January 1970.

**Table 6.5.** Average Number of Days of Various Meteorological Phenomena, 1945 Through 1999

| Phenomenon           | Jan | Feb  | Mar  | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec  | Annual |
|----------------------|-----|------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|--------|
| Thunderstorm         | 0   | ≤0.1 | 0.1  | 0.8 | 1.5 | 2.3 | 2.2 | 2.0 | 0.8 | 0.2 | 0   | ≤0.1 | 10.0   |
| Dust or blowing dust | 0.4 | 0.4  | 0.5  | 0.6 | 0.7 | 0.4 | 0.4 | 0.3 | 0.5 | 0.3 | 0.2 | 0.2  | 4.6    |
| Glaze                | 2.2 | 0.7  | ≤0.1 | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0.8 | 2.4  | 6.1    |

## 6.6 Atmospheric Pressure

Table 6.6 contains atmospheric pressure data for the period 1955 through 1999. This table lists both station and sea-level pressure, including extremes and years of occurrence. Atmospheric pressure may be indicated in several different units, including inches of mercury, millimeters of mercury, millibars, or

Pascals; however, in this table, pressure is stated in inches of mercury. Station pressure is the barometric pressure measured at the Hanford Meteorology Station (at an elevation of 733 feet); sea-level pressure is the station pressure adjusted to sea level. Most are familiar with barometric pressure adjusted to sea level, which allows atmospheric pressures for all locations to be compared, regardless of the elevation of the station where the data are measured.

The highest sea-level pressure ever recorded at the Hanford Meteorology Station was 31.12 inches in January 1979; the lowest was 28.94 inches in December 1995 and on previous occasions.

Some rapid pressure changes occurred on November 3, 1958, falling 0.492 inch over a 6-hours period (0.082 inch per hour), including a 1-hour fall of 0.160 inch. On the same day, the pressure rose 0.554 inch during a 6-hour period (0.090 inch per hour), including a 1-hour rise of 0.145 inch. The greatest sea-level pressure change during a 1-day period was 1.02 inches (December 8, 1971).

**Table 6.6.** Average and Extreme Station and Sea-Level Pressure Data, 1955 Through 1999 (inches of mercury)

| Month  | Station Pressure |       |                         |       |                     | Greatest Daily Range | Sea-Level Pressure |                     |       |                         |
|--------|------------------|-------|-------------------------|-------|---------------------|----------------------|--------------------|---------------------|-------|-------------------------|
|        | Average          | High  | Year                    | Low   | Year                |                      | High               | Year                | Low   | Year                    |
| Jan    | 29.31            | 30.23 | 1979 <sup>(a)</sup>     | 28.18 | 1980                | 0.77                 | 31.12              | 1979                | 28.94 | 1964                    |
| Feb    | 29.27            | 30.08 | 1956                    | 28.23 | 1958 <sup>(a)</sup> | 0.79                 | 30.97              | 1956 <sup>(a)</sup> | 28.98 | 1958 <sup>(a)</sup>     |
| Mar    | 29.20            | 29.92 | 1955                    | 28.34 | 1995                | 0.85                 | 30.79              | 1955                | 29.11 | 1995                    |
| Apr    | 29.19            | 29.91 | 1999                    | 28.49 | 1962 <sup>(a)</sup> | 0.81                 | 30.73              | 1999                | 29.26 | 1962                    |
| May    | 29.16            | 29.68 | 1970 <sup>(a)</sup>     | 28.61 | 1999                | 0.46                 | 30.48              | 1970 <sup>(a)</sup> | 29.38 | 1957 <sup>(a)</sup>     |
| Jun    | 29.13            | 29.60 | 1987 <sup>(a)</sup>     | 28.67 | 1992 <sup>(a)</sup> | 0.54                 | 30.40              | 1987                | 29.42 | 1992                    |
| Jul    | 29.14            | 29.56 | 1993 <sup>(a)</sup>     | 28.80 | 1979 <sup>(a)</sup> | 0.48                 | 30.34              | 1993 <sup>(a)</sup> | 29.55 | 1979 <sup>(a)</sup>     |
| Aug    | 29.14            | 29.55 | 1968                    | 28.75 | 1980                | 0.39                 | 30.32              | 1968                | 29.52 | 1980                    |
| Sep    | 29.18            | 29.79 | 1983 <sup>(a)</sup>     | 28.48 | 1986 <sup>(a)</sup> | 0.56                 | 30.60              | 1983                | 29.25 | 1986                    |
| Oct    | 29.25            | 29.86 | 1999                    | 28.39 | 1962                | 0.74                 | 30.68              | 1999                | 29.15 | 1962                    |
| Nov    | 29.28            | 30.06 | 1979 <sup>(a)</sup>     | 28.36 | 1982 <sup>(a)</sup> | 0.78                 | 30.90              | 1979 <sup>(a)</sup> | 29.13 | 1982                    |
| Dec    | 29.32            | 30.20 | 1978                    | 28.16 | 1995                | 1.02                 | 31.07              | 1978                | 28.94 | 1995 <sup>(a)</sup>     |
| Annual | 29.22            | 30.23 | Jan 1979 <sup>(a)</sup> | 28.16 | Dec 1995            | 1.02                 | 31.12              | Jan 1979            | 28.94 | Dec 1995 <sup>(a)</sup> |

(a) Most recent of several occurrences.

---

## 7.0 Extreme Values

Extreme values are generally described in terms of probability of occurrence or in terms of return period. For low probability events, the return period is simply the reciprocal of the probability when the probability is expressed as the likelihood of the event occurring in a given year. As with all estimate extreme values, the uncertainty in the estimates increases as the return period increases.

### 7.1 Annual Temperature Extremes

Annual maximum and minimum temperatures with return periods from 2 to 1,000 years are listed in Table 7.1. The probabilities of exceeding various maximum and minimum temperatures are shown in Figures 7.1 and 7.2 along with the maximum and minimum temperatures observed at the Hanford Meteorology Station from 1945 through 1998. The curves were estimated by assuming that the annual extreme temperatures may be fit using a normal distribution and calculating distribution parameters from the observed data.

### 7.2 Precipitation Rates

Maximum precipitation rates for return periods of 2 to 1,000 years are listed in Table 7.2. The corresponding precipitation amounts are listed in Table 7.3. The precipitation rate estimates are based on precipitation measurements made at the Hanford Meteorology Station from 1947 through 1998. The precipitation rates were estimated for each return period assuming a lognormal distribution and distribution parameters calculated from the data. Figure 7.3 shows the predicted rates for 1, 3, 6, and 12 hours duration along with the observed data.

**Table 7.1.** Return Periods for Annual Maximum and Minimum Temperatures

| Return Period<br>(years) | Maximum Temperature<br>(°F) | Minimum Temperature<br>(°F) |
|--------------------------|-----------------------------|-----------------------------|
| 2                        | 106.1                       | -0.9                        |
| 5                        | 107.3                       | -9.2                        |
| 10                       | 108.7                       | -13.5                       |
| 20                       | 110.1                       | -17.1                       |
| 50                       | 111.2                       | -21.2                       |
| 100                      | 113.3                       | -23.9                       |
| 200                      | 114.0                       | -26.3                       |
| 500                      | 115.0                       | -29.3                       |
| 1000                     | 115.6                       | -31.4                       |

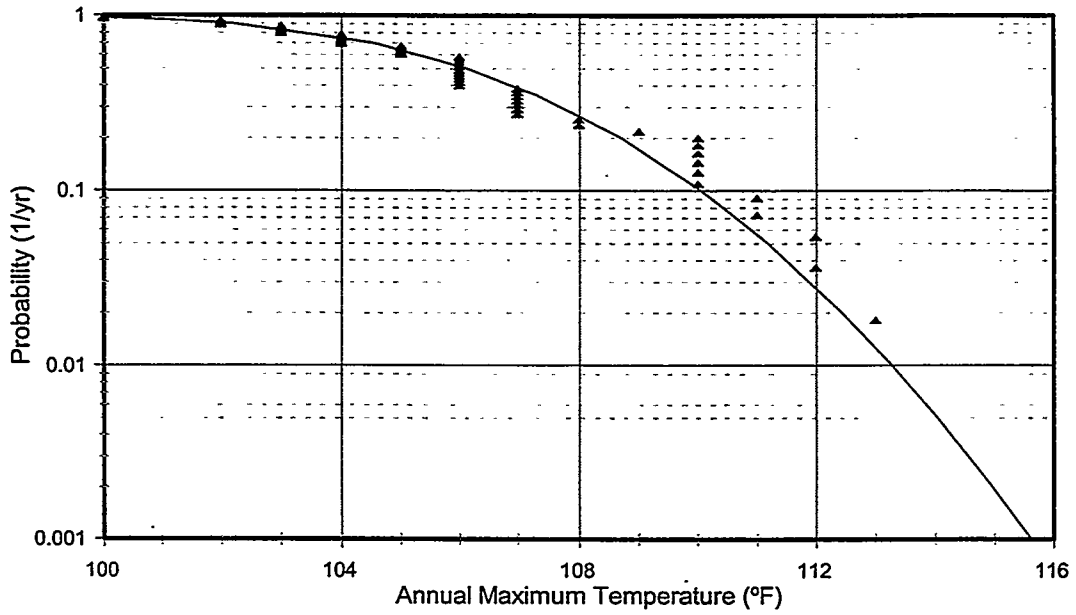


Figure 7.1. Probability of an Annual Maximum Temperature Exceeding a Given Value

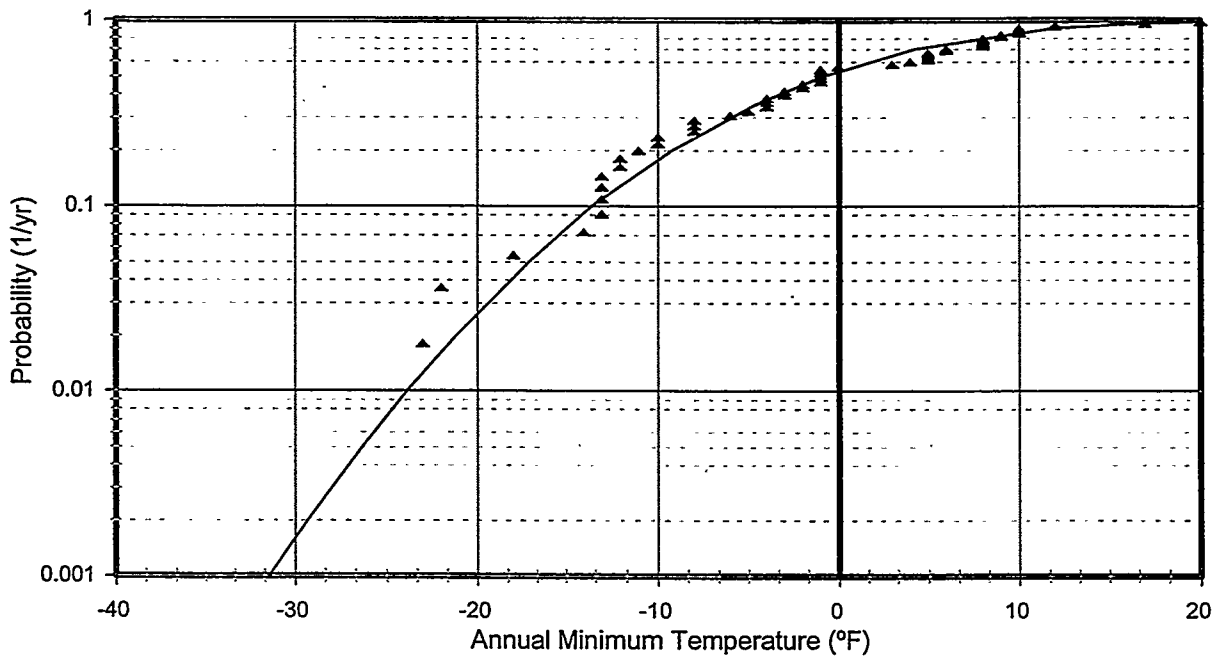


Figure 7.2. Probability of an Annual Minimum Temperature Being Less Than a Given Value



**Table 7.2.** Precipitation Rates (inches per hour) for 1 to 24 Hours Duration and Return Periods from 2 to 1,000 Years

| Return Period<br>(years) | Duration |         |         |         |          |          |
|--------------------------|----------|---------|---------|---------|----------|----------|
|                          | 1 hour   | 2 hours | 3 hours | 6 hours | 12 hours | 24 hours |
| 2                        | 0.22     | 0.15    | 0.12    | 0.081   | 0.051    | 0.029    |
| 5                        | 0.31     | 0.21    | 0.16    | 0.11    | 0.067    | 0.039    |
| 10                       | 0.38     | 0.24    | 0.18    | 0.12    | 0.078    | 0.046    |
| 20                       | 0.44     | 0.28    | 0.20    | 0.14    | 0.089    | 0.052    |
| 50                       | 0.52     | 0.32    | 0.23    | 0.16    | 0.10     | 0.061    |
| 100                      | 0.58     | 0.36    | 0.25    | 0.18    | 0.11     | 0.067    |
| 200                      | 0.65     | 0.39    | 0.27    | 0.19    | 0.12     | 0.073    |
| 500                      | 0.73     | 0.43    | 0.30    | 0.21    | 0.14     | 0.081    |
| 1,000                    | 0.80     | 0.47    | 0.32    | 0.22    | 0.15     | 0.088    |

**Table 7.3.** Precipitation Amounts (inches) for 1 to 24 Hours in Periods and Return Periods from 2 to 1,000 Years

| Return Period<br>(years) | Duration |         |         |         |          |          |
|--------------------------|----------|---------|---------|---------|----------|----------|
|                          | 1 hour   | 2 hours | 3 hours | 6 hours | 12 hours | 24 hours |
| 2                        | 0.22     | 0.31    | 0.36    | 0.48    | 0.61     | 0.70     |
| 5                        | 0.31     | 0.42    | 0.47    | 0.64    | 0.81     | 0.95     |
| 10                       | 0.38     | 0.49    | 0.54    | 0.74    | 0.94     | 1.11     |
| 20                       | 0.44     | 0.56    | 0.61    | 0.84    | 1.07     | 1.26     |
| 50                       | 0.52     | 0.65    | 0.69    | 0.96    | 1.23     | 1.46     |
| 100                      | 0.58     | 0.71    | 0.75    | 1.05    | 1.35     | 1.61     |
| 200                      | 0.65     | 0.78    | 0.81    | 1.14    | 1.47     | 1.75     |
| 500                      | 0.73     | 0.87    | 0.89    | 1.26    | 1.63     | 1.95     |
| 1,000                    | 0.80     | 0.94    | 0.95    | 1.35    | 1.75     | 2.11     |

### 7.3 Snow

Snow extremes for return periods from 2 to 1,000 years are listed in Table 7.4. The estimates are based on data from the Hanford Meteorology Station for the 1946-1947 through 1997-1998 snow seasons. The values in the tables were estimated assuming a Type 1 (Gumbel) extreme value distribution (Johnson et al. 1995) using maximum-likelihood estimates (Kinnison 1985) of the distribution parameter values calculated from the Hanford Meteorology Station data. Figures 7.4, 7.5, and 7.6 show the probabilities of seasonal maximum snowfall, maximum single storm snowfall, and maximum snow depth, respectively with the corresponding Hanford Meteorology Station data.

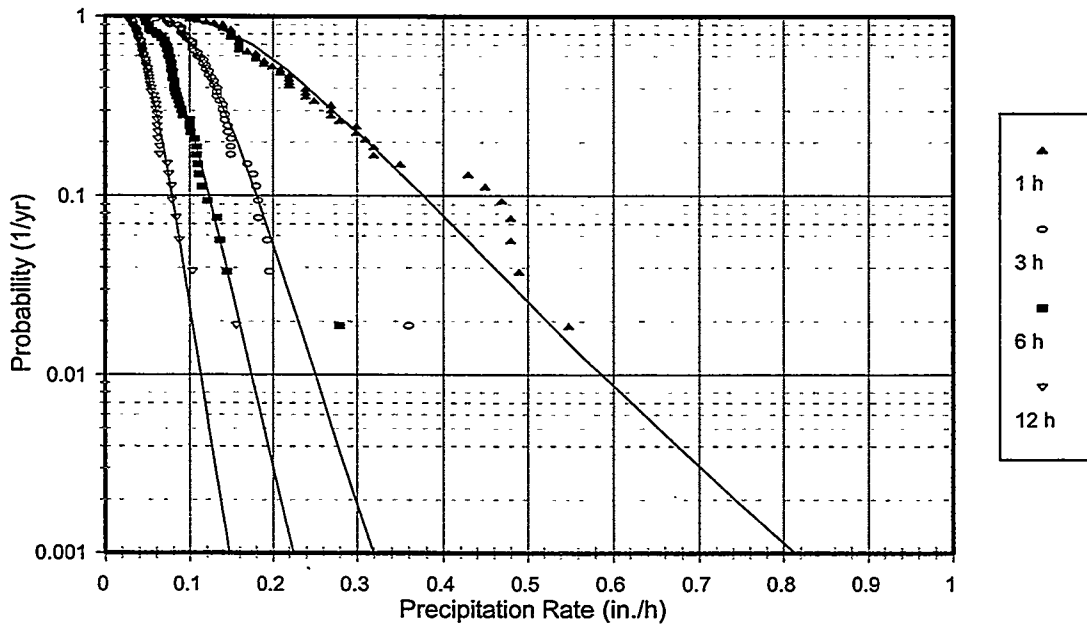


Figure 7.3. Probability of Precipitation Rate Exceeding Given Values by Duration

Table 7.4. Snowfall Extremes for Return Periods from 2 to 1,000 Years

| Return Period<br>(years) | Seasonal Total<br>(inches) | Single Storm<br>(inches) | Maximum on<br>Ground (inches) |
|--------------------------|----------------------------|--------------------------|-------------------------------|
| 2                        | 13.6                       | 3.8                      | 5.1                           |
| 5                        | 23.3                       | 6.0                      | 8.2                           |
| 10                       | 29.6                       | 7.5                      | 10.3                          |
| 20                       | 35.7                       | 8.9                      | 12.3                          |
| 50                       | 43.7                       | 10.7                     | 14.9                          |
| 100                      | 49.6                       | 12.1                     | 16.9                          |
| 200                      | 55.5                       | 13.4                     | 18.8                          |
| 500                      | 63.3                       | 15.2                     | 21.4                          |
| 1,000                    | 69.2                       | 16.5                     | 23.3                          |

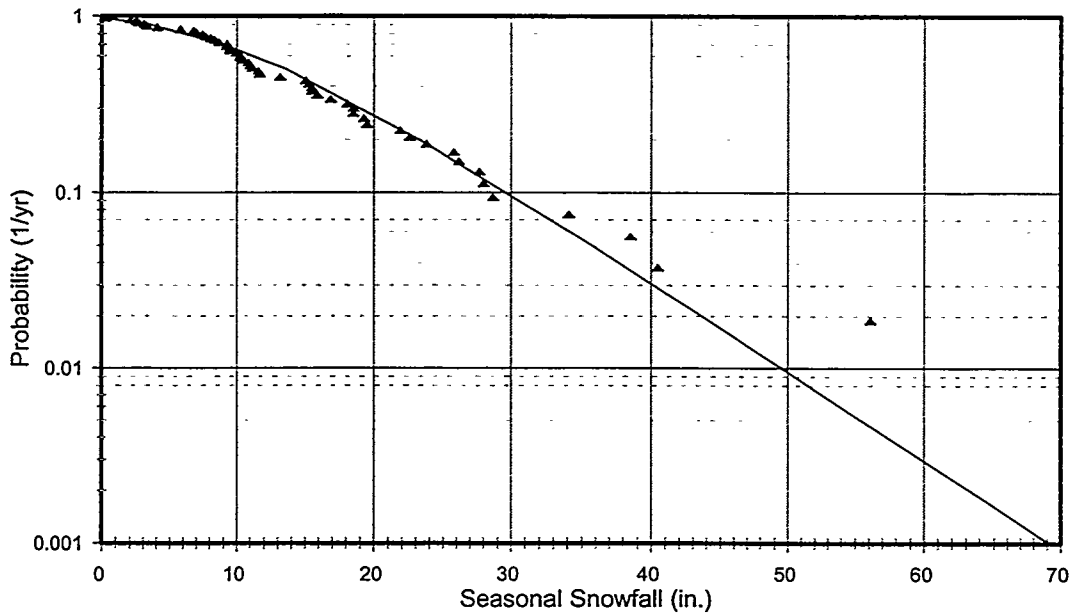


Figure 7.4. Probability of Exceeding a Given Seasonal Snowfall

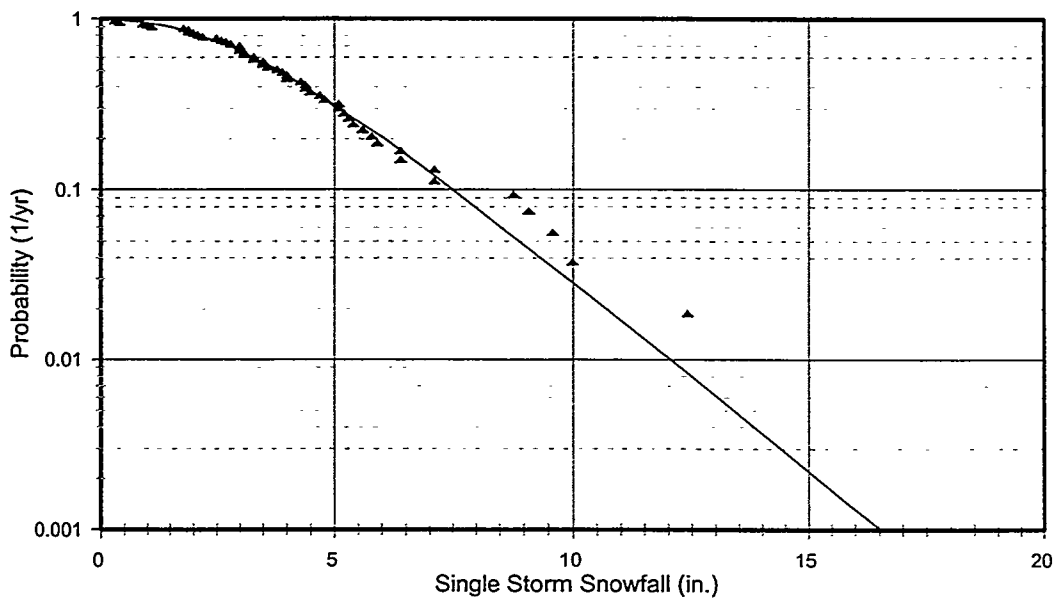


Figure 7.5. Probability of Exceeding a Given Snowfall in a Single Storm

## 7.4 Peak Wind Gusts

Peak wind gusts for return periods of 2 to 10,000 years are listed in Table 7.5 for heights of 30.5, 50, 200, and 400 feet above ground. The peak wind gust estimates are based on wind measurements made at the 50, 200, 400-foot levels of the tower at the Hanford Meteorology Station. The peak wind gusts for

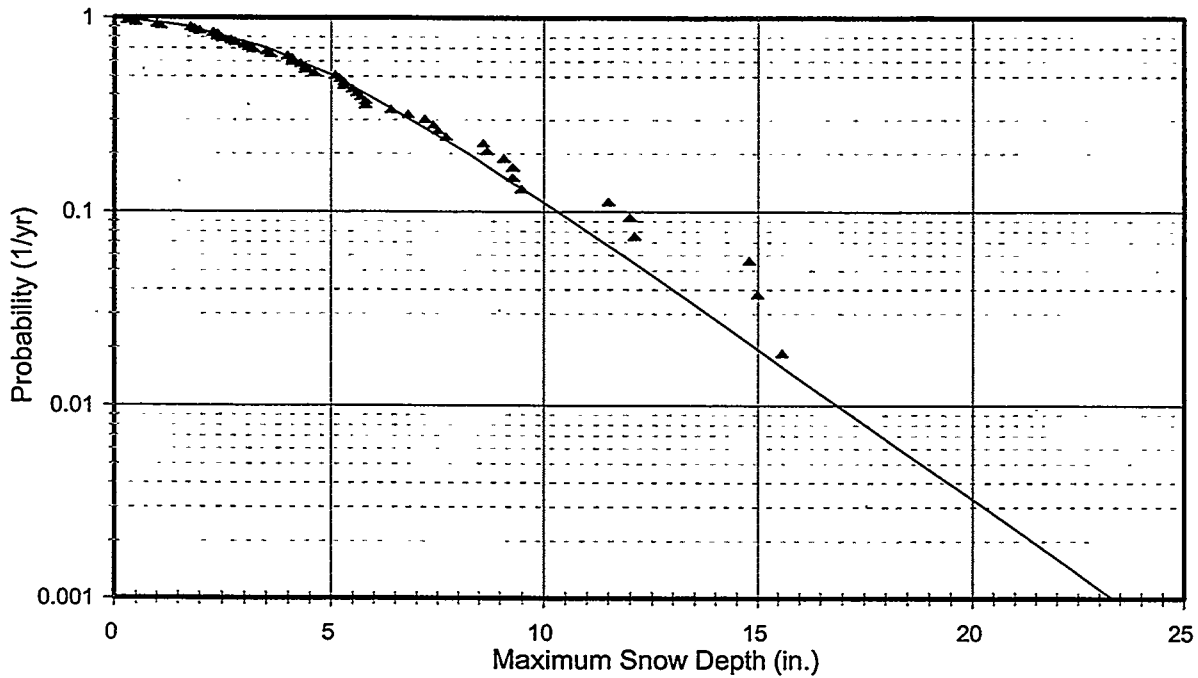


Figure 7.6. Probability of Exceeding a Given Snow Depth

Table 7.5. Peak Wind Gusts (mph) for Return Periods from 2 to 10,000 Years

| Return Period<br>(years) | Height Above Ground |         |          |          |
|--------------------------|---------------------|---------|----------|----------|
|                          | 10 meters           | 50 feet | 200 feet | 400 feet |
| 2                        | 57.4                | 60.2    | 67.5     | 71.6     |
| 5                        | 63.6                | 66.7    | 75.3     | 80.5     |
| 10                       | 67.8                | 71.0    | 80.5     | 86.4     |
| 20                       | 71.7                | 75.2    | 85.4     | 92.1     |
| 50                       | 76.9                | 80.5    | 91.8     | 99.4     |
| 100                      | 80.7                | 84.6    | 96.6     | 104.8    |
| 200                      | 84.5                | 88.6    | 101.4    | 110.3    |
| 500                      | 89.6                | 93.9    | 107.7    | 117.5    |
| 1,000                    | 93.4                | 97.9    | 112.4    | 122.9    |
| 2,000                    | 97.2                | 101.9   | 117.2    | 128.4    |
| 5,000                    | 102.2               | 107.1   | 123.5    | 135.6    |
| 10,000                   | 106.1               | 111.1   | 128.2    | 141.0    |

each return period for these levels were estimated assuming a Type 1 extreme value distribution and maximum likelihood distribution parameters calculated from the Hanford Meteorology Station data. The peak wind gusts for the 30.5-foot (10-meters) level were made by first adjusting the peak gusts observed

at 50 feet to 30.5 feet using the technique described by Peterka and Shahid (1998) and then calculating the distribution parameters using maximum likelihood techniques. Figure 7.7 shows the probabilities of peak wind gusts at all four levels along with the Hanford Meteorology Station peak wind gust data for 50, 200, and 400 feet.

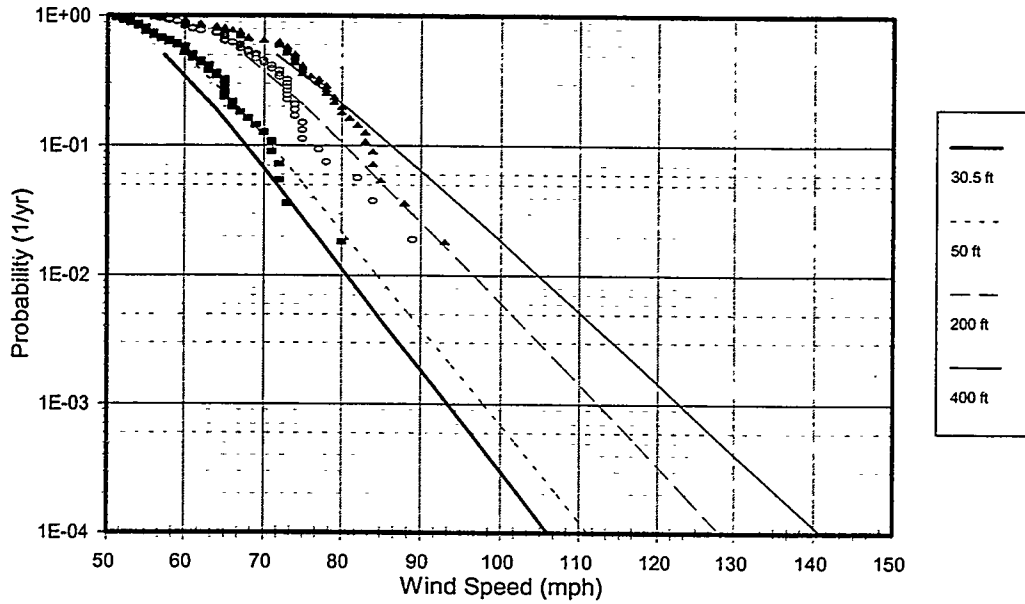


Figure 7.7. Probabilities of Peak Wind Gusts Exceeding Given Values

---

## 8.0 References

- Glantz, C. S., and M. M. Islam. 1988. *The Data Collection Component of the Hanford Meteorology Monitoring Program*. PNL-6684, Pacific Northwest Laboratory, Richland, Washington.
- Hoitink, D. J., and K. W. Burk. 1994. *Climatological Data Summary 1993, with Historical Data*. PNL-9809, Pacific Northwest Laboratory, Richland, Washington.
- Hoitink, D. J., and K. W. Burk. 1995. *Climatological Data Summary 1994, with Historical Data*. PNL-10553, Pacific Northwest Laboratory, Richland, Washington.
- Hoitink, D. J., and K. W. Burk. 1996. *Climatological Data Summary 1995, with Historical Data*. PNNL-11107, Pacific Northwest National Laboratory, Richland, Washington.
- Hoitink, D. J., and K. W. Burk. 1997. *Climatological Data Summary 1996, with Historical Data*. PNNL-11471, Pacific Northwest National Laboratory, Richland, Washington.
- Hoitink, D. J., and K. W. Burk. 1998. *Climatological Data Summary 1997, with Historical Data*. PNNL-11794, Pacific Northwest National Laboratory, Richland, Washington.
- Hoitink, D. J., K. W. Burk, and J. V. Ramsdell, Jr. 1999. *Climatological Data Summary 1998, with Historical Data*. PNNL-12087. Pacific Northwest National Laboratory, Richland, Washington.
- Jenne, D. E., and R. E. Kerns. 1959. *A Climatological Study of the Hanford Area*. HW-57722, General Electric, Hanford Atomic Products Operation, Richland, Washington.
- Johnson, N. L., S. Kotz, and N. Balakrishnan. 1995. *Continuous Univariate Distributions, Vol. 2*, John Wiley & Sons, New York.
- Kinnison, R. R. 1985. *Applied Extreme Value Statistics*. Macmillan, New York.
- Personnel from Pacific Northwest National Laboratory, Fluor Daniel Hanford, Inc., Waste Management Federal Services of Hanford, Inc., and Bechtel Hanford, Inc. for U.S. Department of Energy. 1997. *Environmental Monitoring Plan, United States Department of Energy, Richland Operation Office*. DOE/RL-91-50, Rev. 2. United States Department of Energy, Richland, Washington.
- Peterka, J. A., and S. Shahid. 1998. "Design Gust Wind Speeds in the United States." *Journal of Structural Engineering*, 124:207-214.
- Stone, W. A., D. E. Jenne, and J. M. Thorp. 1972. *Climatology of the Hanford Area*. BNWL-1605, Pacific Northwest Laboratory, Richland, Washington.
- Stone, W. A., J. M. Thorp, O. P. Gifford, and D. J. Hoitink. 1983. *Climatological Summary for the Hanford Area*. PNL-4622, Pacific Northwest Laboratory, Richland, Washington.

# **Appendix**

## **1999 Wind Climatology**

---

## Appendix

### 1999 Wind Climatology

This appendix provides the 1999 station-specific wind roses (Figures A.1[a] and A.2[a]) from the Hanford Meteorological Monitoring Network. Each petal of the wind rose represents the proportional amount of time that the wind blew from that direction. The width of the petal corresponds to each wind speed category. Starting from the center of the rose, the narrowest petal represents winds in the 1- to 3-mph class, the next widest represents the 4- to 7-mph class, and so forth. The length of each of these petals is proportional to the frequency of occurrence for each speed class.

The wind speed histograms (Figures A.1[b] and A.2[b]) represent the proportional amount of time in each speed class.

Table A.1 lists joint frequency distributions (at 10 meters) of wind direction versus wind speed class for the individual stations (see Figure 2.1 in text for locations). Table A.2 lists joint frequency distributions (at 60 meters) for stations 9, 11, 13, and 21 (see Figure 2.2 in text for locations).



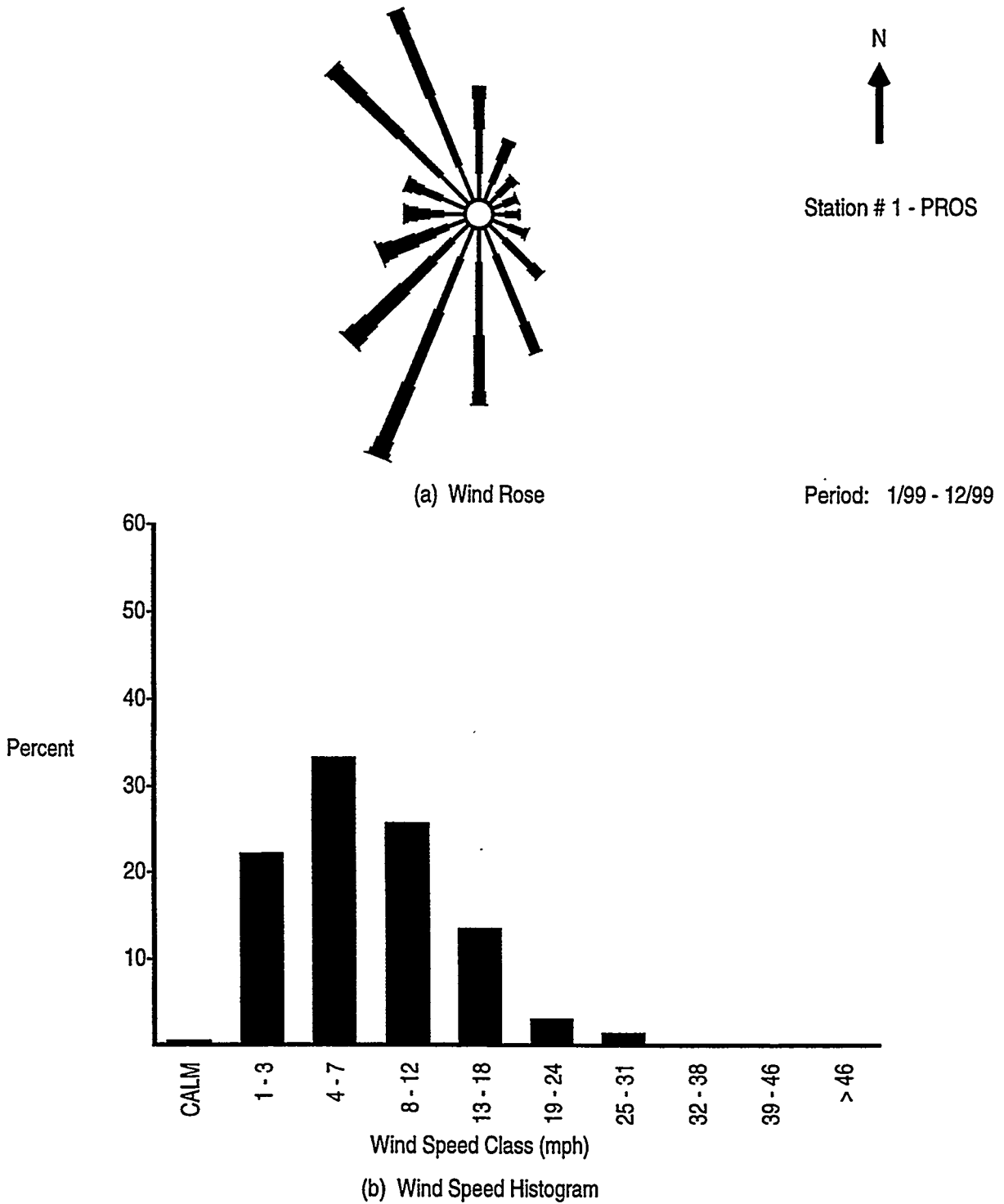
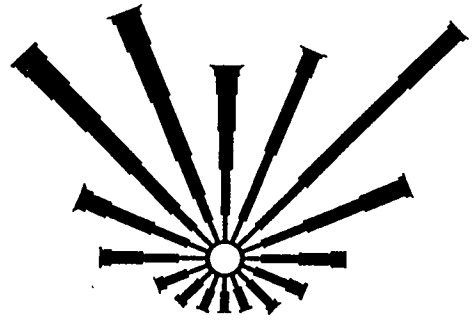


Figure A.1. Wind Rose and Wind Speed Histogram, 10 Meters

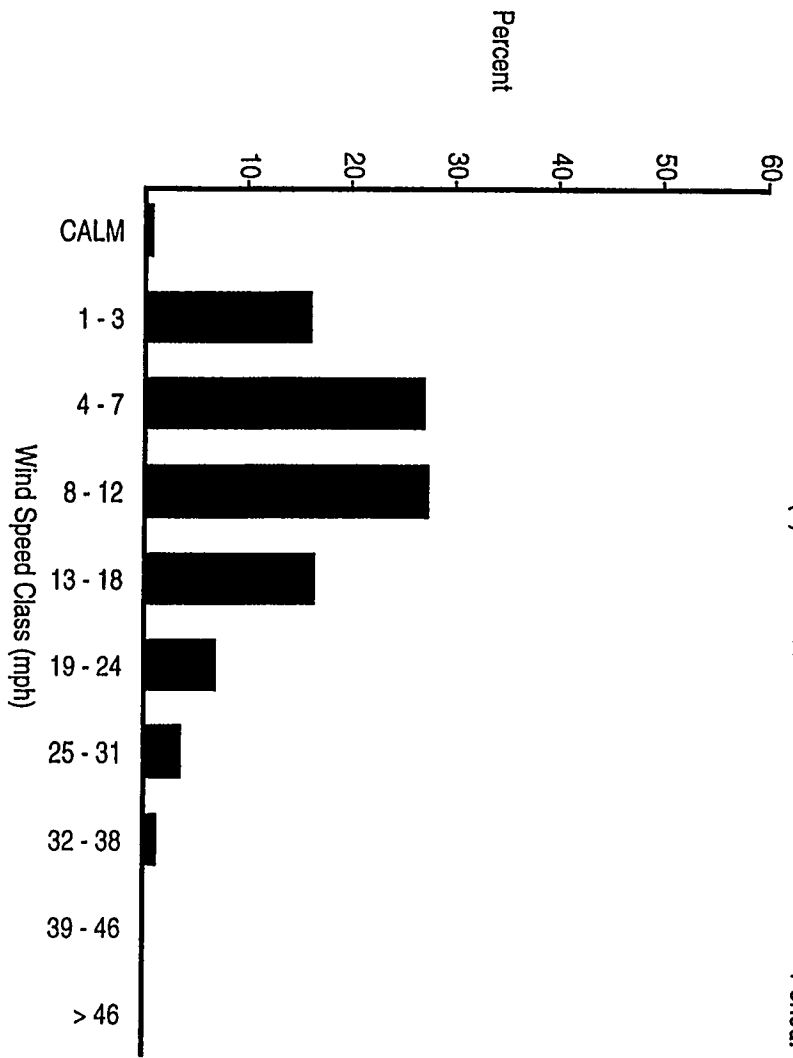


N  
↓

Station # 2 - EOC

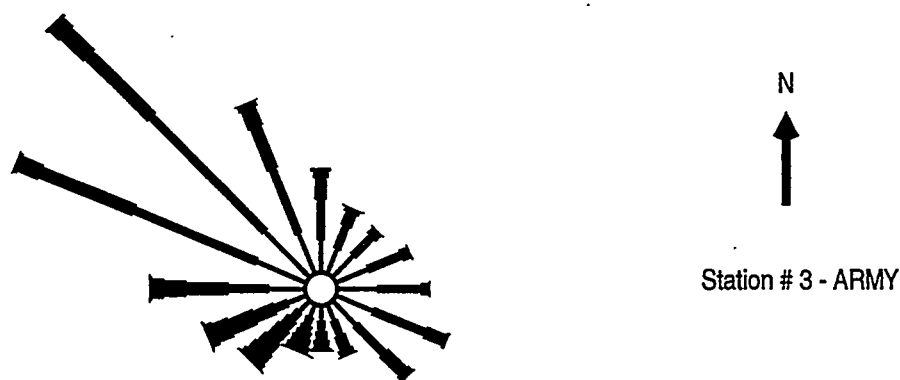
(a) Wind Rose

Period: 1/99 - 12/99



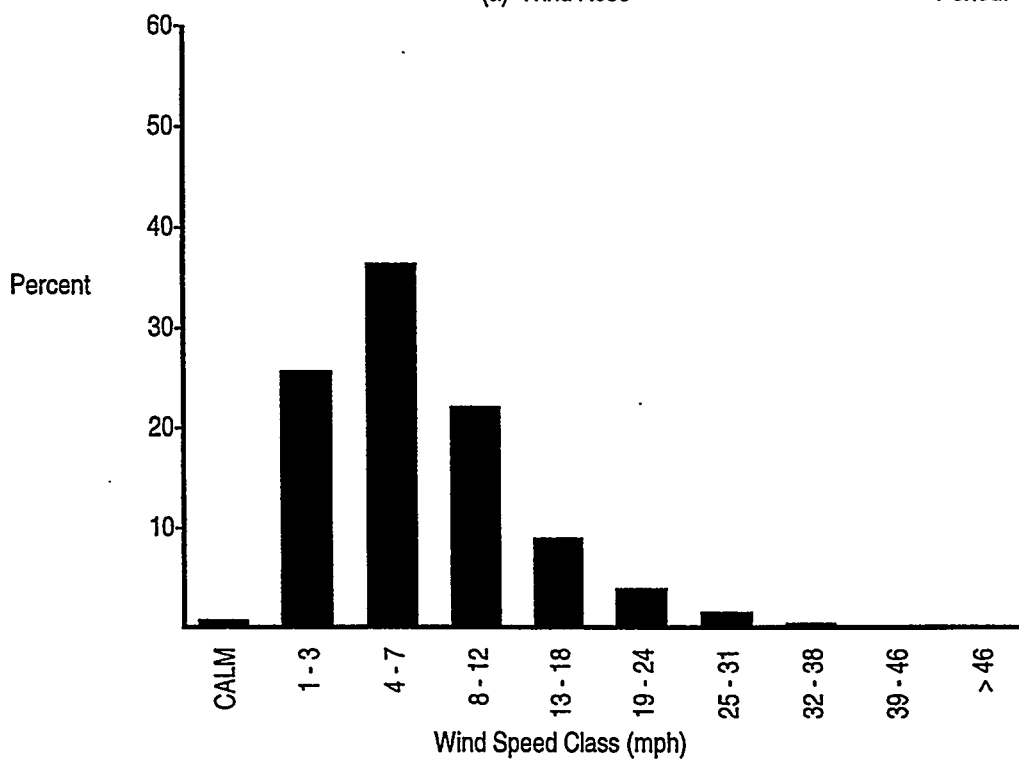
(b) Wind Speed Histogram

Figure A.1. (contd)



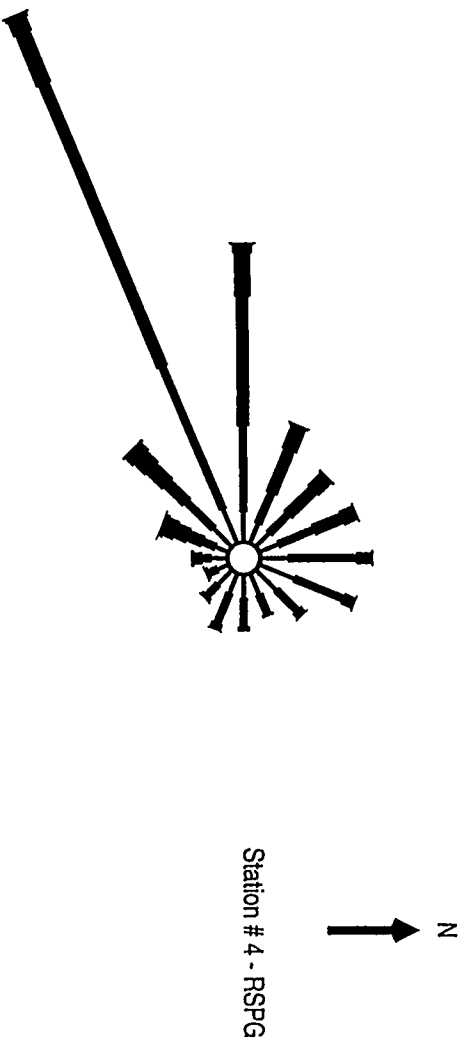
(a) Wind Rose

Period: 1/99 - 12/99



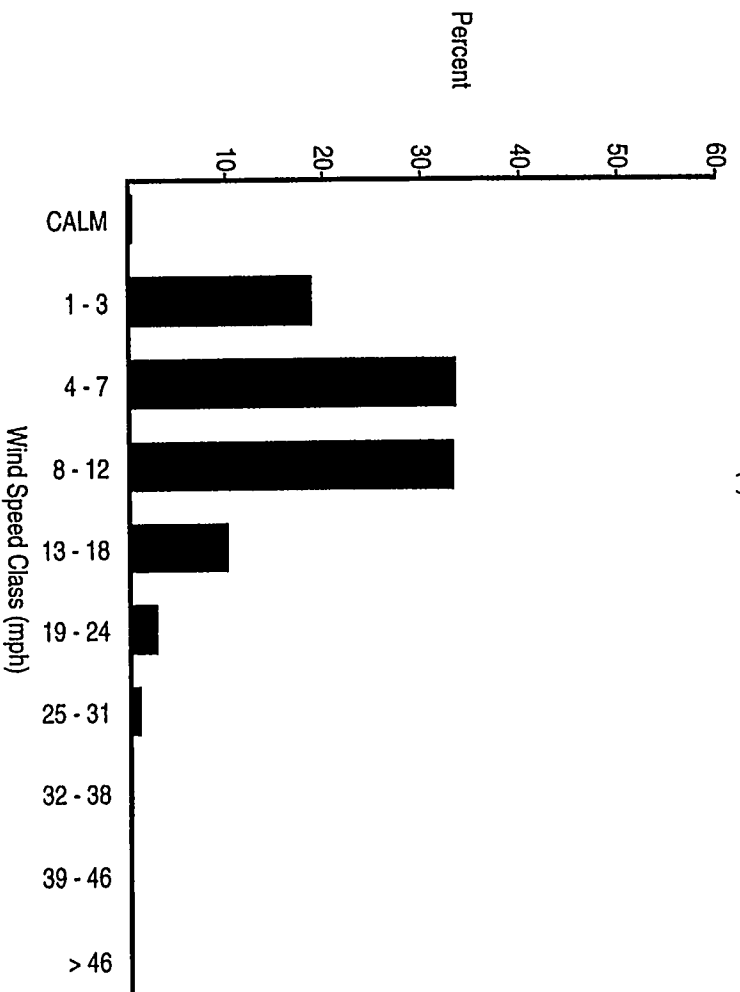
(b) Wind Speed Histogram

Figure A.1. (contd)



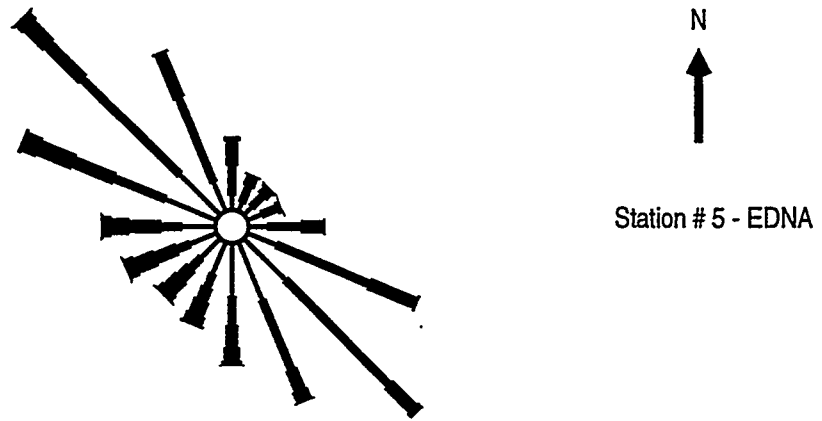
(a) Wind Rose

Period: 1/99 - 12/99



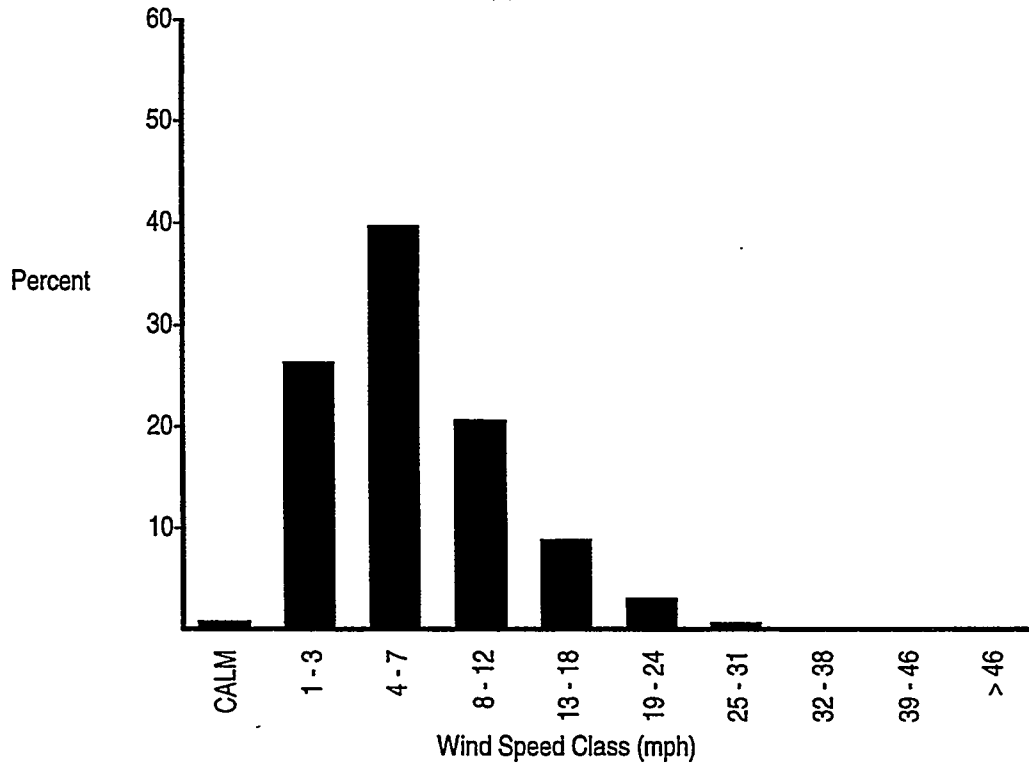
(b) Wind Speed Histogram

Figure A.1. (contd)



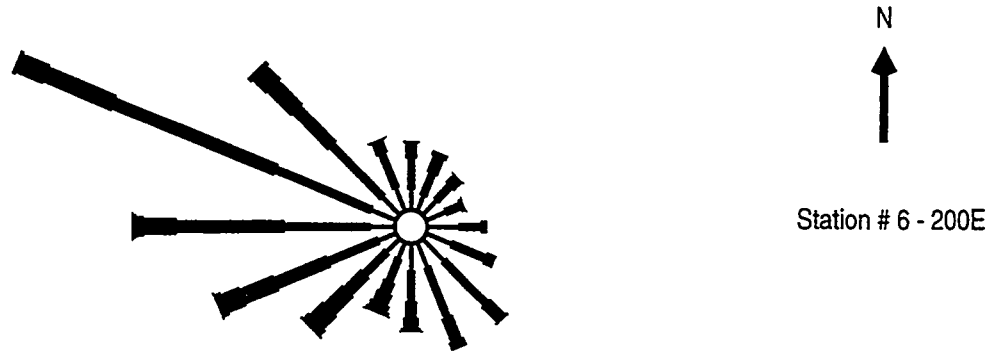
(a) Wind Rose

Period: 1/99 - 12/99



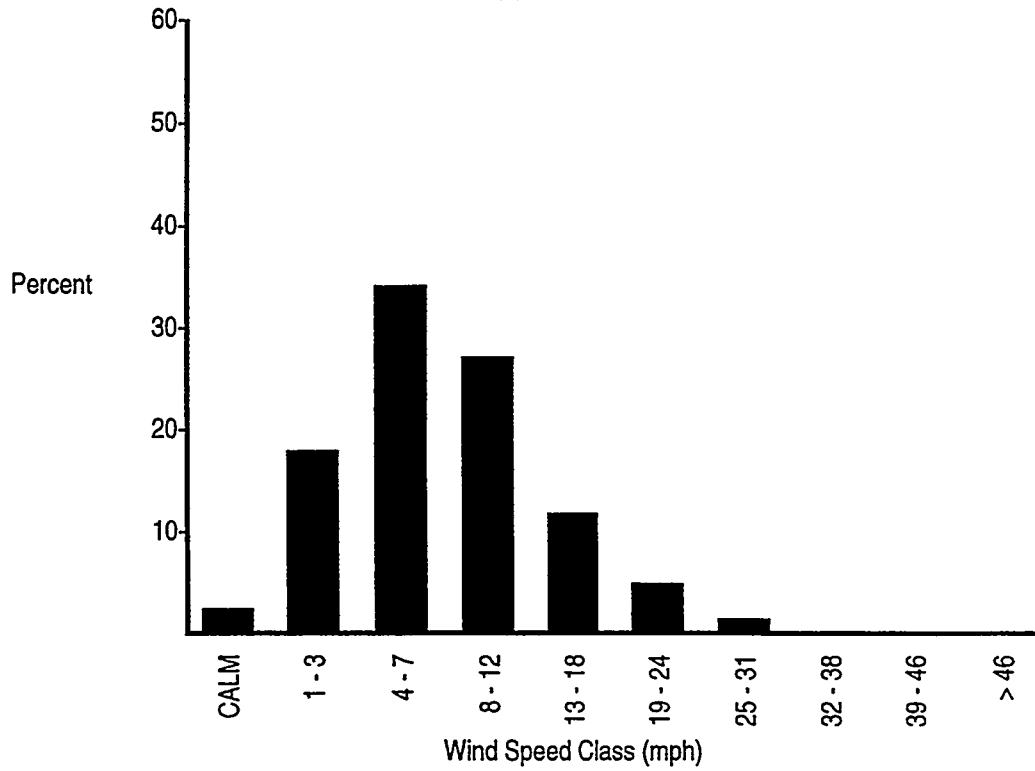
(b) Wind Speed Histogram

Figure A.1. (contd)



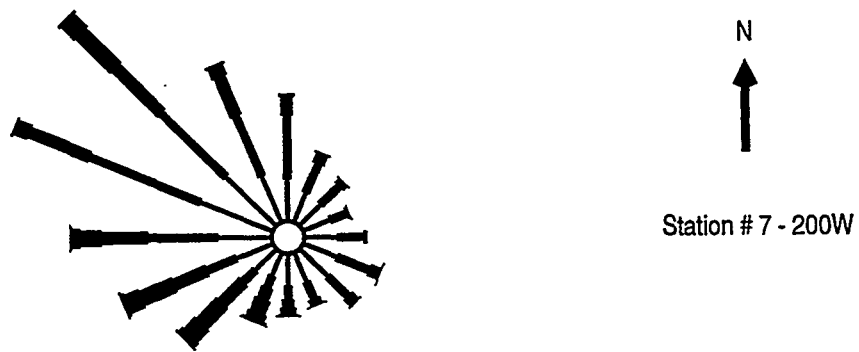
(a) Wind Rose

Period: 1/99 - 12/99



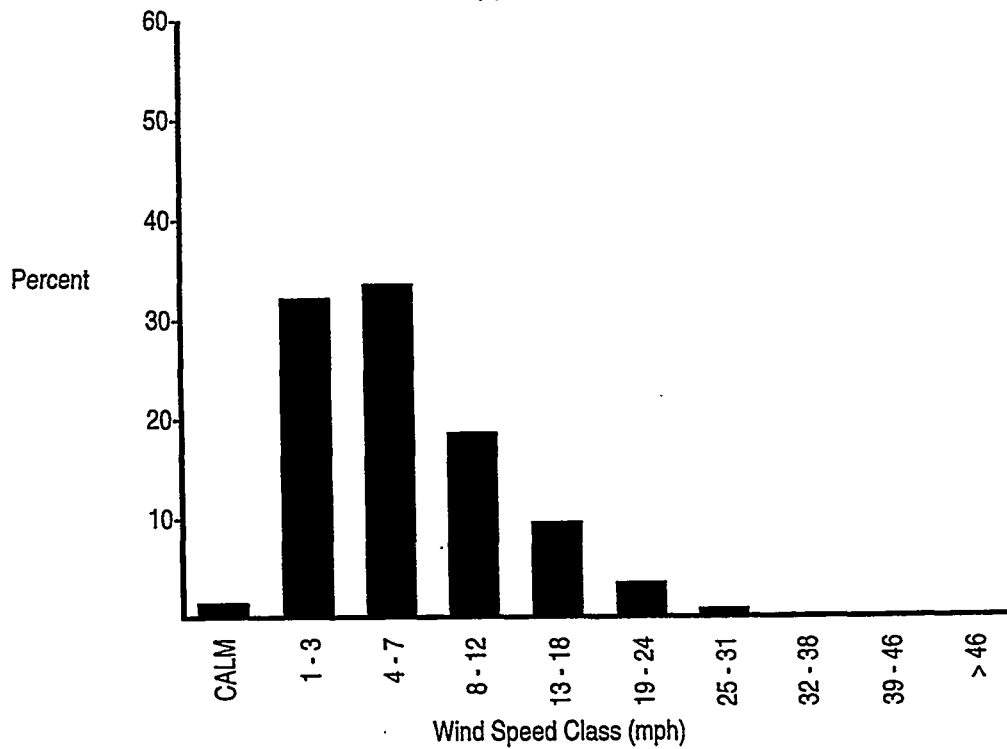
(b) Wind Speed Histogram

Figure A.1. (contd)



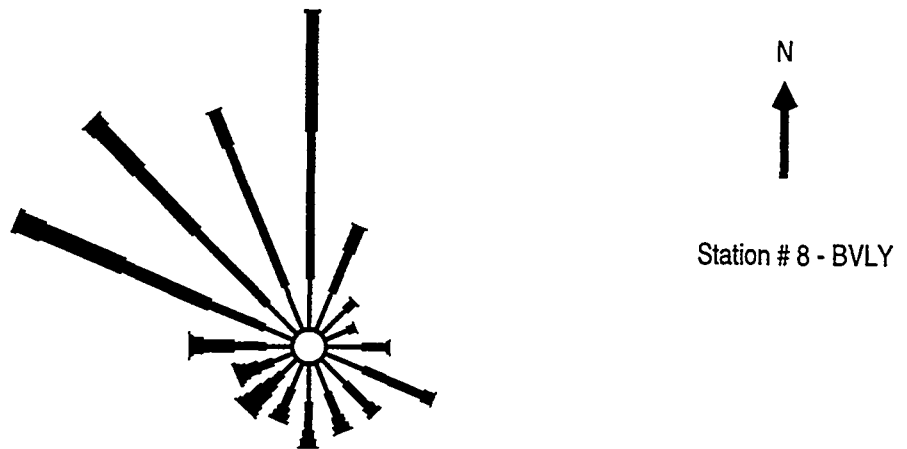
(a) Wind Rose

Period: 1/99 - 12/99



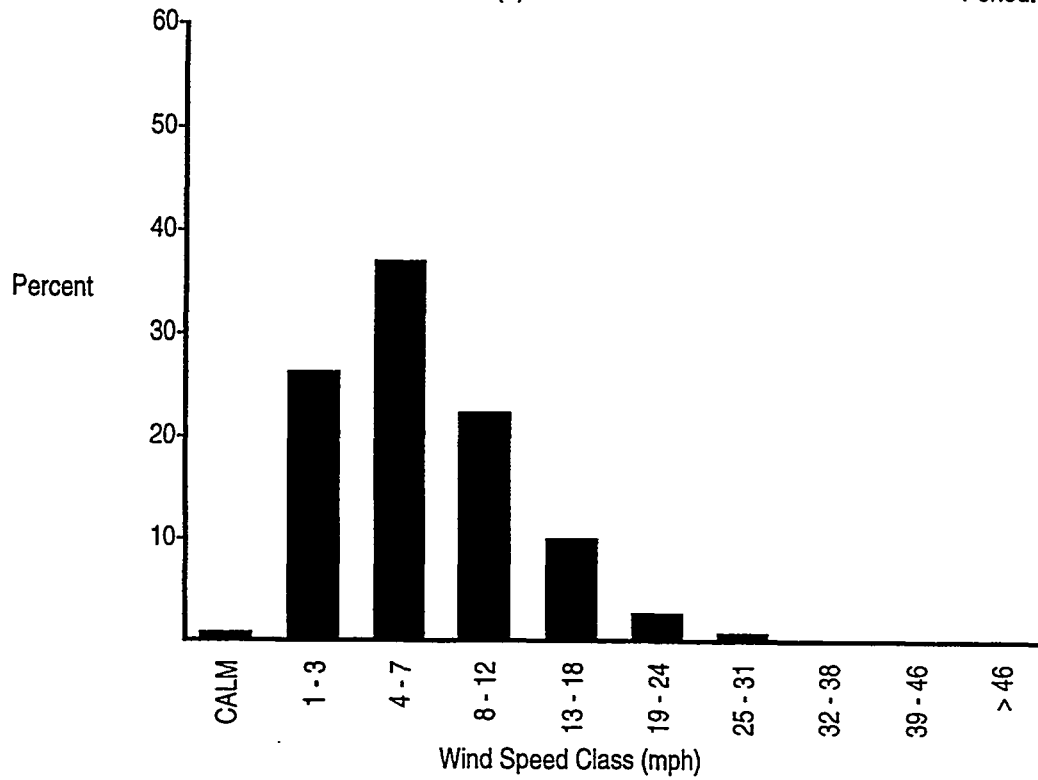
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

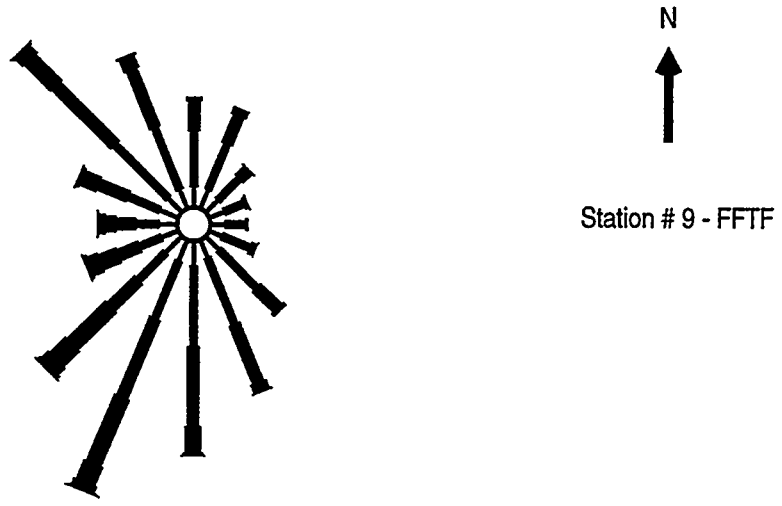
Period: 1/99 - 12/99



(b) Wind Speed Histogram

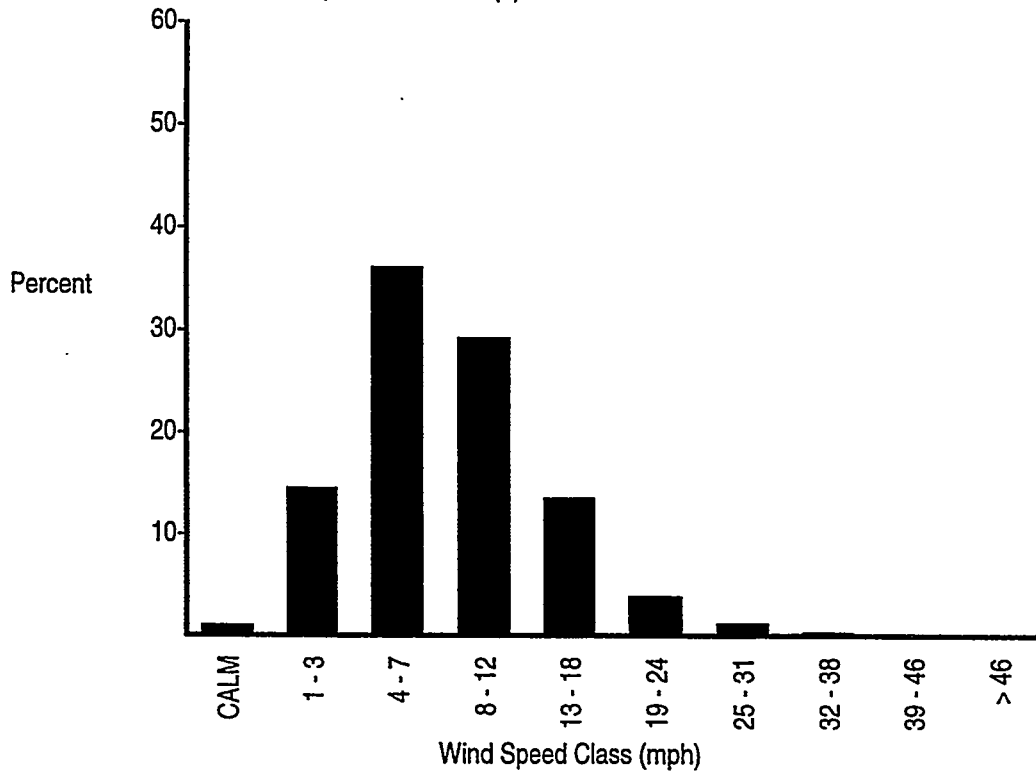
Figure A.1. (contd)





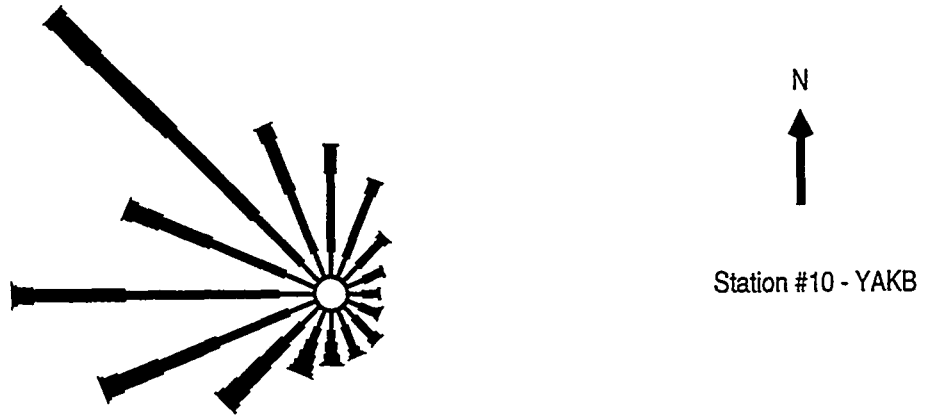
(a) Wind Rose

Period: 1/99 - 12/99



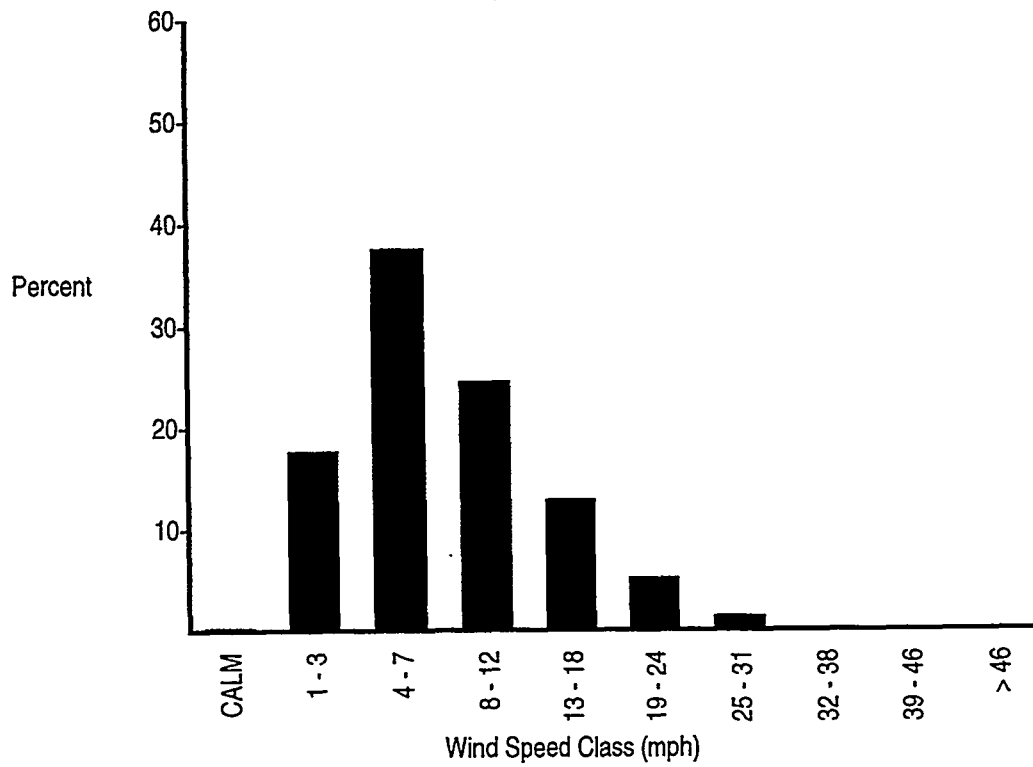
(b) Wind Speed Histogram

Figure A.1. (contd)



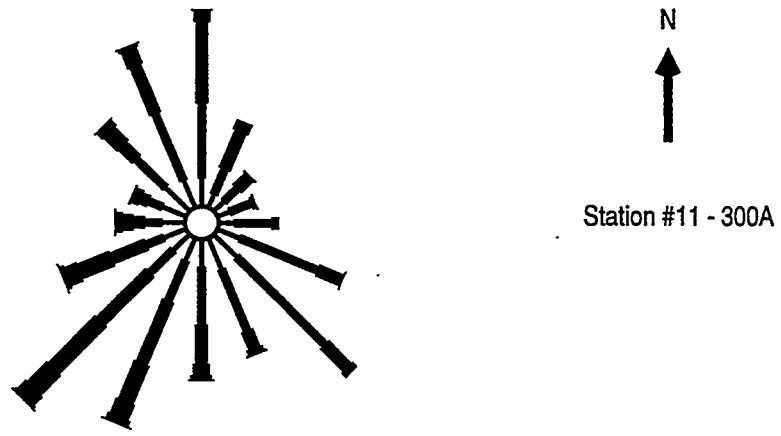
(a) Wind Rose

Period: 1/99 - 12/99



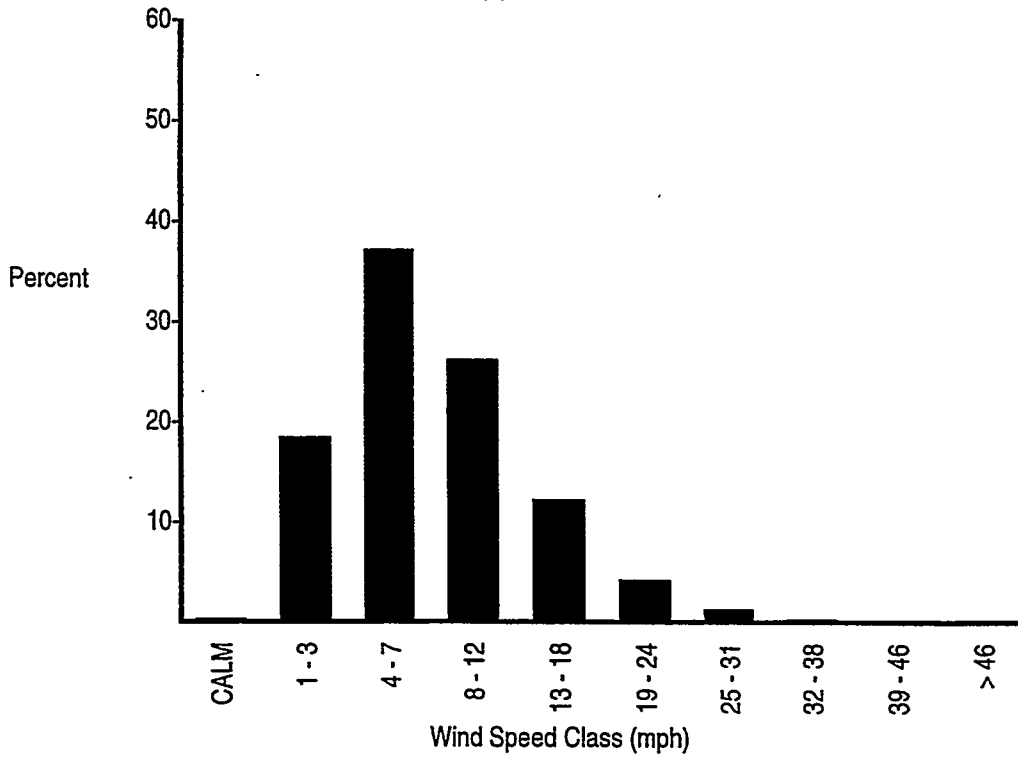
(b) Wind Speed Histogram

Figure A.1. (contd)



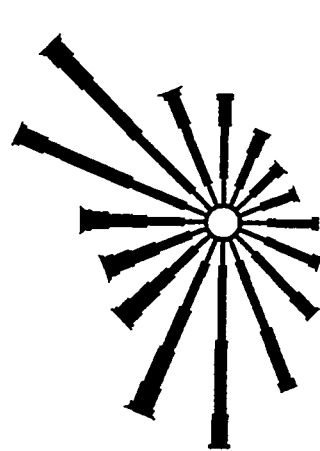
(a) Wind Rose

Period: 1/99 - 12/99



(b) Wind Speed Histogram

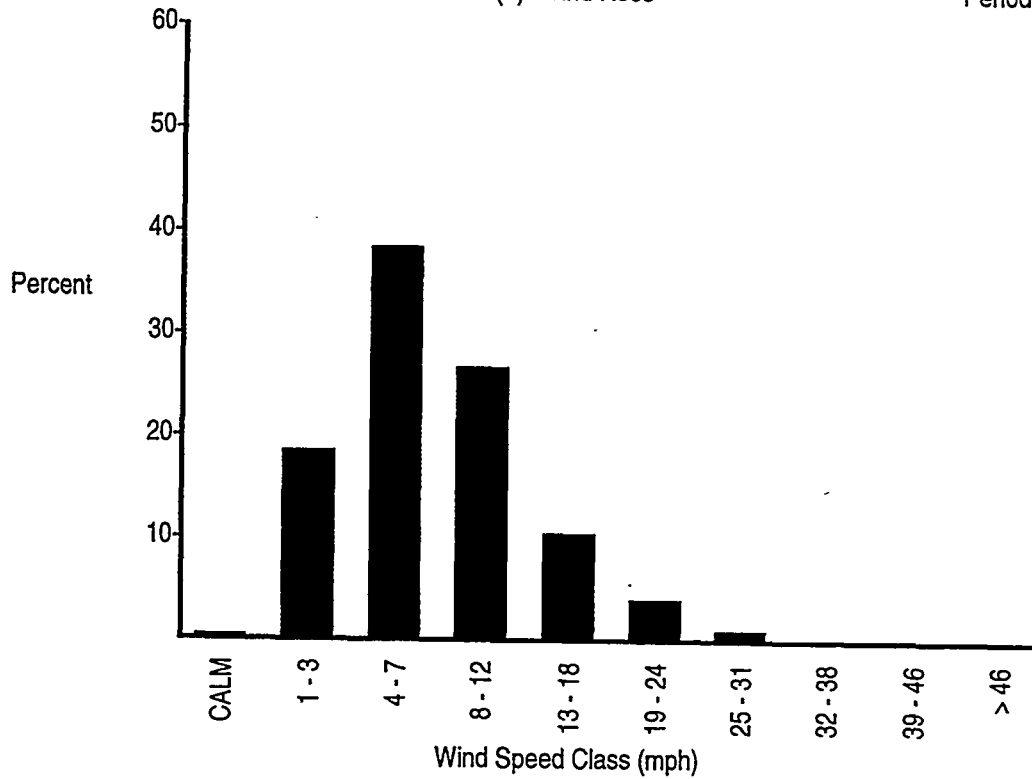
Figure A.1. (contd)



N  
↑  
Station #12 - WYEB

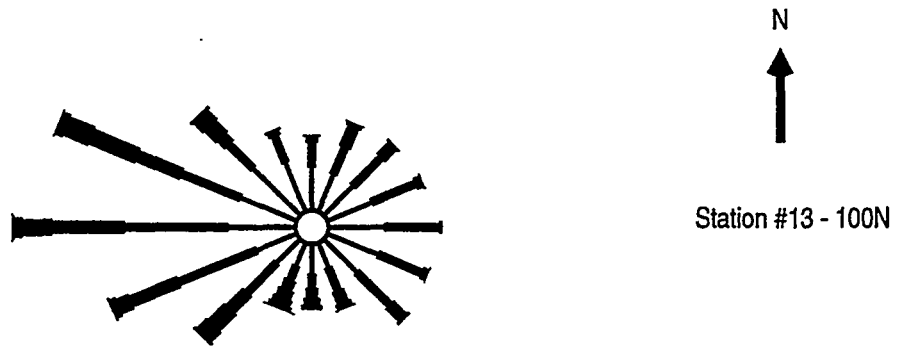
(a) Wind Rose

Period: 1/99 - 12/99



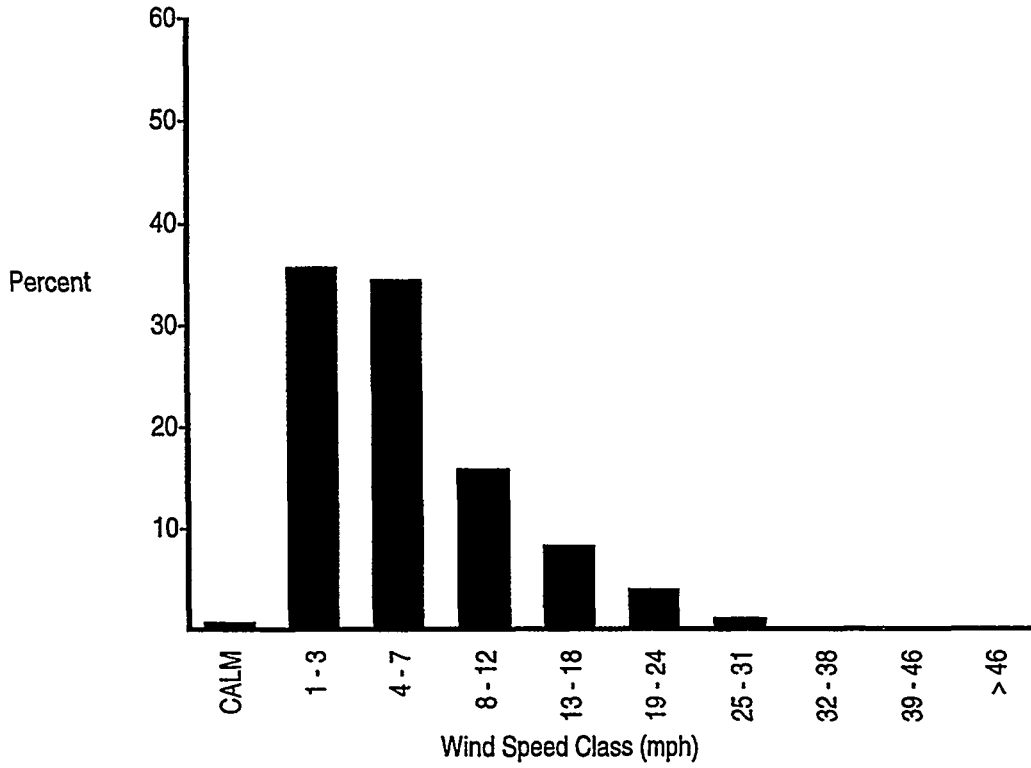
(b) Wind Speed Histogram

Figure A.1. (contd)



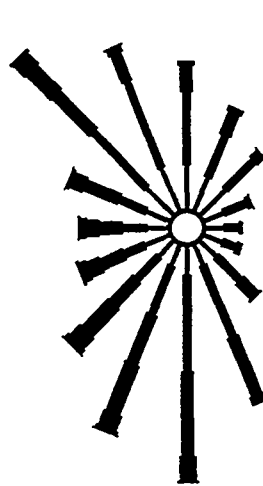
(a) Wind Rose

Period: 1/99 - 12/99



(b) Wind Speed Histogram

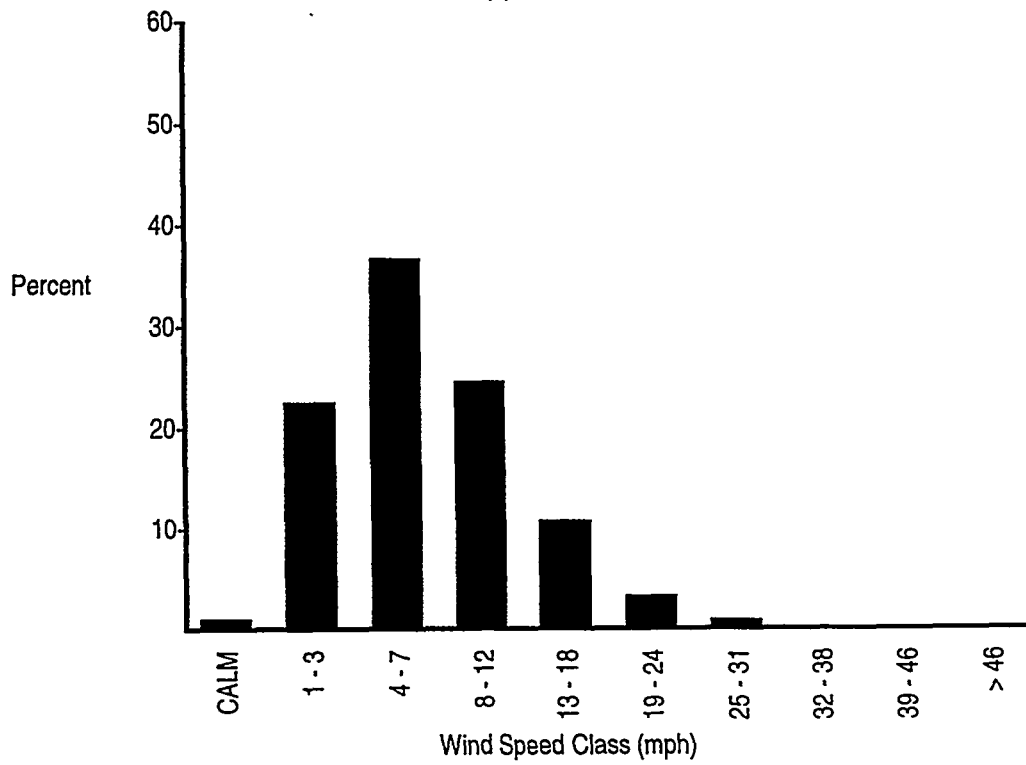
Figure A.1. (contd)



Station #14 - WPPS

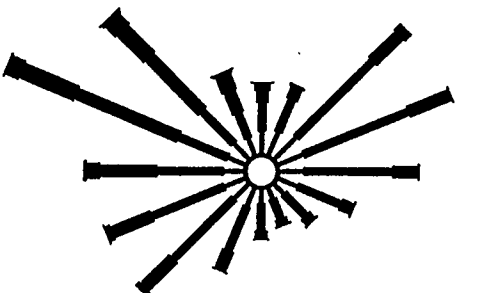
(a) Wind Rose

Period: 1/99 - 12/99



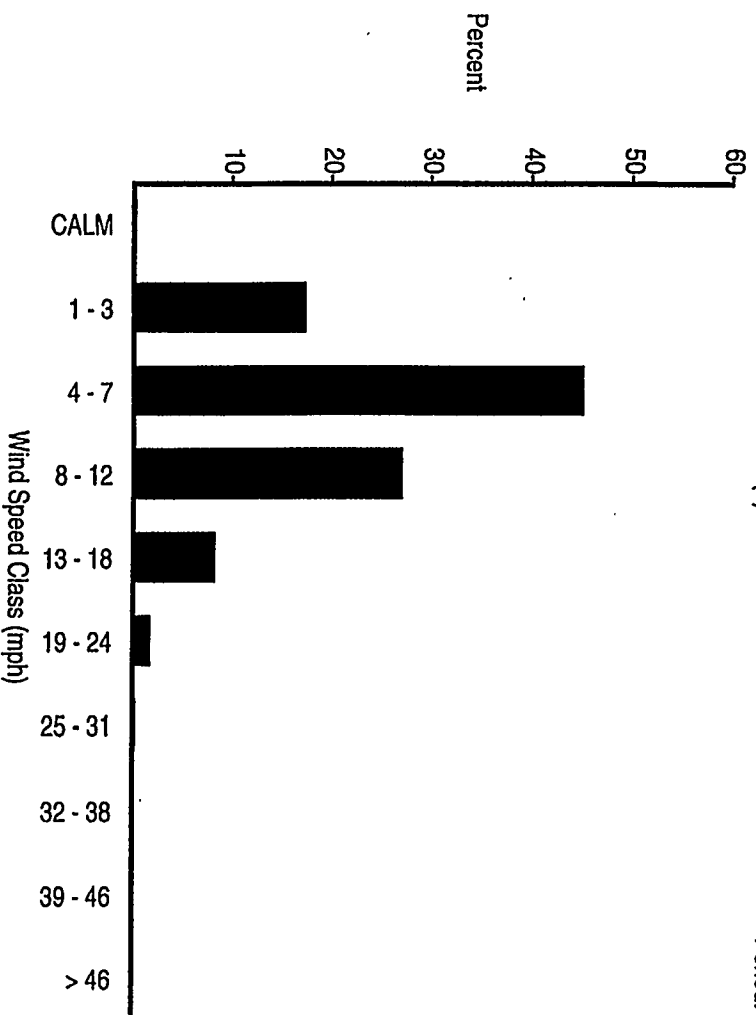
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

Period: 1/99 - 12/99



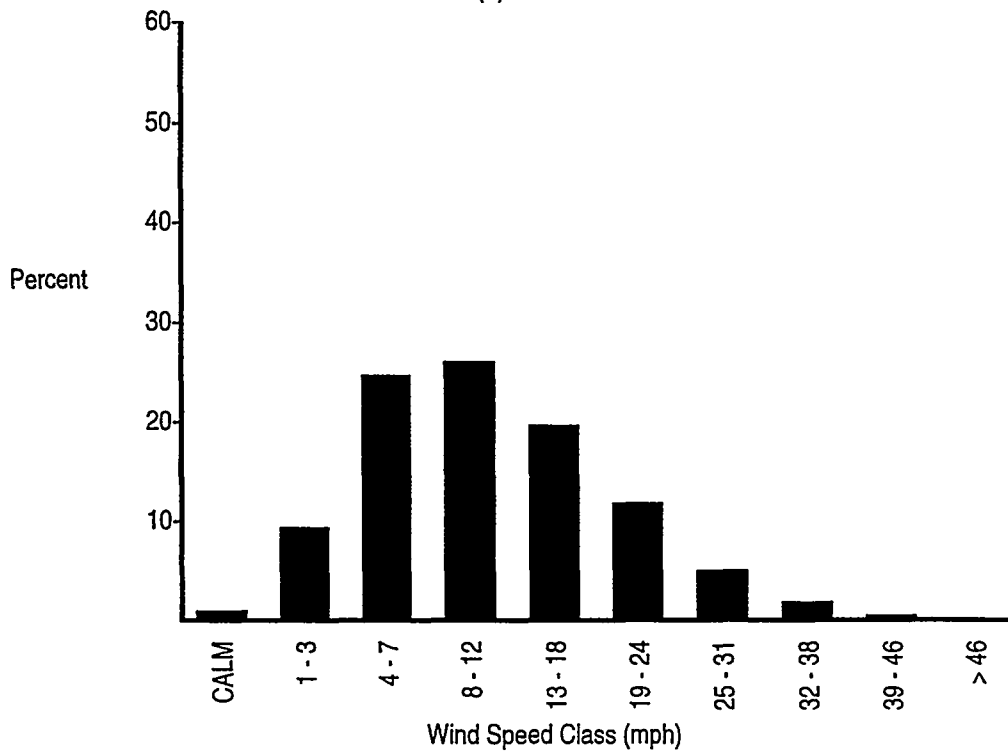
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

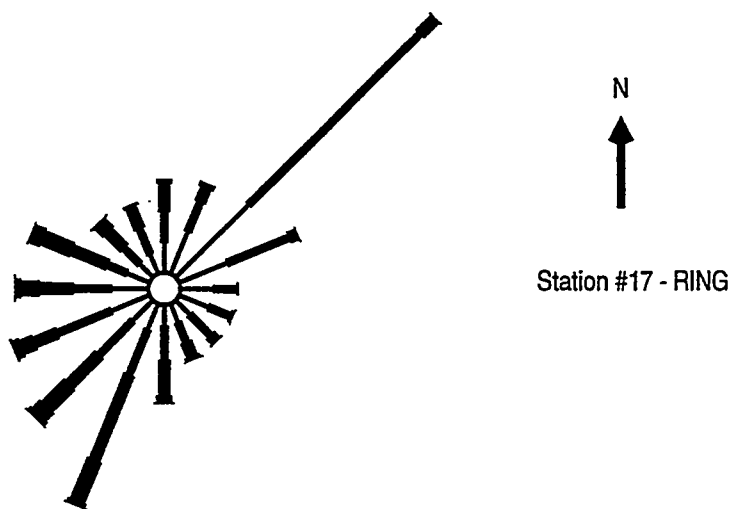
Period: 1/99 - 12/99



(b) Wind Speed Histogram

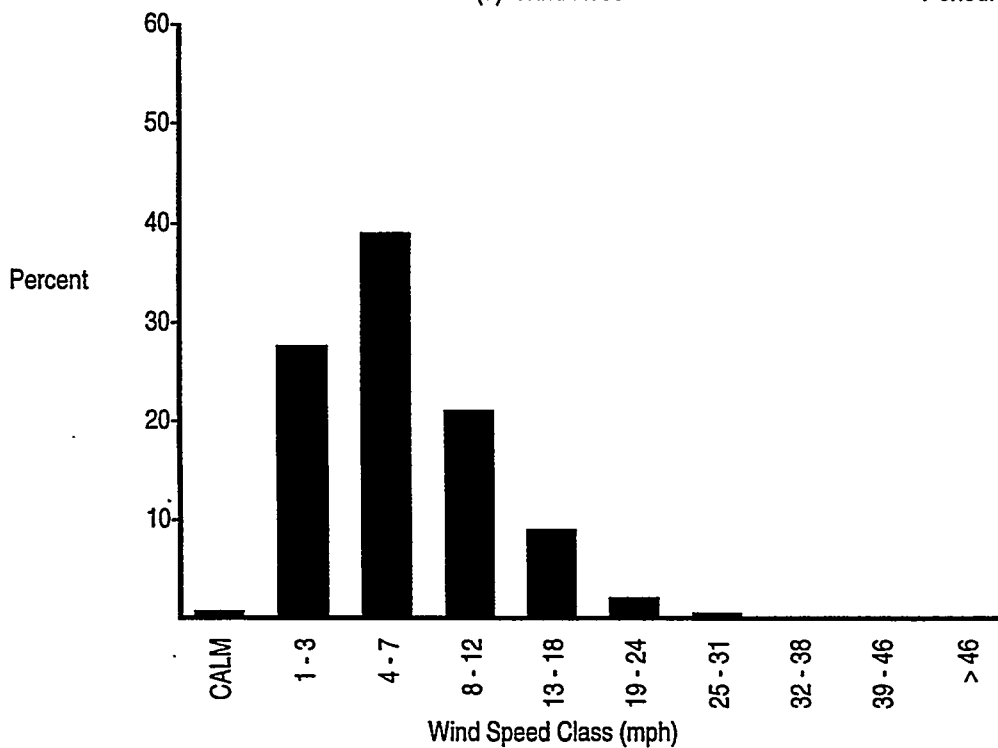
Figure A.1. (contd)





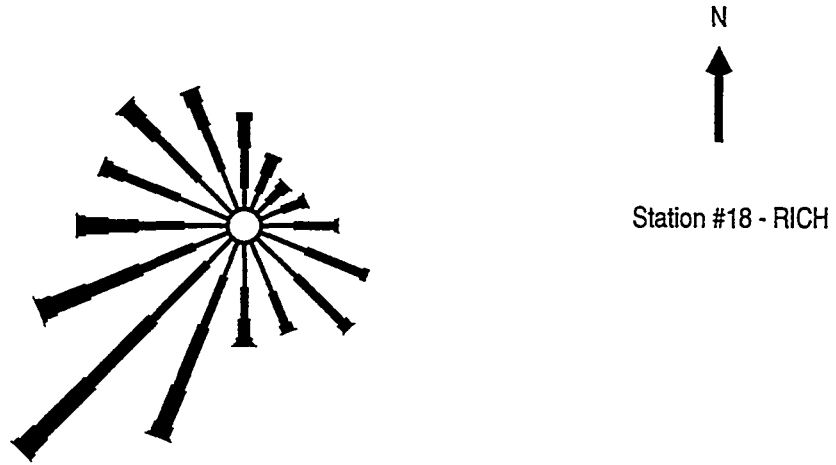
(a) Wind Rose

Period: 1/99 - 12/99



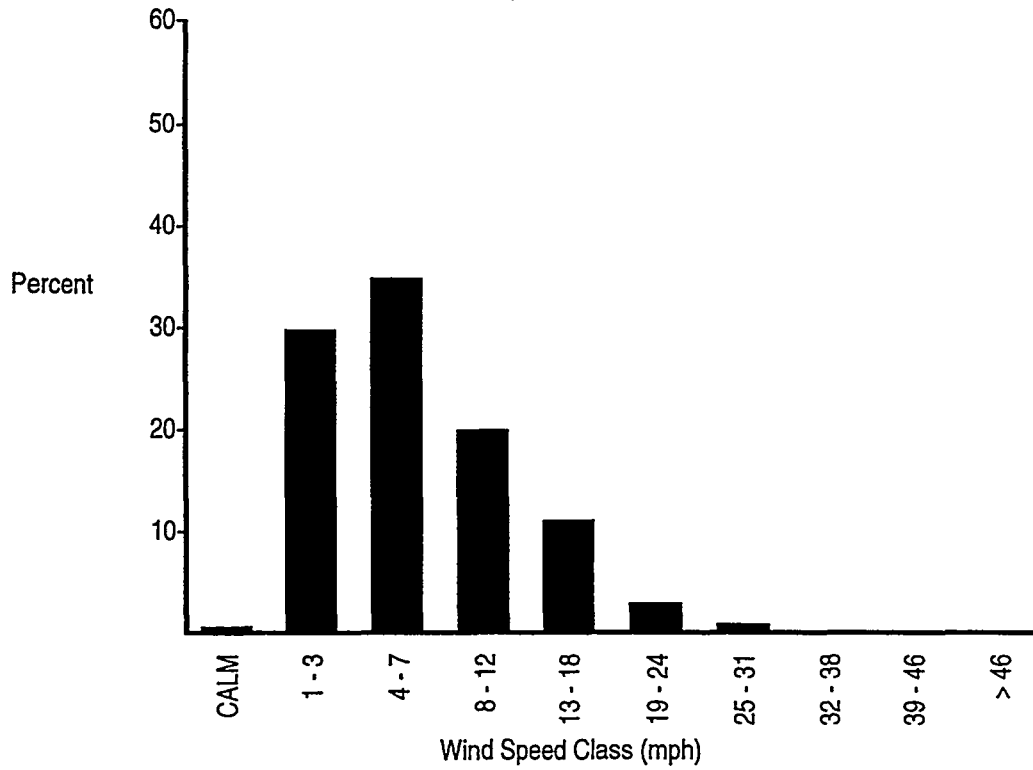
(b) Wind Speed Histogram

Figure A.1. (contd)



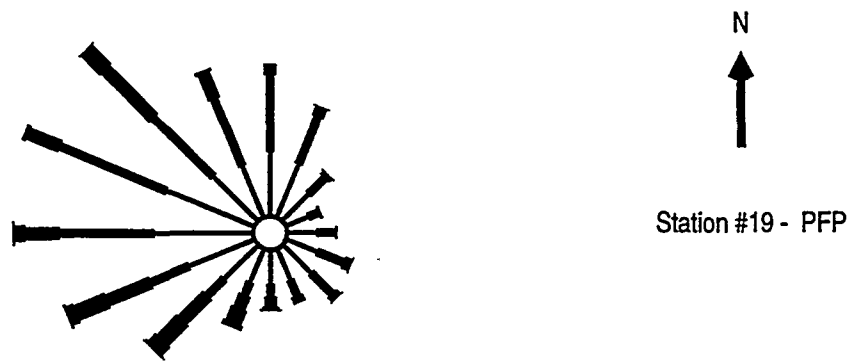
(a) Wind Rose

Period: 1/99 - 12/99



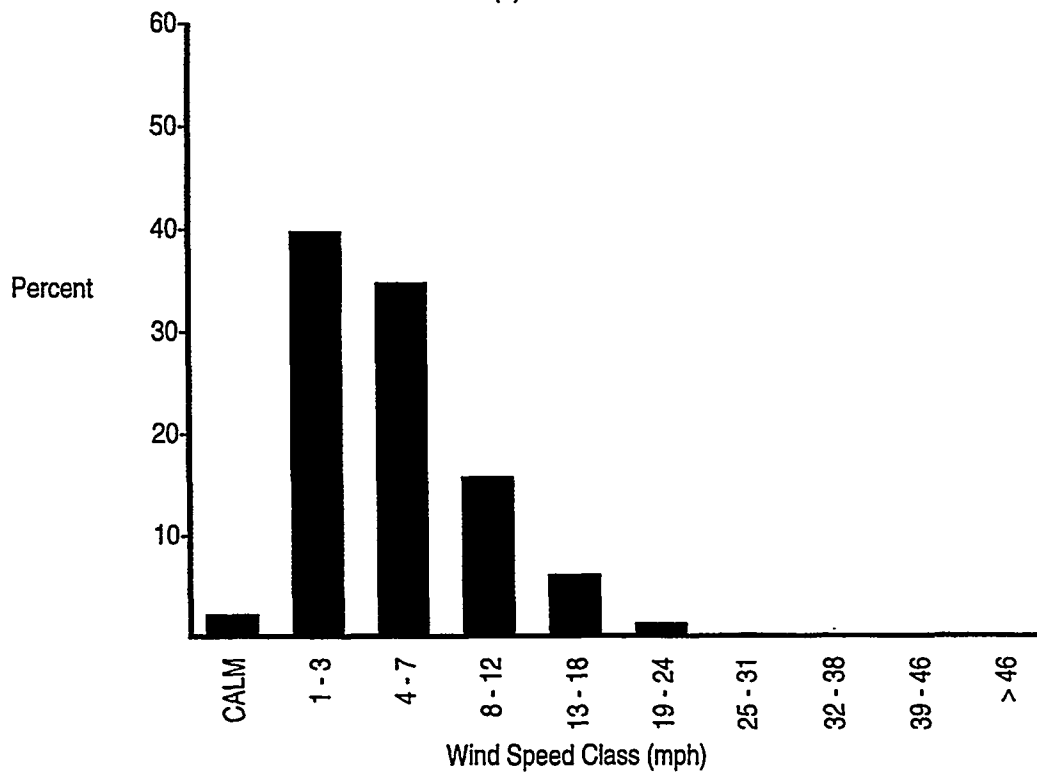
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

Period: 1/99 - 12/99



(b) Wind Speed Histogram

Figure A.1. (contd)

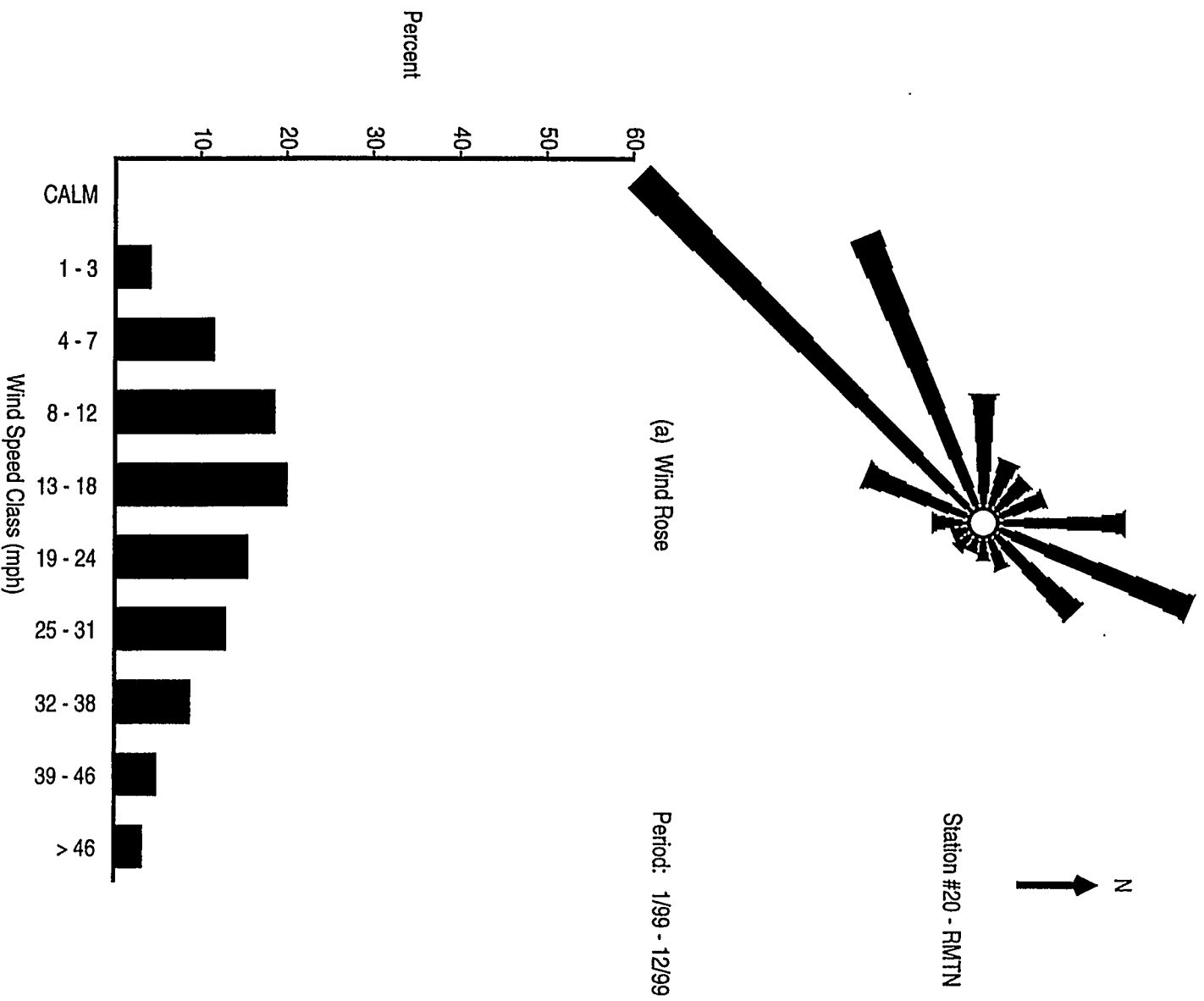
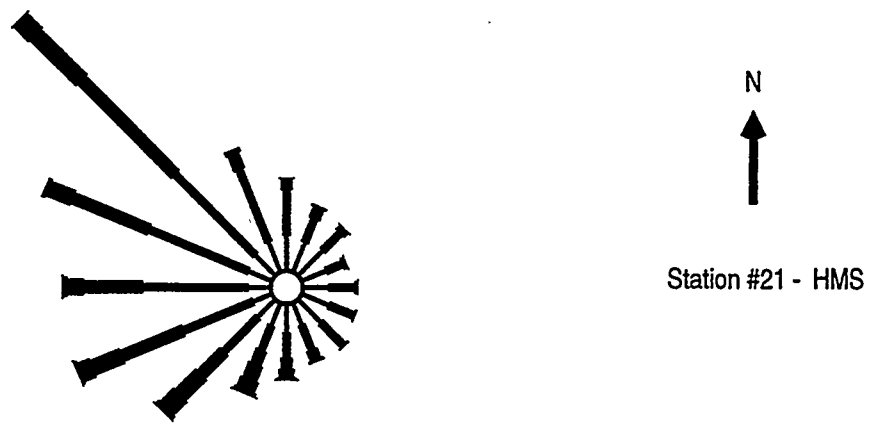
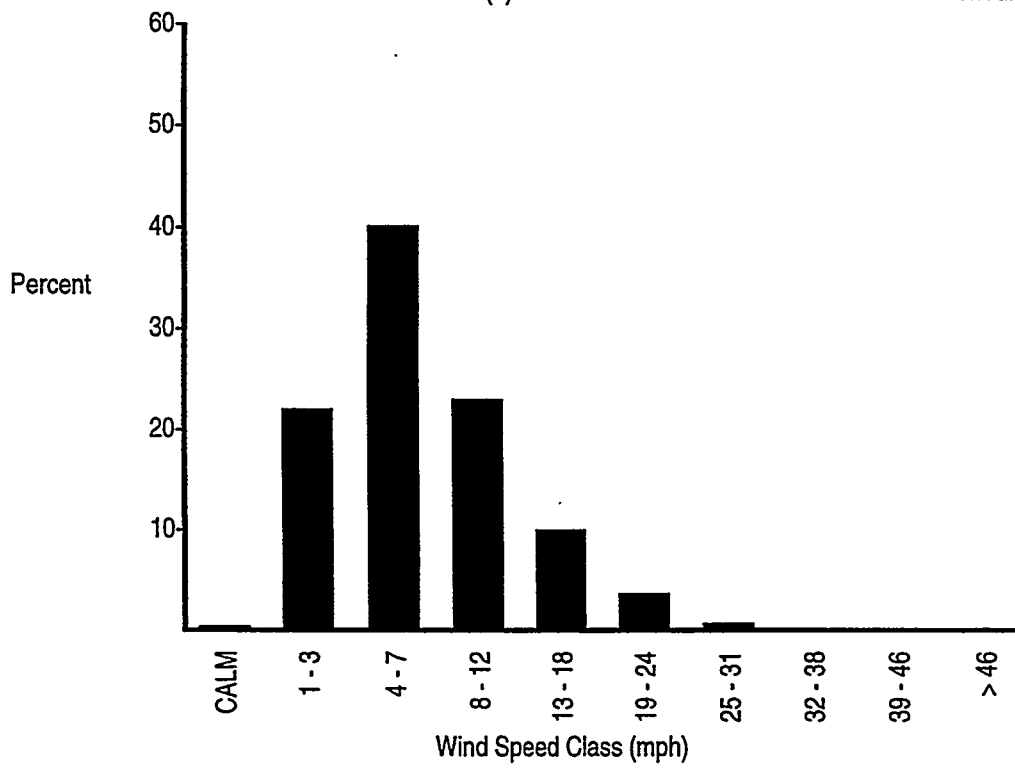


Figure A.1. (contd)



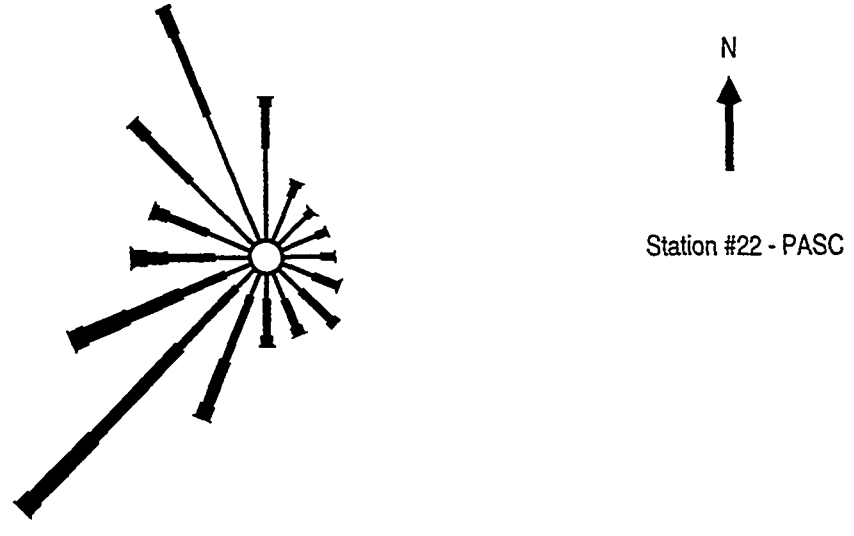
(a) Wind Rose

Period: 1/99 - 12/99



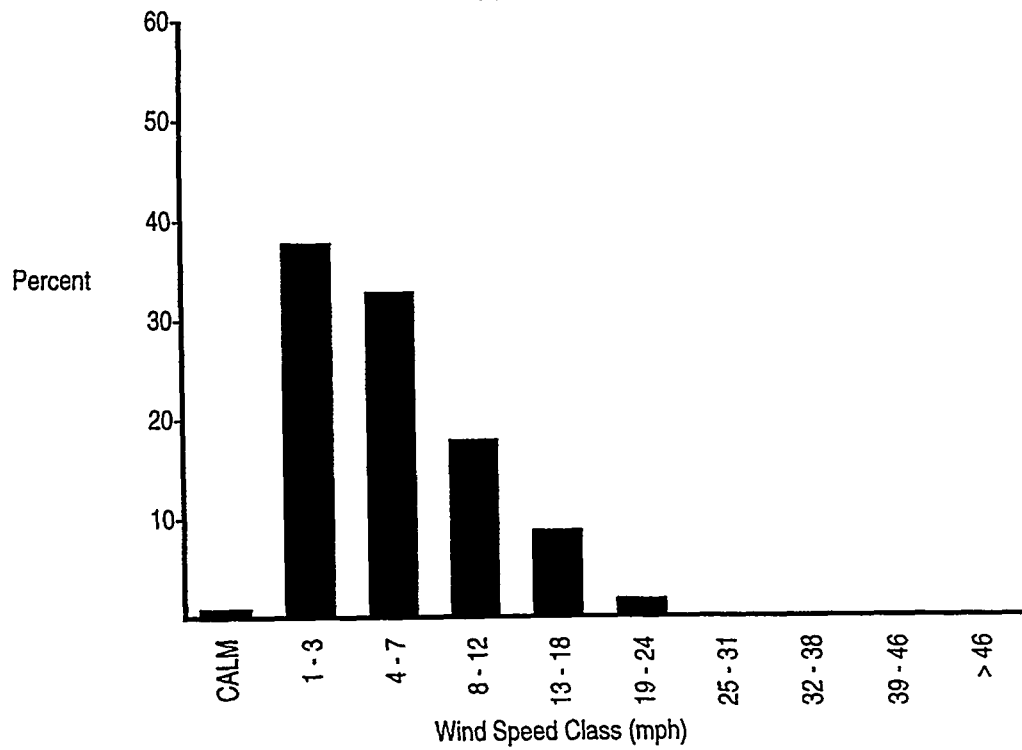
(b) Wind Speed Histogram

Figure A.1. (contd)



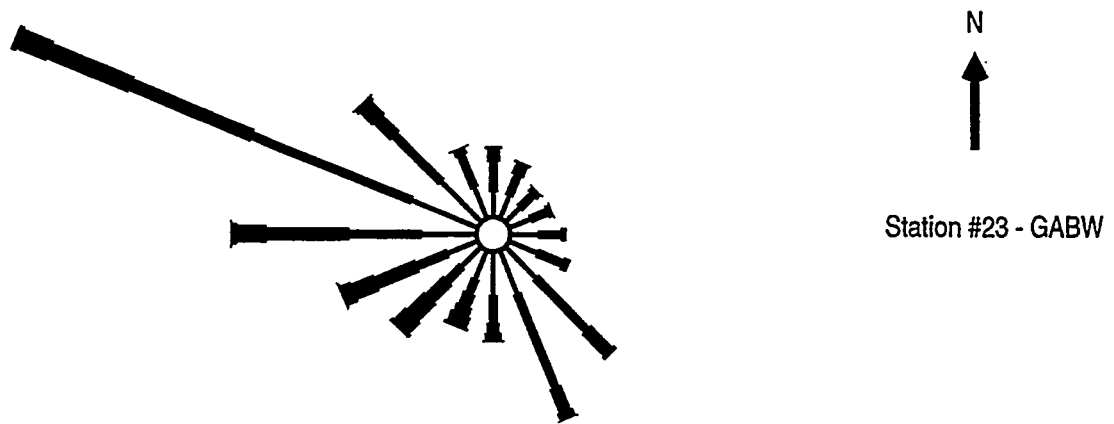
(a) Wind Rose

Period: 1/99 - 12/99



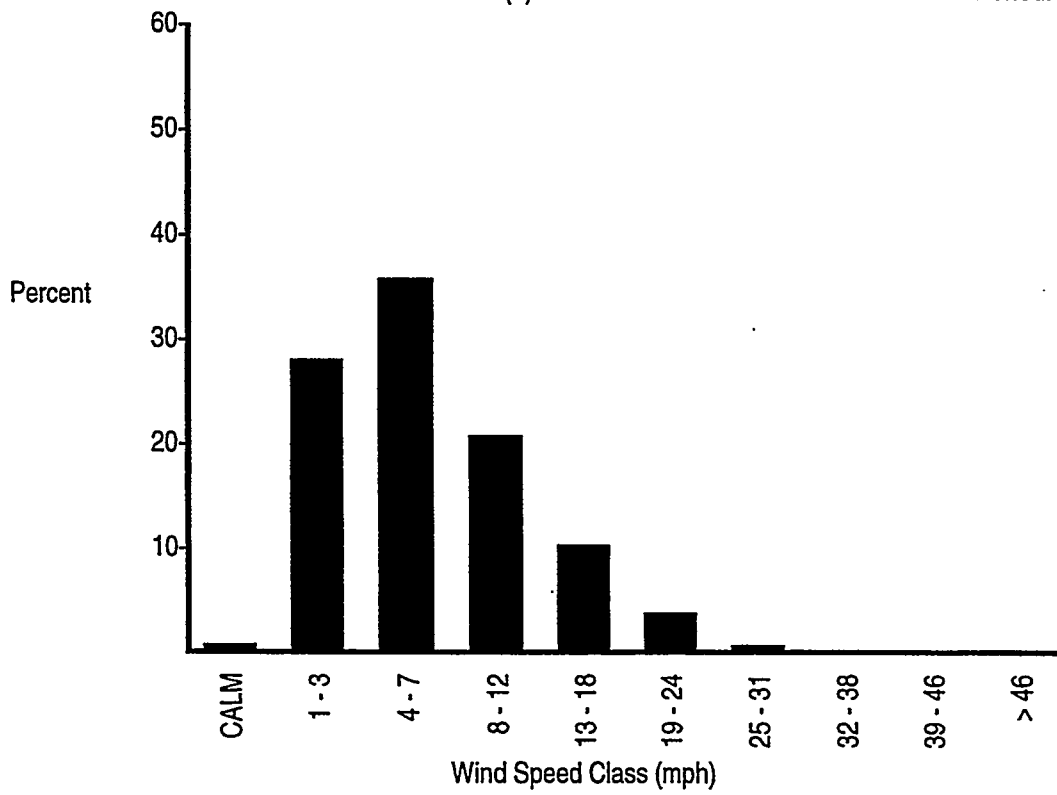
(b) Wind Speed Histogram

Figure A.1. (contd)



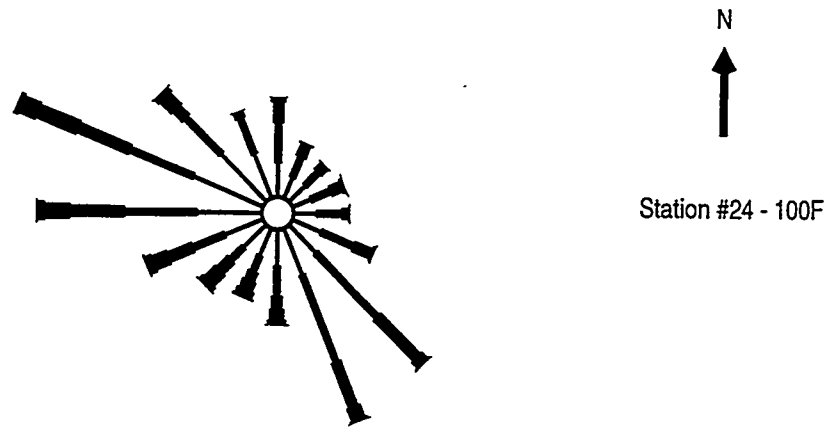
(a) Wind Rose

Period: 1/99 - 12/99



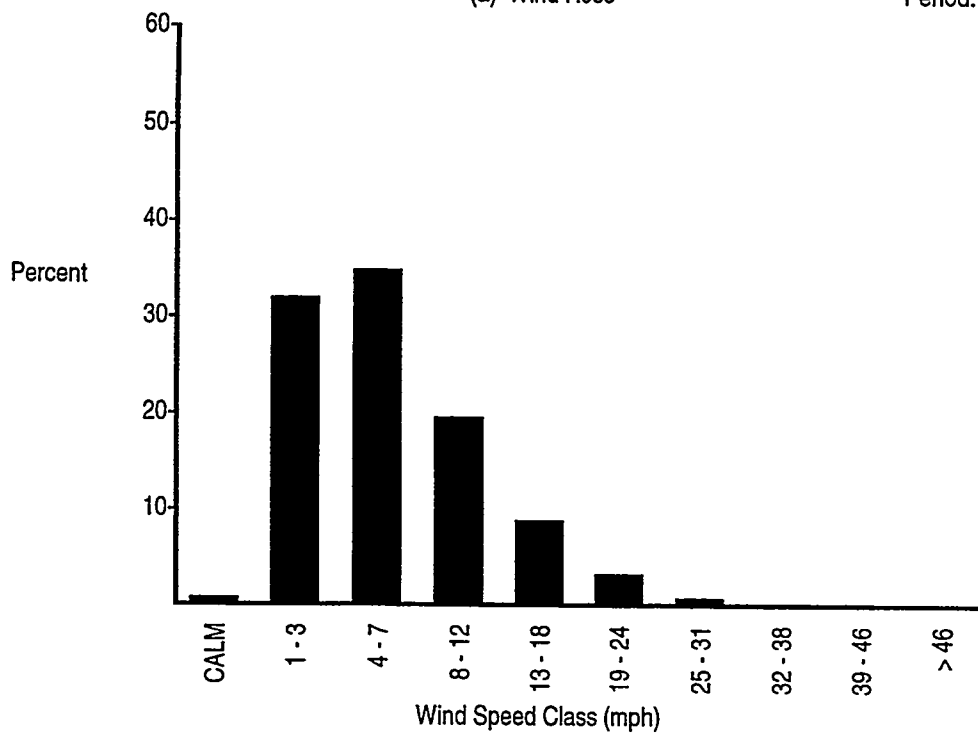
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

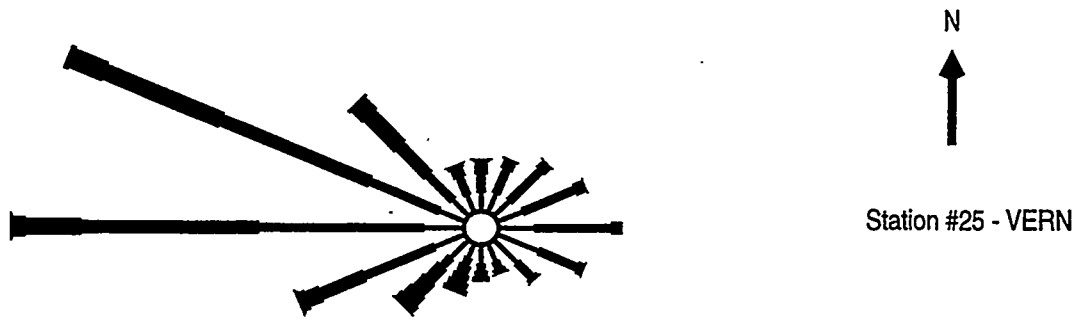
Period: 1/99 - 12/99



(b) Wind Speed Histogram

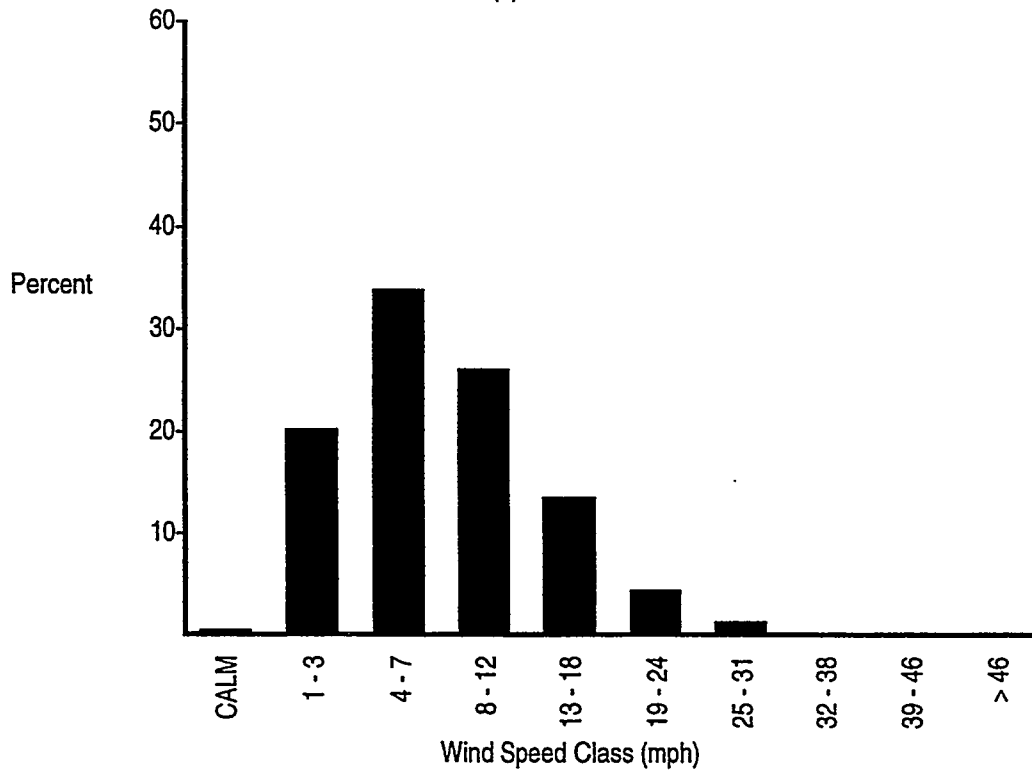
Figure A.1. (contd)





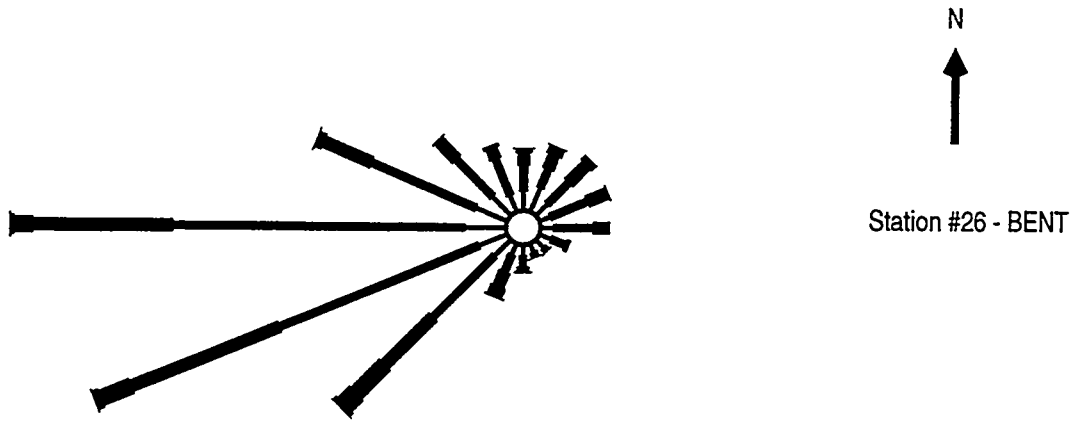
(a) Wind Rose

Period: 1/99 - 12/99



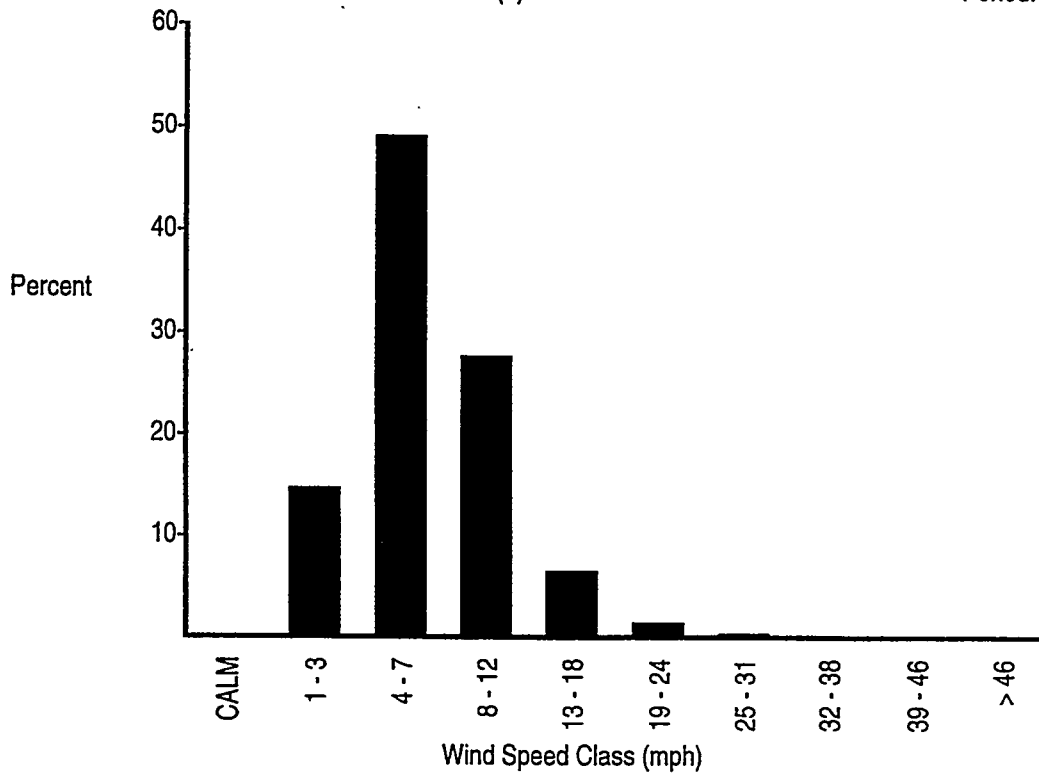
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

Period: 1/99 - 12/99



(b) Wind Speed Histogram

Figure A.1. (contd)

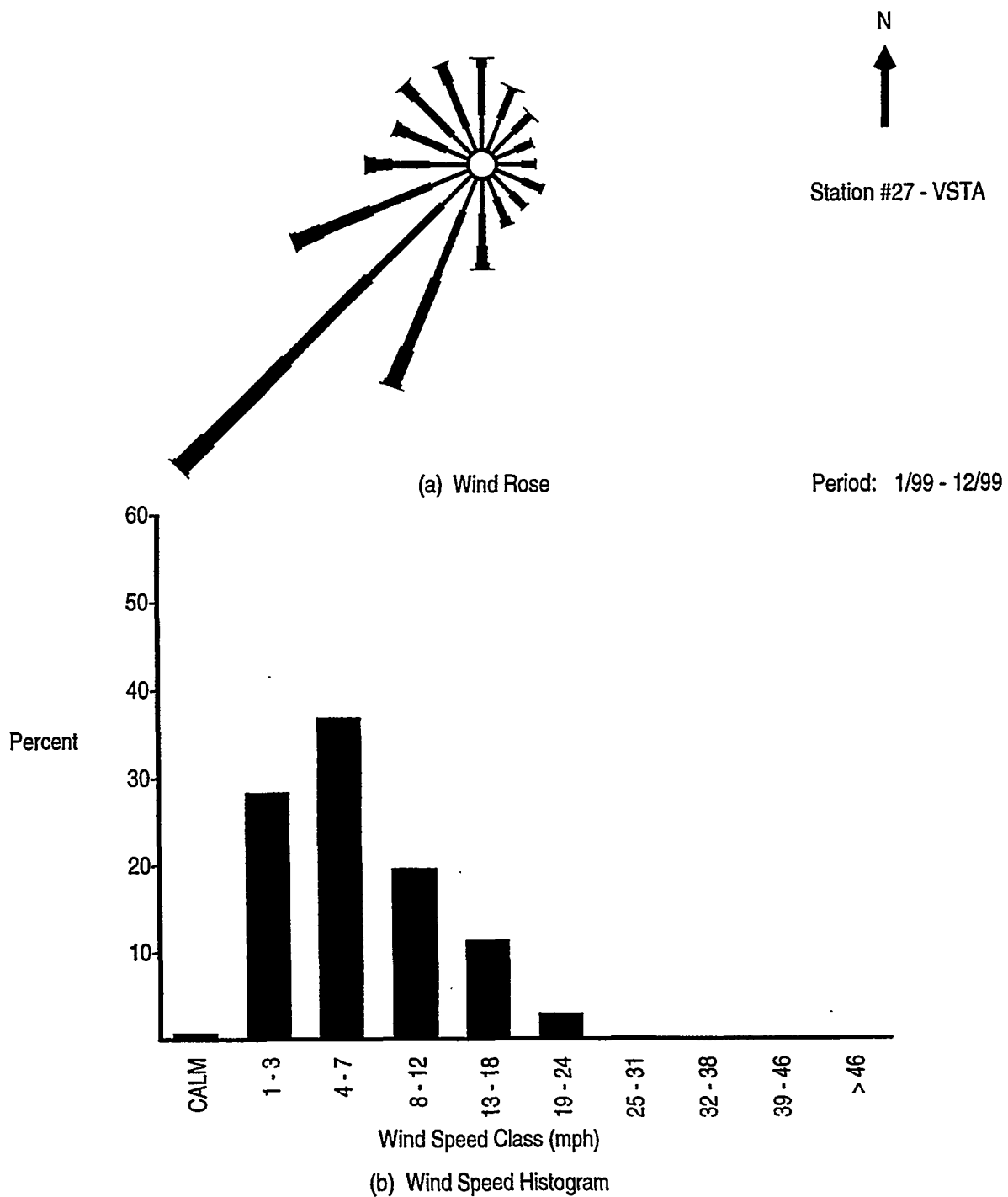
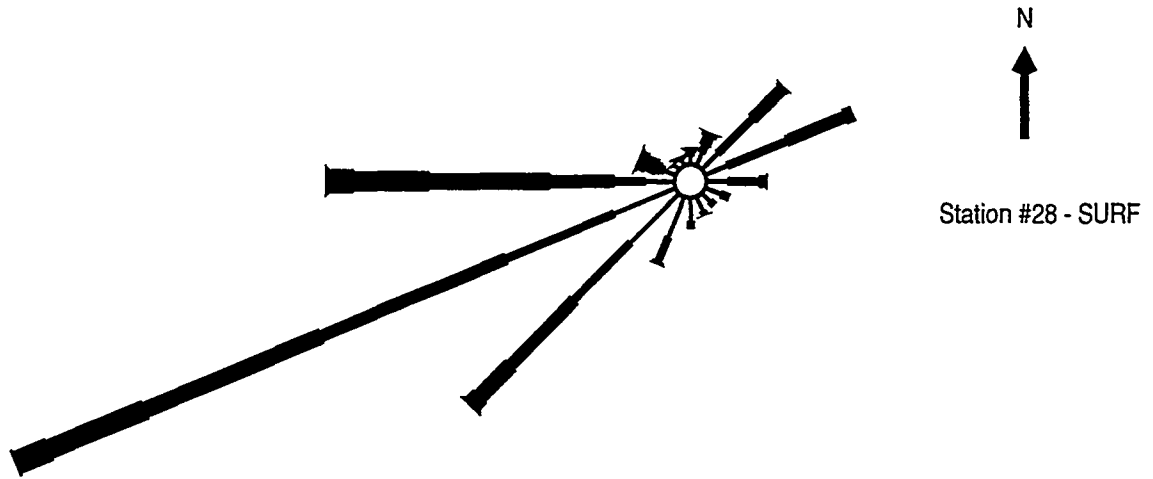
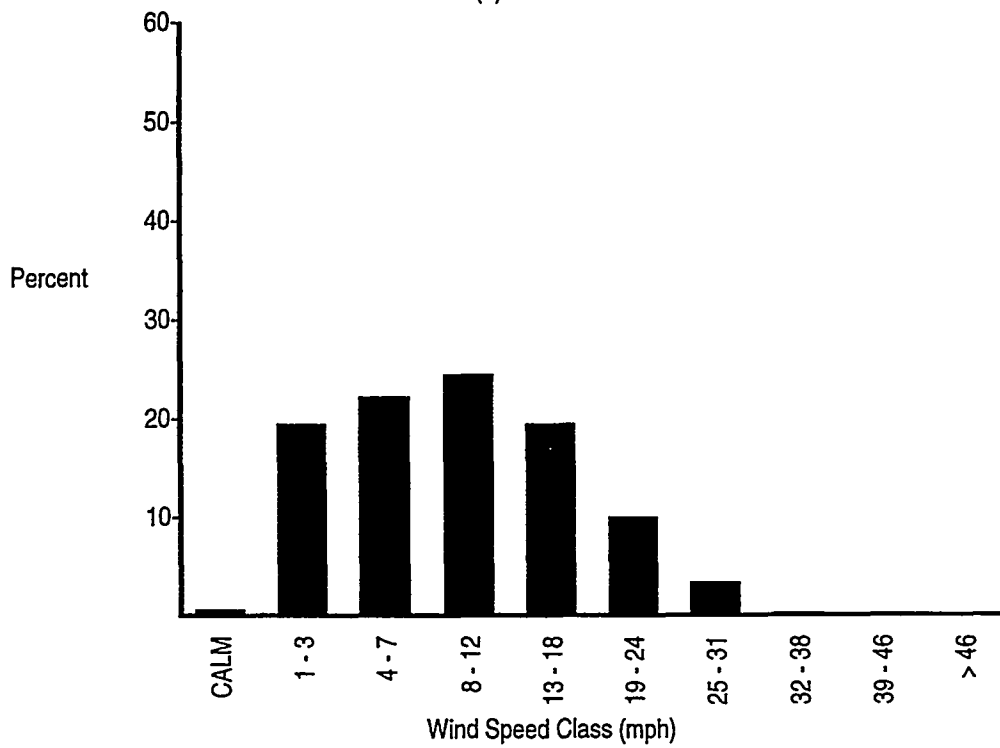


Figure A.1. (contd)



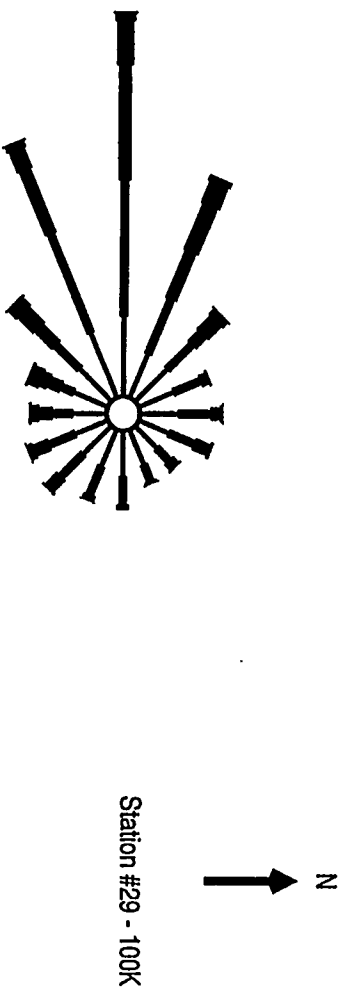
(a) Wind Rose

Period: 1/99 - 12/99



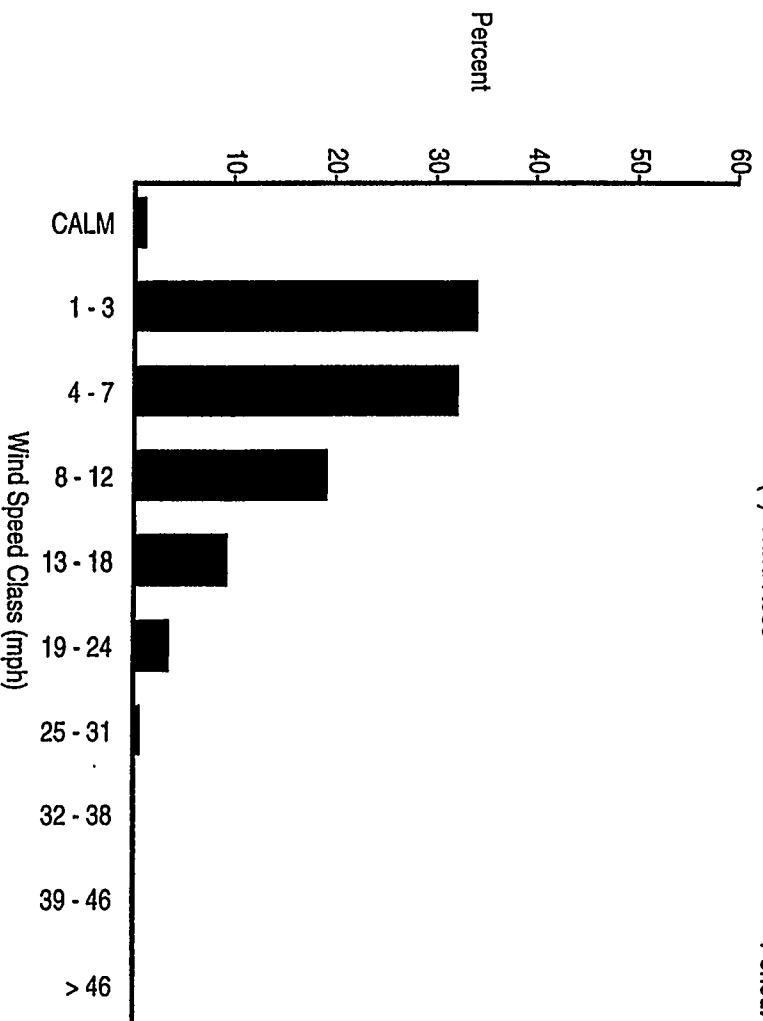
(b) Wind Speed Histogram

Figure A.1. (contd)



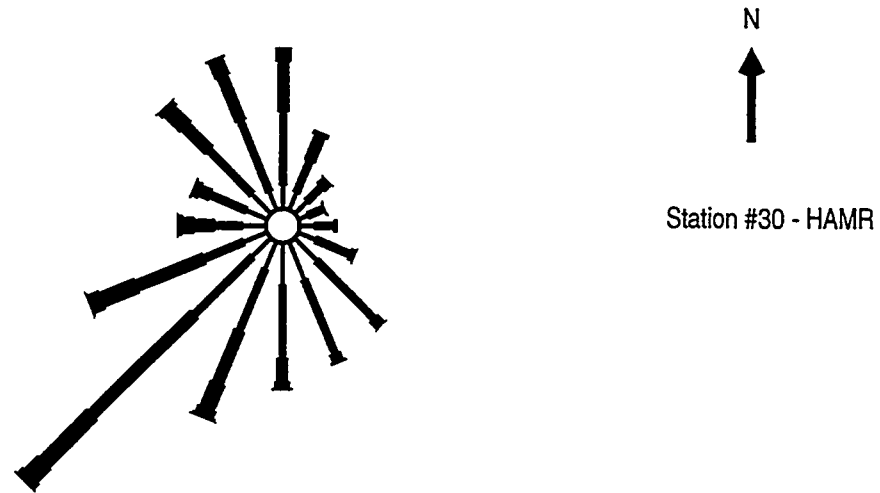
(a) Wind Rose

Period: 1/99 - 12/99



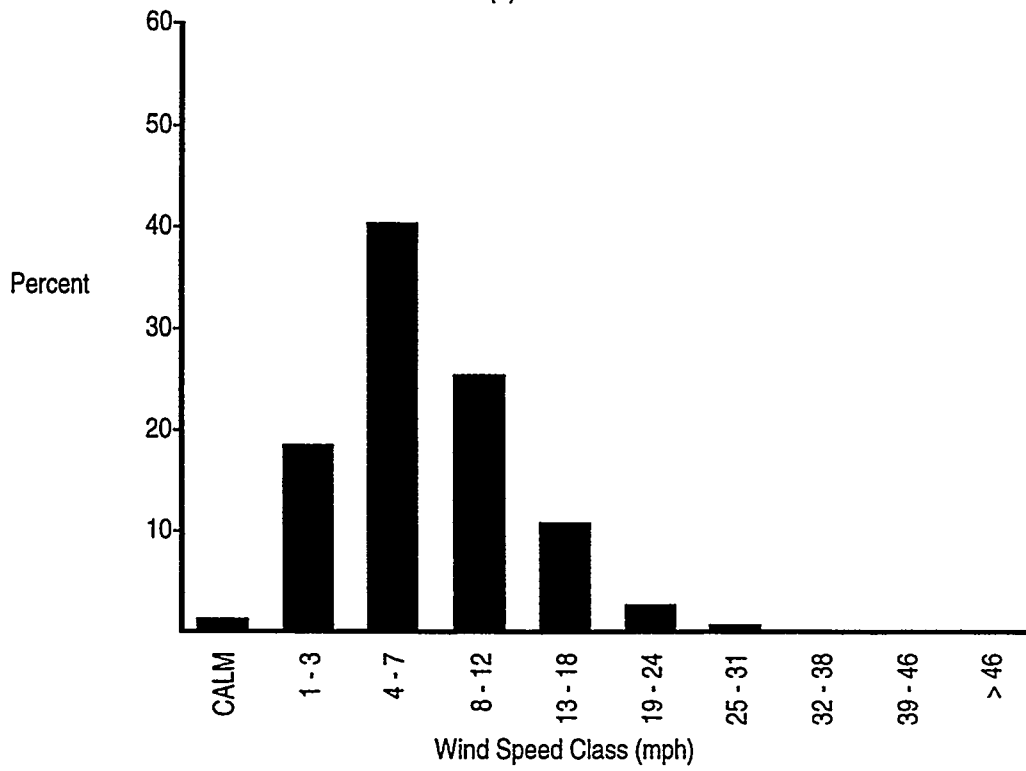
(b) Wind Speed Histogram

Figure A.1. (contd)



(a) Wind Rose

Period: 1/99 - 12/99



(b) Wind Speed Histogram

Figure A.1. (contd)

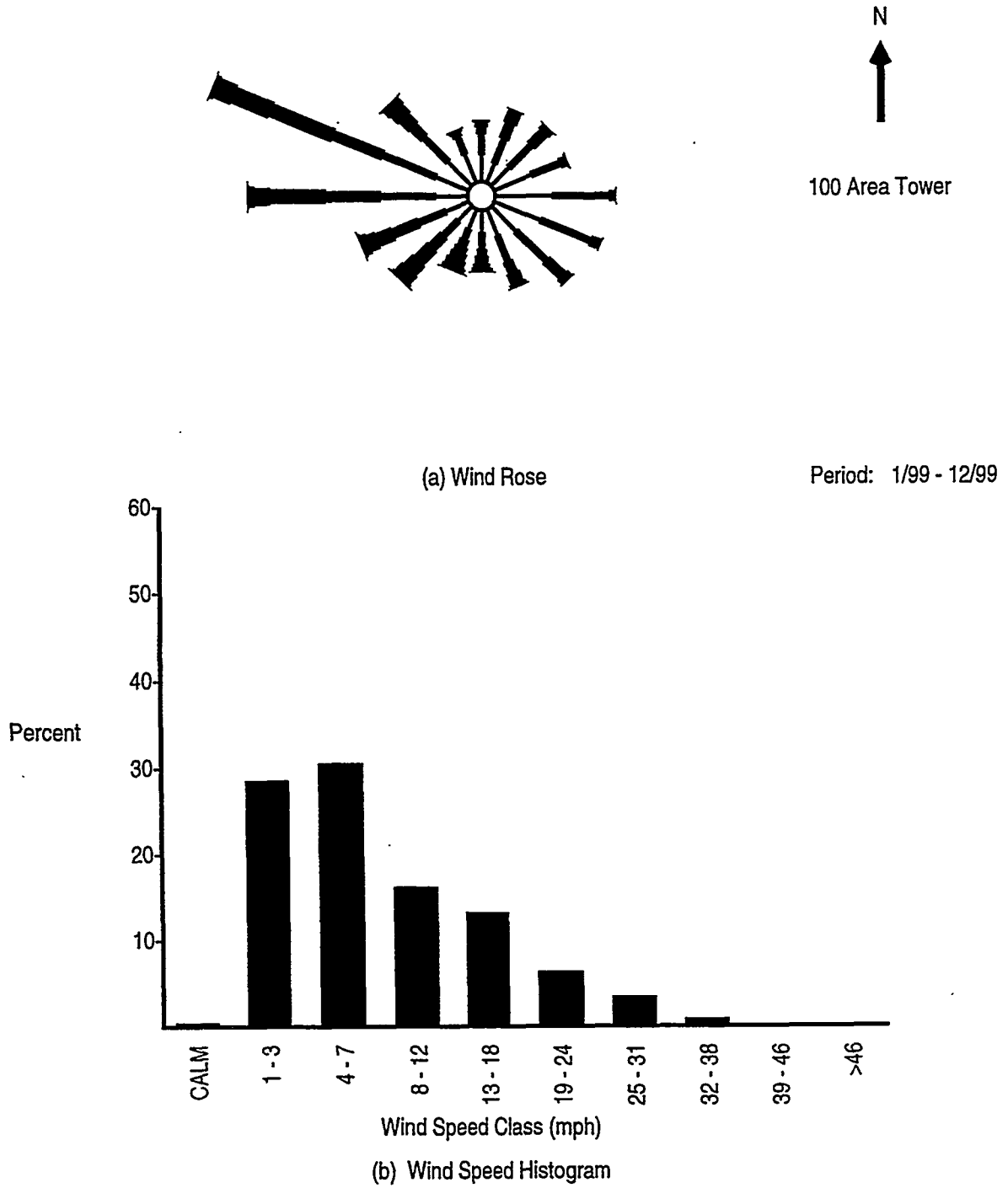
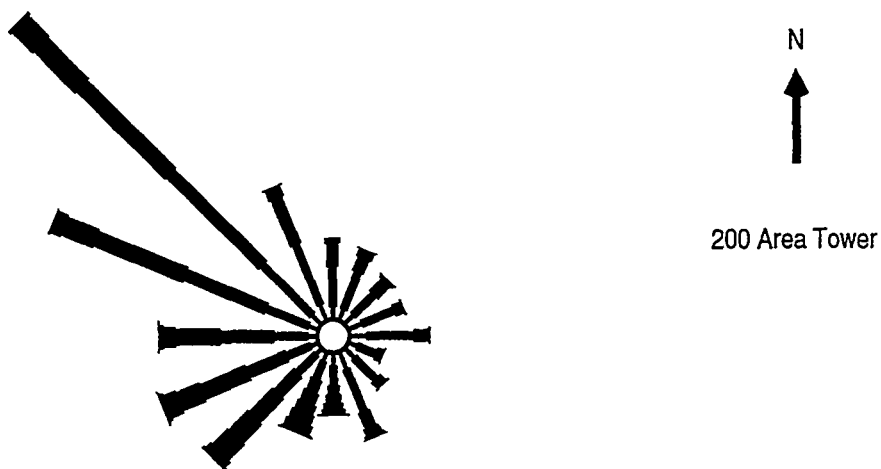
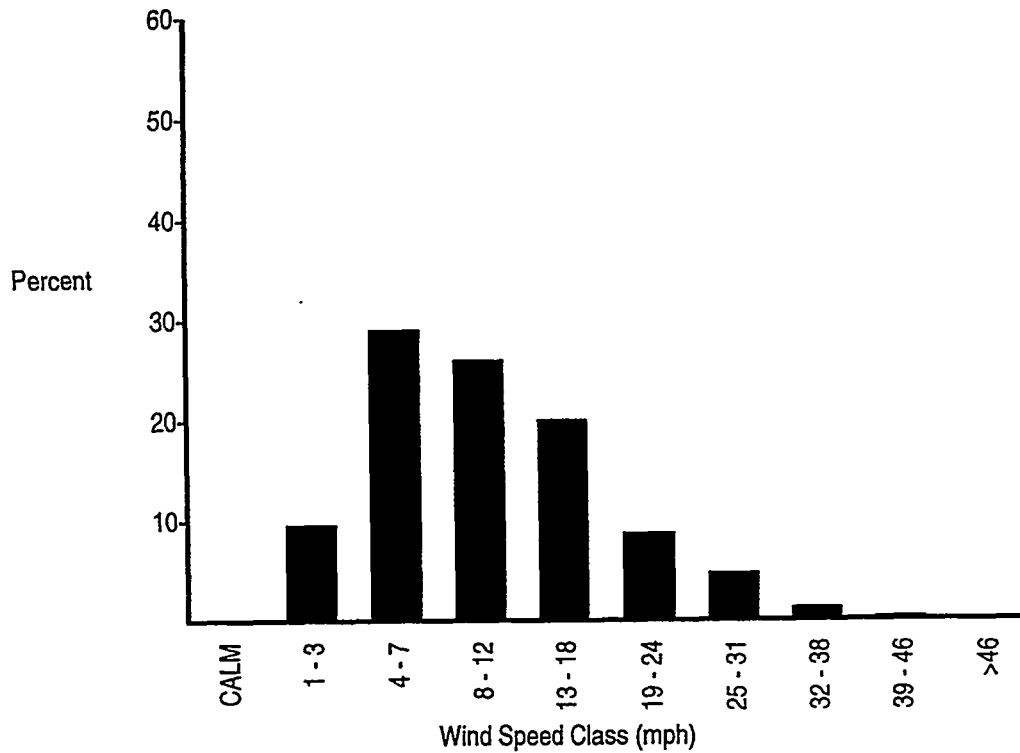


Figure A.2. Wind Rose and Wind Speed Histogram, 60 Meters



(a) Wind Rose

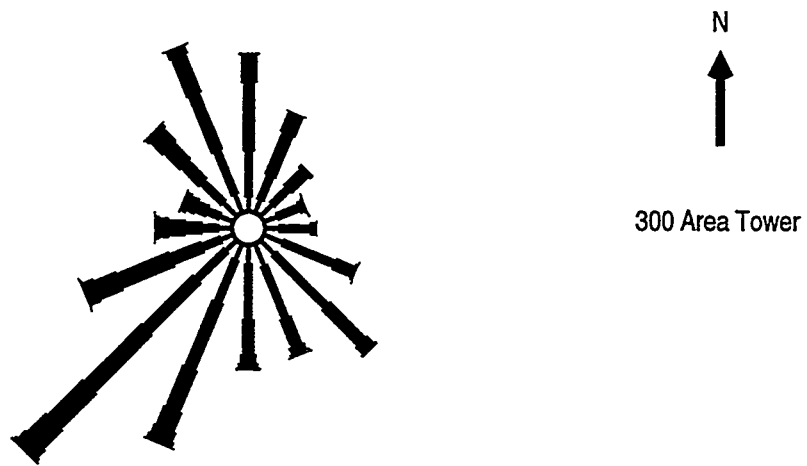
Period: 1/99 - 12/99



(b) Wind Speed Histogram

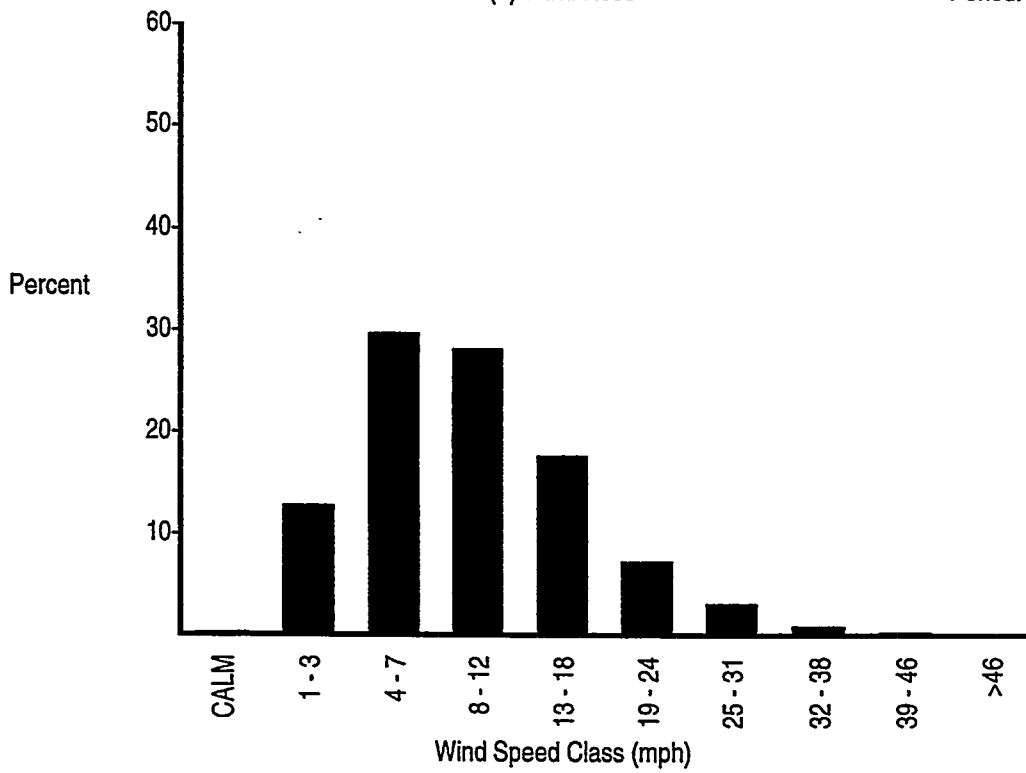
Figure A.2. (contd)





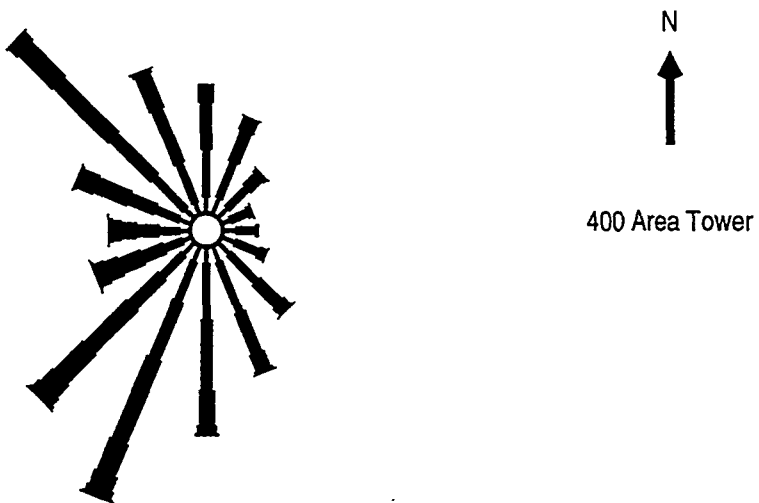
(a) Wind Rose

Period: 1/99 - 12/99



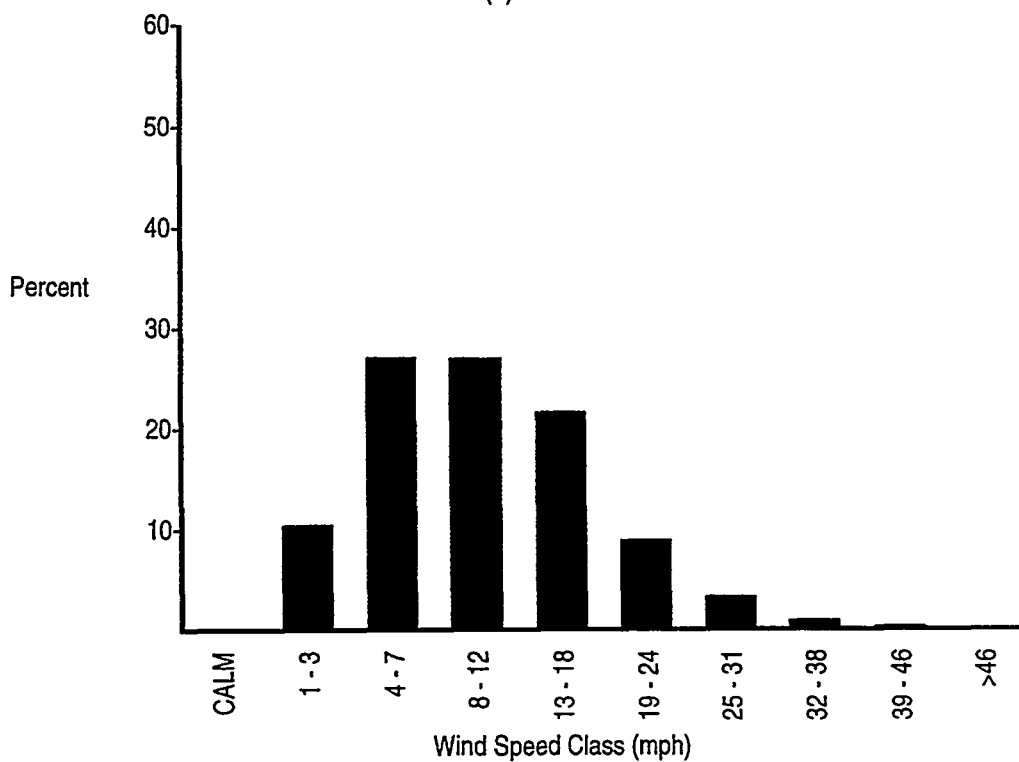
(b) Wind Speed Histogram

Figure A.2. (contd)



(a) Wind Rose

Period: 1/99 - 12/99



(b) Wind Speed Histogram

Figure A.2. (contd)

**Table A.1. Joint Frequency Distributions (%) for Hanford Meteorological Monitoring Network Wind Stations at 10-Meter Level, 1999**

**Station: (1) PROS**

|       | Begin: 1/99 |     |     |     |     |     |     |     |      |      |     |     |     |     |      |      | End: 12/99 |       | Total Hours: 8742 |  |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|------|------------|-------|-------------------|--|
|       | DIRECTION   |     |     |     |     |     |     |     |      |      |     |     |     |     |      |      |            |       |                   |  |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S    | SSW  | SW  | WSW | W   | WNW | NW   | NNW  | CALM       | TOTAL |                   |  |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.5        | 0.5   |                   |  |
| 1-3   | 1.5         | 1.1 | 0.7 | 0.7 | 0.7 | 1.0 | 1.3 | 1.7 | 1.9  | 1.9  | 1.3 | 1.1 | 1.2 | 1.5 | 2.3  | 2.2  | 0.0        | 22.2  |                   |  |
| 4-7   | 2.6         | 1.4 | 0.9 | 0.7 | 0.7 | 0.9 | 2.1 | 4.3 | 4.3  | 3.3  | 1.6 | 0.9 | 0.8 | 1.2 | 3.3  | 4.3  | 0.0        | 33.3  |                   |  |
| 8-12  | 1.7         | 1.0 | 0.4 | 0.1 | 0.2 | 0.2 | 0.8 | 1.7 | 3.2  | 4.6  | 2.3 | 1.1 | 0.7 | 0.5 | 3.0  | 4.0  | 0.0        | 25.7  |                   |  |
| 13-18 | 0.7         | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7  | 3.4  | 2.6 | 1.4 | 0.5 | 0.4 | 2.0  | 1.2  | 0.0        | 13.5  |                   |  |
| 19-24 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.7  | 0.9 | 0.6 | 0.2 | 0.1 | 0.4  | 0.1  | 0.0        | 3.1   |                   |  |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3  | 0.7 | 0.3 | 0.1 | 0.0 | 0.1  | 0.0  | 0.0        | 1.5   |                   |  |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0        | 0.2   |                   |  |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0        | 0.1   |                   |  |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0        | 0.0   |                   |  |
| TOTAL | 6.6         | 3.8 | 2.1 | 1.6 | 1.6 | 2.2 | 4.2 | 7.8 | 10.2 | 14.4 | 9.6 | 5.3 | 3.5 | 3.7 | 11.0 | 11.9 | 0.5        | 100.0 |                   |  |

**Station: (2) EOC**

|       | Begin: 1/99 |     |     |     |     |     |     |     |     |     |      |      |     |     |      |     | End: 12/99 |       | Total Hours: 8742 |  |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-----|------------|-------|-------------------|--|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |      |      |     |     |      |     |            |       |                   |  |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W   | WNW | NW   | NNW | CALM       | TOTAL |                   |  |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0 | 0.8        | 0.8   |                   |  |
| 1-3   | 0.9         | 0.7 | 0.8 | 0.7 | 0.8 | 0.8 | 0.8 | 1.1 | 1.4 | 1.0 | 1.2  | 1.1  | 1.3 | 1.2 | 1.3  | 1.1 | 0.0        | 16.1  |                   |  |
| 4-7   | 1.8         | 1.7 | 1.4 | 1.0 | 1.0 | 1.0 | 1.2 | 1.2 | 1.7 | 1.8 | 1.3  | 1.3  | 2.1 | 3.4 | 3.0  | 2.2 | 0.0        | 27.0  |                   |  |
| 8-12  | 1.5         | 0.7 | 0.3 | 0.1 | 0.1 | 0.1 | 0.3 | 0.4 | 1.5 | 2.3 | 2.7  | 1.9  | 1.8 | 4.0 | 6.7  | 2.9 | 0.0        | 27.4  |                   |  |
| 13-18 | 0.7         | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 1.0 | 2.9  | 3.0  | 1.7 | 1.0 | 3.4  | 2.0 | 0.0        | 16.5  |                   |  |
| 19-24 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 2.2  | 2.7  | 0.9 | 0.2 | 0.3  | 0.3 | 0.0        | 7.0   |                   |  |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.6  | 1.5  | 0.3 | 0.0 | 0.0  | 0.0 | 0.0        | 3.6   |                   |  |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8  | 0.3  | 0.1 | 0.0 | 0.0  | 0.0 | 0.0        | 1.3   |                   |  |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2  | 0.1  | 0.0 | 0.0 | 0.0  | 0.0 | 0.0        | 0.2   |                   |  |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0 | 0.0        | 0.0   |                   |  |
| TOTAL | 4.9         | 3.3 | 2.5 | 1.9 | 1.8 | 1.9 | 2.2 | 2.6 | 5.1 | 6.7 | 12.8 | 11.9 | 8.4 | 9.9 | 14.7 | 8.6 | 0.8        | 100.0 |                   |  |

**Station: (3) ARMY**

|       | Begin: 1/99 |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     | End: 12/99 |       | Total Hours: 8624 |  |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------------|-------|-------------------|--|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     |            |       |                   |  |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW | CALM       | TOTAL |                   |  |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.8        | 0.8   |                   |  |
| 1-3   | 1.6         | 1.3 | 1.5 | 1.7 | 2.0 | 2.0 | 1.7 | 0.8 | 0.7 | 0.7 | 0.7 | 1.0 | 1.8 | 2.7  | 3.2  | 2.1 | 0.0        | 25.7  |                   |  |
| 4-7   | 2.0         | 1.2 | 1.3 | 1.8 | 2.1 | 2.8 | 2.0 | 0.8 | 0.5 | 0.4 | 0.5 | 0.7 | 2.1 | 6.6  | 8.0  | 3.4 | 0.0        | 36.4  |                   |  |
| 8-12  | 1.1         | 0.7 | 0.4 | 0.4 | 0.4 | 1.0 | 1.3 | 0.7 | 0.4 | 0.3 | 0.6 | 1.1 | 2.1 | 4.9  | 4.3  | 2.3 | 0.0        | 22.1  |                   |  |
| 13-18 | 0.3         | 0.2 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.3 | 0.4 | 0.3 | 0.8 | 1.3 | 1.1 | 1.1  | 1.6  | 1.0 | 0.0        | 9.0   |                   |  |
| 19-24 | 0.1         | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.6 | 0.8 | 0.6 | 0.2  | 0.7  | 0.3 | 0.0        | 3.9   |                   |  |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.6 | 0.3 | 0.1 | 0.0  | 0.1  | 0.0 | 0.0        | 1.6   |                   |  |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.1 | 0.1 | 0.0  | 0.0  | 0.0 | 0.0        | 0.5   |                   |  |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.1   |                   |  |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.0   |                   |  |
| TOTAL | 5.2         | 3.5 | 3.3 | 4.0 | 4.6 | 5.9 | 5.3 | 2.7 | 2.2 | 2.5 | 4.3 | 5.4 | 7.8 | 15.6 | 17.9 | 9.1 | 0.8        | 100.0 |                   |  |

**Station: (4) RSPG**

|       | Begin: 1/99 |     |     |     |     |     |     |     |     |     |     |      |      |     |     |     | End: 12/99 |       | Total Hours: 8749 |  |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|------------|-------|-------------------|--|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |     |      |      |     |     |     |            |       |                   |  |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW | NW  | NNW | CALM       | TOTAL |                   |  |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.4        | 0.4   |                   |  |
| 1-3   | 1.4         | 1.9 | 1.4 | 1.1 | 1.2 | 1.0 | 1.0 | 0.6 | 0.8 | 0.7 | 1.3 | 1.9  | 1.5  | 1.1 | 0.9 | 1.0 | 0.0        | 18.8  |                   |  |
| 4-7   | 3.5         | 2.7 | 1.4 | 1.1 | 1.5 | 1.6 | 0.8 | 0.5 | 0.5 | 0.7 | 1.9 | 7.9  | 4.4  | 1.7 | 1.3 | 1.9 | 0.0        | 33.4  |                   |  |
| 8-12  | 0.8         | 0.6 | 0.3 | 0.1 | 0.2 | 0.4 | 0.2 | 0.2 | 0.4 | 0.8 | 1.4 | 15.6 | 6.5  | 2.4 | 1.8 | 1.5 | 0.0        | 33.2  |                   |  |
| 13-18 | 0.0         | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7 | 1.1 | 2.8  | 2.2  | 1.2 | 0.9 | 0.8 | 0.0        | 10.1  |                   |  |
| 19-24 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 0.8  | 0.4  | 0.1 | 0.1 | 0.1 | 0.0        | 2.8   |                   |  |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.2  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0        | 1.0   |                   |  |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.2   |                   |  |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.0   |                   |  |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0        | 0.0   |                   |  |
| TOTAL | 5.6         | 5.2 | 3.3 | 2.3 | 2.9 | 3.1 | 2.0 | 1.3 | 1.8 | 3.6 | 7.1 | 29.1 | 15.2 | 6.6 | 5.1 | 5.3 | 0.4        | 100.0 |                   |  |

Table A.1. (contd)

## Station: (5) EDNA

Begin: 1/99

End: 12/99

Total Hours: 8742

|       | DIRECTION |     |     |     |     |     |      |     |     |     |     |     |     |      |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|------|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE   | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.8   | 0.8 |
| 1-3   | 0.7       | 0.4 | 0.5 | 0.7 | 0.9 | 1.5 | 2.8  | 3.1 | 2.6 | 1.6 | 1.3 | 1.4 | 1.6 | 2.7  | 2.8  | 1.5 | 0.0  | 26.3  |     |
| 4-7   | 1.5       | 0.9 | 0.8 | 0.8 | 1.6 | 4.9 | 7.2  | 3.7 | 1.4 | 0.7 | 0.7 | 0.7 | 1.0 | 2.6  | 6.6  | 4.5 | 0.0  | 39.7  |     |
| 8-12  | 1.2       | 0.5 | 0.4 | 0.2 | 1.1 | 2.5 | 1.7  | 1.1 | 1.1 | 0.7 | 0.7 | 1.1 | 1.5 | 2.1  | 2.4  | 2.4 | 0.0  | 20.6  |     |
| 13-18 | 0.2       | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.3  | 0.6 | 0.7 | 0.8 | 0.8 | 1.0 | 0.9 | 1.8  | 1.3  | 0.1 | 0.0  | 8.8   |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 | 0.8  | 0.4  | 0.0 | 0.0  | 3.1   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2  | 0.1  | 0.0 | 0.0  | 0.7   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 3.6       | 1.9 | 1.8 | 1.8 | 3.7 | 9.0 | 12.1 | 8.4 | 6.0 | 4.4 | 3.9 | 4.8 | 5.5 | 10.2 | 13.6 | 8.5 | 0.8  | 100.0 |     |

## Station: (6) 200E

Begin: 1/99

End: 12/99

Total Hours: 8742

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 2.5   | 2.5 |
| 1-3   | 1.0       | 0.8 | 0.9 | 1.0 | 1.5 | 1.3 | 1.5 | 1.3 | 1.3 | 0.8 | 0.9 | 0.9 | 1.2  | 1.3  | 1.2 | 1.1 | 0.0  | 17.9  |     |
| 4-7   | 1.5       | 1.2 | 1.0 | 0.8 | 1.1 | 1.8 | 2.9 | 2.6 | 1.5 | 1.2 | 1.5 | 2.7 | 4.2  | 5.0  | 3.5 | 1.8 | 0.0  | 34.2  |     |
| 8-12  | 0.7       | 0.8 | 0.5 | 0.2 | 0.3 | 0.5 | 1.0 | 1.2 | 0.8 | 0.6 | 1.2 | 2.7 | 5.1  | 8.4  | 2.4 | 0.6 | 0.0  | 27.1  |     |
| 13-18 | 0.1       | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.5 | 0.5 | 1.3 | 1.7 | 1.6  | 3.6  | 1.6 | 0.1 | 0.0  | 11.8  |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.9 | 0.9 | 0.4  | 1.4  | 0.9 | 0.0 | 0.0  | 4.9   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.3 | 0.2  | 0.2  | 0.2 | 0.0 | 0.0  | 1.5   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.2   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 3.3       | 3.0 | 2.5 | 2.0 | 2.9 | 3.6 | 5.5 | 5.5 | 4.3 | 3.7 | 6.1 | 9.3 | 12.6 | 19.8 | 9.8 | 3.6 | 2.5  | 100.0 |     |

## Station: (7) 200W

Begin: 1/99

End: 12/99

Total Hours: 8742

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 1.5   | 1.5 |
| 1-3   | 2.1       | 1.6 | 1.5 | 1.4 | 1.6 | 1.8 | 2.0 | 1.6 | 1.6 | 1.2 | 1.5 | 1.9 | 2.6  | 3.8  | 3.5  | 2.5 | 0.0  | 32.2  |     |
| 4-7   | 3.2       | 1.6 | 1.3 | 0.9 | 1.3 | 1.8 | 1.4 | 0.9 | 0.7 | 0.6 | 0.8 | 1.6 | 3.6  | 6.1  | 4.6  | 3.3 | 0.0  | 33.6  |     |
| 8-12  | 0.9       | 0.5 | 0.3 | 0.1 | 0.2 | 0.5 | 0.4 | 0.3 | 0.4 | 0.6 | 1.5 | 1.8 | 2.3  | 3.2  | 3.2  | 2.1 | 0.0  | 18.6  |     |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.7 | 1.5 | 1.8 | 1.1  | 0.7  | 2.5  | 0.6 | 0.0  | 9.6   |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.8 | 0.8 | 0.4  | 0.1  | 0.9  | 0.1 | 0.0  | 3.5   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.1 | 0.1  | 0.0  | 0.1  | 0.0 | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.2   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 6.4       | 3.7 | 3.1 | 2.4 | 3.1 | 4.1 | 3.8 | 2.9 | 3.1 | 3.7 | 6.5 | 8.1 | 10.1 | 13.9 | 14.8 | 8.6 | 1.5  | 100.0 |     |

## Station: (8) BVLY

Begin: 1/99

End: 12/99

Total Hours: 8734

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW  |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.8   | 0.8 |
| 1-3   | 2.4       | 2.0 | 1.6 | 1.2 | 1.7 | 2.0 | 1.7 | 1.5 | 1.8 | 1.3 | 1.0 | 1.1 | 1.2 | 1.5  | 2.0  | 2.3  | 0.0  | 26.3  |     |
| 4-7   | 7.1       | 2.1 | 0.6 | 0.4 | 1.2 | 3.1 | 1.5 | 1.2 | 1.4 | 0.9 | 0.6 | 0.7 | 1.5 | 2.8  | 4.8  | 7.2  | 0.0  | 37.0  |     |
| 8-12  | 5.7       | 1.3 | 0.1 | 0.0 | 0.2 | 0.6 | 0.4 | 0.4 | 0.4 | 0.3 | 0.5 | 0.5 | 1.5 | 4.7  | 4.1  | 1.8  | 0.0  | 22.4  |     |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.4 | 0.3 | 0.8 | 0.3 | 0.5 | 4.2  | 2.6  | 0.1  | 0.0  | 10.0  |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.3 | 0.1 | 0.2 | 1.1  | 0.6  | 0.0  | 0.0  | 2.7   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2  | 0.1  | 0.0  | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.1   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   |     |
| TOTAL | 15.3      | 5.4 | 2.3 | 1.6 | 3.1 | 5.7 | 3.7 | 3.6 | 4.1 | 3.0 | 3.5 | 2.9 | 4.9 | 14.6 | 14.3 | 11.3 | 0.8  | 100.0 |     |

Table A.1. (contd)

Station: (9) FFTF

Begin: 1/99

End: 12/99

Total Hours: 8740

|       | DIRECTION |     |     |     |     |     |     |     |      |      |     |     |     |     |      |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S    | SSW  | SW  | WSW | W   | WNW | NW   | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 1.1   | 1.1   |
| 1-3   | 1.0       | 1.0 | 0.8 | 0.8 | 0.7 | 0.6 | 0.9 | 0.9 | 1.2  | 1.1  | 1.1 | 0.8 | 0.9 | 1.0 | 0.9  | 1.0 | 0.0  | 14.5  | 14.5  |
| 4-7   | 2.7       | 2.4 | 1.5 | 1.0 | 1.0 | 1.5 | 2.6 | 3.5 | 3.9  | 3.1  | 1.9 | 1.2 | 1.1 | 1.7 | 3.7  | 3.3 | 0.0  | 36.1  | 36.1  |
| 8-12  | 1.5       | 1.5 | 0.6 | 0.2 | 0.1 | 0.3 | 1.4 | 3.1 | 3.9  | 4.2  | 1.9 | 1.1 | 0.9 | 1.5 | 4.0  | 3.0 | 0.0  | 29.2  | 29.2  |
| 13-18 | 0.2       | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 1.3  | 3.5  | 2.6 | 0.9 | 0.5 | 0.8 | 1.8  | 0.6 | 0.0  | 13.5  | 13.5  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2  | 1.0  | 1.1 | 0.5 | 0.3 | 0.2 | 0.5  | 0.1 | 0.0  | 3.9   | 3.9   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3  | 0.5 | 0.2 | 0.1 | 0.0 | 0.1  | 0.0 | 0.0  | 1.2   | 1.2   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.2 | 0.1 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.3   | 0.3   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.1   | 0.1   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 5.4       | 5.3 | 3.0 | 2.0 | 1.8 | 2.4 | 5.1 | 8.0 | 10.5 | 13.3 | 9.2 | 4.8 | 3.9 | 5.2 | 11.1 | 8.0 | 1.1  | 100.0 | 100.0 |

Station: (10) YAKB

Begin: 1/99

End: 12/99

Total Hours: 8742

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |      |      |      |      |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW  | NW   | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.3   | 0.3   |
| 1-3   | 1.2       | 1.0 | 1.1 | 0.9 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 | 0.9 | 1.2 | 1.5  | 1.8  | 1.6  | 1.2  | 1.3 | 0.0  | 17.7  | 17.7  |
| 4-7   | 3.8       | 3.3 | 1.6 | 1.0 | 0.8 | 0.9 | 1.3 | 1.1 | 0.6 | 0.7 | 1.1 | 3.8  | 7.4  | 4.0  | 3.2  | 3.1 | 0.0  | 37.6  | 37.6  |
| 8-12  | 1.3       | 0.7 | 0.3 | 0.1 | 0.1 | 0.2 | 0.4 | 0.3 | 0.6 | 0.6 | 1.5 | 3.0  | 4.5  | 2.6  | 5.8  | 2.6 | 0.0  | 24.6  | 24.6  |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.4 | 0.5 | 1.5 | 2.0  | 0.8  | 1.3  | 5.1  | 0.7 | 0.0  | 12.9  | 12.9  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.8 | 0.7  | 0.2  | 0.4  | 2.5  | 0.1 | 0.0  | 5.2   | 5.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.2  | 0.1  | 0.0  | 0.5  | 0.0 | 0.0  | 1.4   | 1.4   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.2   | 0.2   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 6.4       | 5.1 | 3.0 | 2.0 | 1.6 | 1.8 | 2.4 | 2.5 | 2.7 | 3.4 | 6.7 | 11.2 | 14.8 | 10.0 | 18.3 | 7.9 | 0.3  | 100.0 | 100.0 |

Station: (11) 300A

Begin: 1/99

End: 12/99

Total Hours: 8723

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW | W   | WNW | NW  | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3   | 0.3   |
| 1-3   | 1.4       | 0.7 | 0.7 | 0.6 | 0.7 | 1.1 | 1.5 | 1.6 | 1.3 | 1.2 | 1.1  | 1.1 | 1.1 | 1.2 | 1.6 | 1.4 | 0.0  | 18.4  | 18.4  |
| 4-7   | 3.7       | 1.4 | 0.9 | 1.1 | 1.8 | 4.1 | 6.1 | 3.3 | 2.9 | 2.2 | 1.6  | 0.9 | 0.8 | 0.7 | 2.0 | 3.6 | 0.0  | 37.1  | 37.1  |
| 8-12  | 4.0       | 2.0 | 0.8 | 0.2 | 0.4 | 1.3 | 1.6 | 0.9 | 1.9 | 3.3 | 3.4  | 1.8 | 0.6 | 0.4 | 0.9 | 2.5 | 0.0  | 26.2  | 26.2  |
| 13-18 | 0.6       | 0.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 0.6 | 2.1 | 3.3  | 1.7 | 0.5 | 0.4 | 0.9 | 0.9 | 0.0  | 12.2  | 12.2  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.8 | 1.4  | 0.7 | 0.3 | 0.1 | 0.4 | 0.1 | 0.0  | 4.2   | 4.2   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.6  | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 1.3   | 1.3   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3   | 0.3   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1   | 0.1   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 9.7       | 4.6 | 2.5 | 2.0 | 2.9 | 6.6 | 9.5 | 6.2 | 7.0 | 9.9 | 11.6 | 6.5 | 3.4 | 2.8 | 5.9 | 8.6 | 0.3  | 100.0 | 100.0 |

Station: (12) WYEB

Begin: 1/99

End: 12/99

Total Hours: 8732

|       | DIRECTION |     |     |     |     |     |     |     |      |     |     |     |     |     |      |     | CALM | TOTAL |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-----|------|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S    | SSW | SW  | WSW | W   | WNW | NW   | NNW |      |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.5   | 0.5   |
| 1-3   | 1.3       | 1.0 | 1.1 | 1.1 | 1.3 | 1.4 | 1.3 | 1.2 | 1.2  | 1.3 | 1.0 | 0.8 | 1.0 | 1.1 | 1.3  | 1.1 | 0.0  | 18.6  | 18.6  |
| 4-7   | 2.5       | 1.7 | 1.5 | 1.5 | 2.1 | 2.3 | 2.8 | 3.5 | 3.6  | 2.4 | 1.6 | 1.7 | 1.8 | 2.8 | 3.7  | 3.0 | 0.0  | 38.5  | 38.5  |
| 8-12  | 1.2       | 1.0 | 0.4 | 0.2 | 0.3 | 0.4 | 1.2 | 2.6 | 3.5  | 2.1 | 1.1 | 1.3 | 1.8 | 4.5 | 3.5  | 1.5 | 0.0  | 26.7  | 26.7  |
| 13-18 | 0.3       | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 1.4  | 1.9 | 1.3 | 0.8 | 0.9 | 1.2 | 1.5  | 0.3 | 0.0  | 10.5  | 10.5  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2  | 1.1 | 0.7 | 0.5 | 0.4 | 0.3 | 0.9  | 0.1 | 0.0  | 4.1   | 4.1   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3 | 0.2 | 0.2 | 0.1 | 0.0 | 0.2  | 0.0 | 0.0  | 1.1   | 1.1   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.2   | 0.2   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   | 0.0   |
| TOTAL | 5.3       | 3.9 | 3.0 | 2.9 | 3.7 | 4.2 | 5.3 | 7.8 | 10.0 | 9.1 | 5.9 | 5.3 | 6.0 | 9.9 | 11.1 | 6.0 | 0.5  | 100.0 | 100.0 |

Table A.1. (contd)

Station: (13) 100N

Begin: 1/99

End: 12/99

Total Hours: 8648

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     |      |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW | CALM | TOTAL |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.7  | 0.7   |
| 1-3   | 2.1       | 1.9 | 2.0 | 2.3 | 2.7 | 2.7 | 2.3 | 1.3 | 1.4 | 1.2 | 1.6 | 2.1 | 3.3  | 2.9  | 3.2 | 2.6 | 0.0  | 35.7  |
| 4-7   | 1.2       | 1.5 | 2.0 | 2.4 | 2.7 | 2.4 | 2.3 | 1.2 | 0.7 | 0.8 | 2.0 | 4.1 | 5.0  | 3.1  | 1.7 | 1.4 | 0.0  | 34.4  |
| 8-12  | 0.3       | 1.1 | 0.8 | 0.3 | 0.1 | 0.3 | 0.9 | 0.7 | 0.5 | 0.5 | 1.2 | 2.5 | 3.6  | 2.3  | 0.5 | 0.2 | 0.0  | 15.8  |
| 13-18 | 0.1       | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.2 | 0.3 | 0.3 | 0.4 | 1.1 | 0.7 | 1.4  | 2.4  | 0.8 | 0.1 | 0.0  | 8.3   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.7 | 0.3 | 0.4  | 1.3  | 0.6 | 0.0 | 0.0  | 3.9   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.1  | 0.4  | 0.1 | 0.0 | 0.0  | 1.1   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |
| TOTAL | 3.7       | 4.7 | 4.9 | 5.1 | 5.6 | 5.3 | 5.6 | 3.5 | 3.2 | 3.5 | 6.8 | 9.7 | 13.9 | 12.6 | 7.0 | 4.3 | 0.7  | 100.0 |

Station: (14) WPPS

Begin: 1/99

End: 12/99

Total Hours: 8742

|       | DIRECTION |     |     |     |     |     |     |     |      |     |     |     |     |     |      |     |      |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S    | SSW | SW  | WSW | W   | WNW | NW   | NNW | CALM | TOTAL |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 1.0  | 1.0   |
| 1-3   | 2.2       | 1.8 | 1.8 | 1.0 | 0.9 | 1.0 | 1.1 | 1.1 | 1.4  | 1.1 | 1.1 | 1.3 | 1.1 | 1.3 | 1.9  | 2.3 | 0.0  | 22.6  |
| 4-7   | 3.5       | 2.2 | 2.0 | 1.2 | 0.7 | 0.7 | 1.6 | 3.8 | 4.7  | 2.5 | 1.6 | 1.2 | 1.3 | 1.5 | 3.8  | 4.5 | 0.0  | 36.7  |
| 8-12  | 1.3       | 1.1 | 0.5 | 0.2 | 0.2 | 0.3 | 1.0 | 3.1 | 4.2  | 2.6 | 1.7 | 1.3 | 1.2 | 1.9 | 2.6  | 1.5 | 0.0  | 24.6  |
| 13-18 | 0.2       | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 1.2  | 2.6 | 1.9 | 0.7 | 0.6 | 0.7 | 1.7  | 0.3 | 0.0  | 10.8  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.8 | 0.7 | 0.4 | 0.4 | 0.2 | 0.8  | 0.1 | 0.0  | 3.3   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.2 | 0.3 | 0.1 | 0.1 | 0.0 | 0.2  | 0.0 | 0.0  | 0.9   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0  | 0.0   |
| TOTAL | 7.3       | 5.4 | 4.3 | 2.5 | 1.8 | 2.0 | 3.9 | 8.4 | 11.6 | 9.9 | 7.3 | 4.9 | 4.6 | 5.5 | 10.9 | 8.7 | 1.0  | 100.0 |

Station: (15) FRNK

Begin: 1/99

End: 12/99

Total Hours: 8739

|       | DIRECTION |     |     |     |     |     |     |     |     |      |      |     |     |     |     |     |      |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW | W   | WNW | NW  | NNW | CALM | TOTAL |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3  | 0.3   |
| 1-3   | 1.3       | 1.1 | 0.7 | 0.6 | 0.8 | 1.0 | 1.1 | 1.2 | 1.0 | 1.0  | 1.1  | 1.0 | 1.2 | 1.3 | 1.6 | 1.4 | 0.0  | 17.3  |
| 4-7   | 4.4       | 2.3 | 1.5 | 1.1 | 1.4 | 2.4 | 4.3 | 3.9 | 3.3 | 2.7  | 2.2  | 1.3 | 1.4 | 1.7 | 5.3 | 5.6 | 0.0  | 45.1  |
| 8-12  | 1.3       | 0.6 | 0.4 | 0.3 | 0.4 | 1.1 | 2.0 | 2.2 | 2.9 | 5.6  | 3.8  | 1.2 | 0.6 | 0.6 | 1.9 | 2.2 | 0.0  | 27.0  |
| 13-18 | 0.1       | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.3 | 0.3 | 0.7 | 3.0  | 1.9  | 0.8 | 0.4 | 0.1 | 0.5 | 0.1 | 0.0  | 8.2   |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7  | 0.7  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 1.8   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.2  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |
| TOTAL | 7.0       | 4.1 | 2.8 | 2.1 | 2.6 | 4.5 | 7.6 | 7.5 | 8.1 | 13.0 | 10.0 | 4.5 | 3.6 | 3.8 | 9.2 | 9.3 | 0.3  | 100.0 |

Station: (16) GABL

Begin: 1/99

End: 12/99

Total Hours: 8742

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     |      |       |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW | CALM | TOTAL |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 1.0  | 1.0   |
| 1-3   | 0.7       | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.9 | 0.6 | 0.7 | 0.6 | 0.6 | 0.5  | 0.7  | 0.6 | 0.0  | 9.4   |
| 4-7   | 1.9       | 1.8 | 1.3 | 0.9 | 1.0 | 0.8 | 1.0 | 1.7 | 3.0 | 2.1 | 1.5 | 1.3 | 1.4 | 1.4  | 1.8  | 1.9 | 0.0  | 24.7  |
| 8-12  | 1.9       | 2.1 | 1.2 | 0.4 | 0.4 | 0.6 | 1.0 | 2.1 | 2.7 | 1.8 | 1.4 | 1.6 | 1.7 | 2.1  | 3.3  | 1.8 | 0.0  | 26.1  |
| 13-18 | 1.0       | 1.9 | 0.7 | 0.1 | 0.1 | 0.1 | 0.3 | 1.2 | 1.5 | 0.9 | 1.5 | 1.8 | 2.0 | 3.2  | 2.7  | 0.6 | 0.0  | 19.6  |
| 19-24 | 0.3       | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.6 | 0.5 | 1.4 | 1.3 | 1.3 | 2.9  | 2.1  | 0.2 | 0.0  | 11.8  |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.6 | 0.9 | 0.6 | 0.3 | 1.2  | 0.7  | 0.0 | 0.0  | 5.0   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.4 | 0.6 | 0.2 | 0.1 | 0.2  | 0.1  | 0.0 | 0.0  | 1.9   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.1 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.5   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0  | 0.1   |
| TOTAL | 5.8       | 7.0 | 4.1 | 1.8 | 1.9 | 1.8 | 2.9 | 6.0 | 9.5 | 7.2 | 8.1 | 7.4 | 7.5 | 11.5 | 11.4 | 5.1 | 1.0  | 100.0 |

Table A.1. (contd)

Station: (17) RING

Begin: 1/99

End: 12/99

Total Hours: 8684

|       | DIRECTION |     |      |     |     |     |     |     |     |      |     |     |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|-----|------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE | NE   | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW  | WSW | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.7   | 0.7 |
| 1-3   | 1.5       | 2.3 | 5.2  | 2.6 | 1.7 | 1.6 | 1.0 | 1.0 | 1.0 | 1.4  | 1.4 | 2.1 | 1.8 | 1.2 | 0.9 | 1.0 | 0.0  | 27.6  |     |
| 4-7   | 1.6       | 1.6 | 12.3 | 3.4 | 1.2 | 1.2 | 1.5 | 1.1 | 1.7 | 2.5  | 2.4 | 2.9 | 2.0 | 1.1 | 1.1 | 1.4 | 0.0  | 39.0  |     |
| 8-12  | 1.5       | 0.8 | 1.1  | 0.4 | 0.1 | 0.1 | 0.4 | 0.8 | 1.8 | 4.7  | 2.1 | 1.3 | 1.7 | 2.0 | 1.2 | 1.2 | 0.0  | 21.0  |     |
| 13-18 | 0.2       | 0.3 | 0.1  | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.4 | 2.3  | 1.6 | 0.7 | 0.9 | 1.6 | 0.6 | 0.1 | 0.0  | 9.0   |     |
| 19-24 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2  | 0.5 | 0.3 | 0.3 | 0.6 | 0.1 | 0.0 | 0.0  | 2.1   |     |
| 25-31 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.5   |     |
| 32-38 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 4.7       | 4.9 | 18.6 | 6.4 | 2.9 | 2.9 | 2.9 | 3.0 | 5.0 | 11.1 | 8.4 | 7.4 | 6.8 | 6.5 | 3.9 | 3.8 | 0.7  | 100.0 |     |

Station: (18) RICH

Begin: 1/99

End: 12/99

Total Hours: 8743

|       | DIRECTION |     |     |     |     |     |     |     |     |      |      |      |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW  | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.6   | 0.6 |
| 1-3   | 1.0       | 0.9 | 0.8 | 1.1 | 1.5 | 2.4 | 2.6 | 2.7 | 2.1 | 1.8  | 1.8  | 1.8  | 2.1 | 2.6 | 2.4 | 2.1 | 0.0  | 29.8  |     |
| 4-7   | 1.9       | 0.9 | 0.7 | 0.9 | 1.9 | 2.8 | 3.1 | 1.6 | 1.5 | 2.6  | 3.7  | 2.8  | 2.2 | 2.9 | 2.9 | 2.2 | 0.0  | 34.8  |     |
| 8-12  | 1.3       | 0.8 | 0.4 | 0.3 | 0.2 | 0.3 | 0.5 | 0.4 | 0.9 | 3.2  | 4.3  | 2.8  | 1.5 | 0.8 | 1.1 | 1.2 | 0.0  | 19.9  |     |
| 13-18 | 0.4       | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 1.9  | 3.3  | 1.8  | 1.1 | 0.4 | 0.9 | 0.7 | 0.0  | 11.1  |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.6  | 0.9  | 0.5  | 0.4 | 0.1 | 0.2 | 0.1 | 0.0  | 2.9   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.4  | 0.2  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.8   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 4.7       | 2.9 | 2.0 | 2.3 | 3.6 | 5.5 | 6.2 | 4.7 | 5.0 | 10.2 | 14.5 | 10.0 | 7.4 | 6.7 | 7.5 | 6.3 | 0.6  | 100.0 |     |

Station: (19) PFP

Begin: 1/99

End: 12/99

Total Hours: 8743

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |      |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW   | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 2.2   | 2.2 |
| 1-3   | 3.1       | 2.8 | 1.8 | 1.2 | 1.4 | 1.6 | 2.0 | 1.7 | 1.7 | 1.8 | 2.3 | 3.4 | 4.7  | 4.6  | 3.0  | 2.7 | 0.0  | 39.7  |     |
| 4-7   | 3.7       | 2.5 | 1.1 | 0.5 | 0.9 | 1.4 | 1.4 | 0.8 | 0.6 | 0.7 | 1.2 | 2.0 | 4.7  | 5.7  | 4.1  | 3.5 | 0.0  | 34.7  |     |
| 8-12  | 0.5       | 0.5 | 0.2 | 0.1 | 0.1 | 0.4 | 0.3 | 0.3 | 0.5 | 0.7 | 1.7 | 2.3 | 1.7  | 1.7  | 3.3  | 1.4 | 0.0  | 15.7  |     |
| 13-18 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7 | 1.3 | 1.6 | 0.5  | 0.2  | 1.3  | 0.1 | 0.0  | 6.1   |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.5 | 0.4 | 0.1  | 0.0  | 0.0  | 0.0 | 0.0  | 1.3   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.2   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 7.4       | 5.8 | 3.2 | 1.8 | 2.4 | 3.4 | 3.7 | 2.8 | 3.0 | 4.1 | 7.2 | 9.8 | 11.7 | 12.1 | 11.8 | 7.7 | 2.2  | 100.0 |     |

Station: (20) RMTN

Begin: 1/99

End: 12/99

Total Hours: 8749

|       | DIRECTION |      |     |     |     |     |     |     |     |     |      |      |     |     |     |     | CALM | TOTAL |     |
|-------|-----------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|-------|-----|
|       | N         | NNE  | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W   | WNW | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.2   | 0.2 |
| 1-3   | 0.3       | 0.2  | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.2 | 0.4 | 0.2 | 0.4  | 0.3  | 0.2 | 0.3 | 0.2 | 0.2 | 0.0  | 4.1   |     |
| 4-7   | 1.2       | 0.8  | 0.7 | 0.7 | 0.6 | 0.4 | 0.5 | 0.3 | 0.5 | 1.0 | 1.4  | 1.0  | 0.6 | 0.6 | 0.6 | 0.7 | 0.0  | 11.5  |     |
| 8-12  | 2.4       | 2.1  | 1.8 | 0.8 | 0.4 | 0.3 | 0.4 | 0.3 | 0.5 | 1.3 | 2.6  | 2.0  | 1.3 | 0.7 | 0.7 | 1.0 | 0.0  | 18.7  |     |
| 13-18 | 2.0       | 3.0  | 1.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.5 | 1.6 | 4.5  | 2.8  | 1.7 | 0.6 | 0.7 | 0.8 | 0.0  | 20.1  |     |
| 19-24 | 0.8       | 2.3  | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.1 | 4.6  | 2.9  | 1.5 | 0.6 | 0.3 | 0.2 | 0.0  | 15.5  |     |
| 25-31 | 0.4       | 2.2  | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7 | 4.4  | 3.0  | 0.9 | 0.2 | 0.1 | 0.0 | 0.0  | 13.0  |     |
| 32-38 | 0.1       | 1.0  | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 4.0  | 2.7  | 0.2 | 0.0 | 0.0 | 0.0 | 0.0  | 8.8   |     |
| 39-46 | 0.0       | 0.4  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 2.9  | 1.3  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 4.9   |     |
| >46   | 0.0       | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.2  | 1.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 3.3   |     |
| TOTAL | 7.3       | 11.9 | 6.5 | 2.0 | 1.3 | 0.9 | 1.2 | 1.0 | 2.1 | 6.4 | 27.1 | 17.0 | 6.6 | 3.0 | 2.6 | 2.9 | 0.2  | 100.0 |     |

Table A.1. (contd)

Station: (21) HMS

Begin: 1/99

End: 12/99

Total Hours: 8750

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |      |      |      |      |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW  | NW   | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.4   | 0.4   |
| 1-3   | 1.7       | 1.6 | 1.7 | 1.3 | 1.3 | 1.5 | 1.6 | 1.2 | 1.4 | 1.2 | 1.2 | 1.0  | 1.1  | 1.3  | 1.4  | 1.6 | 0.0 | 22.0  |       |
| 4-7   | 2.3       | 1.3 | 1.2 | 0.9 | 1.3 | 1.3 | 1.6 | 1.3 | 1.2 | 1.3 | 2.4 | 3.8  | 5.2  | 5.4  | 5.7  | 3.9 | 0.0 | 40.1  |       |
| 8-12  | 0.6       | 0.6 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 | 0.5 | 0.6 | 0.8 | 1.6 | 3.3  | 2.9  | 4.0  | 6.5  | 0.8 | 0.0 | 23.0  |       |
| 13-18 | 0.0       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.8 | 1.4 | 1.5  | 0.8  | 1.3  | 3.1  | 0.2 | 0.0 | 10.0  |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.9 | 0.6  | 0.2  | 0.2  | 1.1  | 0.0 | 0.0 | 3.7   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.1  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.7   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.1   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 4.6       | 3.5 | 3.3 | 2.4 | 2.8 | 2.9 | 3.3 | 3.1 | 3.8 | 4.8 | 7.9 | 10.4 | 10.3 | 12.1 | 17.8 | 6.5 | 0.4 | 100.0 |       |

Station: (22) PASC

Begin: 1/99

End: 12/99

Total Hours: 8743

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |     |     |     |     |      |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW | W   | WNW | NW  | NNW  |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.9   | 0.9   |
| 1-3   | 4.6       | 2.4 | 2.0 | 1.8 | 1.9 | 1.7 | 1.6 | 1.5 | 1.2 | 1.2 | 1.3  | 1.4 | 1.7 | 2.3 | 4.5 | 6.7  | 0.0 | 37.7  |       |
| 4-7   | 2.0       | 0.5 | 0.4 | 0.5 | 0.7 | 1.3 | 2.0 | 1.5 | 1.8 | 3.5 | 4.1  | 2.4 | 2.4 | 2.2 | 3.1 | 4.3  | 0.0 | 32.8  |       |
| 8-12  | 0.5       | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.4 | 0.5 | 0.5 | 2.3 | 6.2  | 3.0 | 1.1 | 0.6 | 1.0 | 1.3  | 0.0 | 17.9  |       |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7 | 4.2  | 2.3 | 0.7 | 0.2 | 0.1 | 0.2  | 0.0 | 8.7   |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.8 | 0.7  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 1.8   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.2   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0   |       |
| TOTAL | 7.1       | 3.2 | 2.4 | 2.5 | 2.6 | 3.1 | 4.0 | 3.4 | 3.7 | 7.8 | 16.7 | 9.9 | 6.0 | 5.4 | 8.7 | 12.6 | 0.9 | 100.0 |       |

Station: (23) GABW

Begin: 1/99

End: 12/99

Total Hours: 8740

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.7   | 0.7   |
| 1-3   | 1.2       | 1.1 | 0.9 | 1.1 | 1.3 | 1.5 | 2.1 | 2.2 | 2.1 | 1.4 | 1.3 | 1.5 | 2.6  | 3.4  | 2.7 | 1.6 | 0.0 | 28.0  |       |
| 4-7   | 1.4       | 1.1 | 0.9 | 0.9 | 1.1 | 1.3 | 3.5 | 4.8 | 1.3 | 0.7 | 1.0 | 1.6 | 3.4  | 8.0  | 3.1 | 1.7 | 0.0 | 35.8  |       |
| 8-12  | 0.6       | 0.6 | 0.3 | 0.2 | 0.3 | 0.3 | 1.4 | 1.2 | 0.5 | 0.6 | 1.2 | 2.1 | 3.8  | 6.2  | 1.1 | 0.3 | 0.0 | 20.7  |       |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.3 | 0.4 | 1.1 | 1.1 | 1.4  | 4.1  | 0.8 | 0.0 | 0.0 | 10.3  |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.7 | 0.5 | 0.2  | 1.5  | 0.2 | 0.0 | 0.0 | 3.8   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.0  | 0.2  | 0.0 | 0.0 | 0.0 | 0.7   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 3.4       | 2.9 | 2.1 | 2.2 | 2.7 | 3.1 | 7.2 | 8.6 | 4.3 | 3.9 | 5.5 | 6.9 | 11.5 | 23.5 | 8.0 | 3.6 | 0.7 | 100.0 |       |

Station: (24) 100F

Begin: 1/99

End: 12/99

Total Hours: 8743

|       | DIRECTION |     |     |     |     |     |      |      |     |     |     |     |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE   | SSE  | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.8   | 0.8   |
| 1-3   | 1.7       | 1.1 | 1.1 | 1.0 | 1.2 | 1.6 | 2.0  | 2.5  | 1.8 | 1.5 | 1.6 | 2.1 | 3.3  | 3.8  | 3.3 | 2.4 | 0.0 | 32.0  |       |
| 4-7   | 2.1       | 1.1 | 1.0 | 1.1 | 1.3 | 1.9 | 4.6  | 4.8  | 1.6 | 0.9 | 0.9 | 1.8 | 3.7  | 3.5  | 2.6 | 2.0 | 0.0 | 34.8  |       |
| 8-12  | 1.1       | 0.7 | 0.5 | 0.6 | 0.4 | 1.0 | 2.9  | 2.5  | 0.7 | 0.5 | 0.8 | 1.3 | 2.7  | 2.9  | 0.7 | 0.4 | 0.0 | 19.5  |       |
| 13-18 | 0.3       | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.4  | 0.7  | 0.6 | 0.5 | 0.8 | 0.8 | 1.3  | 2.2  | 0.8 | 0.0 | 0.0 | 8.8   |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1  | 0.1  | 0.3 | 0.3 | 0.3 | 0.3 | 0.4  | 0.9  | 0.3 | 0.0 | 0.0 | 3.2   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1  | 0.3  | 0.0 | 0.0 | 0.0 | 0.8   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 5.1       | 3.0 | 2.6 | 2.9 | 3.0 | 4.6 | 10.0 | 10.6 | 4.9 | 3.9 | 4.5 | 6.4 | 11.5 | 13.6 | 7.8 | 4.7 | 0.8 | 100.0 |       |



Table A.1. (contd)

Station: (25) VERN

Begin: 1/99

End: 12/99

Total Hours: 8743

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.5   | 0.5   |
| 1-3   | 0.9       | 1.0 | 1.0 | 1.3 | 1.7 | 2.1 | 1.6 | 0.9 | 0.9 | 0.7 | 1.2 | 1.6 | 1.9  | 1.4  | 1.1 | 0.9 | 0.0 | 20.2  |       |
| 4-7   | 0.9       | 1.3 | 2.1 | 2.8 | 3.8 | 2.1 | 1.0 | 0.4 | 0.4 | 0.4 | 0.6 | 3.8 | 8.1  | 3.7  | 1.7 | 1.0 | 0.0 | 33.9  |       |
| 8-12  | 0.6       | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.2 | 0.2 | 0.3 | 0.4 | 0.9 | 2.3 | 8.6  | 7.8  | 2.0 | 0.4 | 0.0 | 26.1  |       |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.8 | 0.7 | 2.7  | 6.1  | 2.1 | 0.2 | 0.0 | 13.5  |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.6 | 0.3 | 0.6  | 1.7  | 0.8 | 0.0 | 0.0 | 4.4   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 0.1 | 0.1  | 0.3  | 0.1 | 0.0 | 0.0 | 1.3   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.1   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 2.6       | 2.8 | 3.6 | 4.6 | 6.0 | 4.5 | 2.7 | 1.6 | 1.8 | 2.5 | 4.6 | 8.8 | 22.0 | 20.9 | 7.8 | 2.5 | 0.5 | 100.0 |       |

Station: (26) BENT

Begin: 1/99

End: 12/99

Total Hours: 8707

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |      |      |      |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W    | WNW  | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.2   | 0.2   |
| 1-3   | 0.9       | 1.2 | 0.8 | 0.5 | 0.6 | 0.6 | 0.5 | 0.4 | 0.5 | 0.6 | 1.1  | 1.4  | 2.0  | 1.6  | 1.3 | 0.8 | 0.0 | 14.7  |       |
| 4-7   | 1.2       | 1.0 | 1.4 | 2.0 | 1.9 | 0.7 | 0.2 | 0.3 | 0.5 | 0.9 | 4.3  | 10.5 | 14.2 | 5.5  | 2.5 | 1.9 | 0.0 | 49.1  |       |
| 8-12  | 0.6       | 0.7 | 1.2 | 1.0 | 0.8 | 0.2 | 0.0 | 0.0 | 0.2 | 0.8 | 3.3  | 7.6  | 6.7  | 2.5  | 1.3 | 0.5 | 0.0 | 27.6  |       |
| 13-18 | 0.2       | 0.4 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 2.0  | 1.6  | 0.9  | 0.3  | 0.1 | 0.2 | 0.0 | 6.5   |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.8  | 0.3  | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 | 1.4   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3  | 0.0  | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 | 0.4   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 3.0       | 3.4 | 3.7 | 3.6 | 3.3 | 1.5 | 0.8 | 0.7 | 1.3 | 2.8 | 11.6 | 21.5 | 23.9 | 10.1 | 5.1 | 3.4 | 0.2 | 100.0 |       |

Station: (27) VSTA

Begin: 1/99

End: 12/99

Total Hours: 8735

|       | DIRECTION |     |     |     |     |     |     |     |     |      |      |      |     |     |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW  | W   | WNW | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7   | 0.7   |
| 1-3   | 2.0       | 2.0 | 1.8 | 1.3 | 1.4 | 1.7 | 1.6 | 1.3 | 2.0 | 2.0  | 2.4  | 2.3  | 2.2 | 1.3 | 1.6 | 1.5 | 0.0 | 28.3  |       |
| 4-7   | 2.7       | 1.7 | 1.3 | 1.0 | 0.8 | 1.1 | 1.0 | 1.2 | 1.8 | 4.2  | 5.9  | 3.6  | 2.1 | 2.4 | 3.0 | 2.7 | 0.0 | 36.8  |       |
| 8-12  | 0.5       | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.4 | 1.0 | 4.3  | 6.7  | 3.0  | 0.9 | 0.5 | 0.9 | 1.0 | 0.0 | 19.6  |       |
| 13-18 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 2.0  | 6.4  | 1.4  | 0.5 | 0.3 | 0.1 | 0.1 | 0.0 | 11.3  |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3  | 2.1  | 0.3  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9   |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 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 | 0.3   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 5.2       | 3.9 | 3.2 | 2.3 | 2.3 | 2.9 | 2.6 | 3.0 | 5.2 | 12.9 | 23.7 | 10.8 | 5.8 | 4.6 | 5.5 | 5.4 | 0.7 | 100.0 |       |

Station: (28) SURF

Begin: 1/99

End: 12/99

Total Hours: 8631

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |      |      |     |     |     |     | CALM  | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|-------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW  | W    | WNW | NW  | NNW |     |       |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.6   | 0.6   |
| 1-3   | 0.4       | 0.7 | 1.1 | 1.2 | 1.0 | 0.8 | 0.6 | 0.8 | 1.2 | 2.2 | 3.5  | 3.4  | 1.5  | 0.6 | 0.3 | 0.3 | 0.0 | 19.5  |       |
| 4-7   | 0.2       | 0.4 | 2.4 | 3.2 | 1.6 | 0.5 | 0.3 | 0.2 | 0.4 | 1.3 | 4.0  | 5.9  | 1.6  | 0.2 | 0.1 | 0.1 | 0.0 | 22.2  |       |
| 8-12  | 0.1       | 0.5 | 2.1 | 3.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 4.6  | 10.0 | 3.3  | 0.2 | 0.0 | 0.0 | 0.0 | 24.5  |       |
| 13-18 | 0.1       | 0.2 | 0.2 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.2  | 9.5  | 6.1  | 0.6 | 0.0 | 0.0 | 0.0 | 19.5  |       |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6  | 5.2  | 3.7  | 0.3 | 0.0 | 0.0 | 0.0 | 10.0  |       |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 1.8  | 1.3  | 0.1 | 0.0 | 0.0 | 0.0 | 3.4   |       |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.3   |       |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.1   |       |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0   |       |
| TOTAL | 0.8       | 1.8 | 5.8 | 8.0 | 3.0 | 1.3 | 0.8 | 1.0 | 1.5 | 3.7 | 15.0 | 35.9 | 17.6 | 2.1 | 0.5 | 0.5 | 0.6 | 100.0 |       |

Table A.1. (contd)

Station: (29) 100K

Begin: 1/99

End: 12/99

Total Hours: 8743

|       | DIRECTION |     |     |     |     |     |     |     |     |     |     |      |      |      |     |     | CALM | TOTAL |     |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|------|-------|-----|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW  | W    | WNW  | NW  | NNW |      |       |     |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 1.1   | 1.1 |
| 1-3   | 1.9       | 1.6 | 1.5 | 1.8 | 2.2 | 1.9 | 1.9 | 1.7 | 1.7 | 1.8 | 2.2 | 3.5  | 3.9  | 2.3  | 2.2 | 1.8 | 0.0  | 34.1  |     |
| 4-7   | 1.6       | 1.4 | 0.9 | 0.9 | 1.4 | 1.5 | 1.6 | 1.4 | 1.0 | 0.7 | 1.7 | 5.3  | 6.7  | 2.9  | 1.7 | 1.5 | 0.0  | 32.1  |     |
| 8-12  | 0.5       | 0.8 | 0.4 | 0.1 | 0.2 | 0.3 | 0.8 | 0.8 | 0.7 | 0.7 | 1.2 | 3.4  | 5.7  | 2.5  | 0.7 | 0.4 | 0.0  | 19.2  |     |
| 13-18 | 0.1       | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.4 | 0.4 | 1.1 | 1.1  | 2.2  | 2.5  | 0.9 | 0.1 | 0.0  | 9.3   |     |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.5 | 0.6 | 0.3  | 0.4  | 1.2  | 0.4 | 0.0 | 0.0  | 3.5   |     |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1  | 0.1  | 0.3  | 0.1 | 0.0 | 0.0  | 0.7   |     |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |     |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |     |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0  | 0.0 | 0.0 | 0.0  | 0.0   |     |
| TOTAL | 4.1       | 3.9 | 2.8 | 2.9 | 3.8 | 3.7 | 4.4 | 4.2 | 3.8 | 4.2 | 6.8 | 13.6 | 19.0 | 11.7 | 6.0 | 3.7 | 1.1  | 100.0 |     |

Station: (30) HAMR

Begin: 1/99

End: 12/99

Total Hours: 8748

|       | DIRECTION |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     | CALM | TOTAL |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|-------|
|       | N         | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW   | WSW | W   | WNW | NW  | NNW |      |       |
| CALM  | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3  | 1.3   |
| 1-3   | 1.1       | 0.9 | 0.8 | 0.5 | 0.7 | 0.9 | 1.5 | 1.9 | 2.0 | 1.4 | 1.3  | 1.2 | 1.1 | 1.1 | 1.3 | 0.9 | 0.0  | 18.5  |
| 4-7   | 3.6       | 1.7 | 0.9 | 0.8 | 0.9 | 1.8 | 3.9 | 3.9 | 3.6 | 3.3 | 4.0  | 2.1 | 1.4 | 1.9 | 3.0 | 3.7 | 0.0  | 40.4  |
| 8-12  | 2.4       | 1.3 | 0.5 | 0.1 | 0.2 | 0.3 | 0.5 | 0.4 | 1.1 | 2.7 | 6.9  | 3.5 | 1.0 | 0.5 | 1.6 | 2.4 | 0.0  | 25.5  |
| 13-18 | 0.7       | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 1.3 | 3.4  | 1.8 | 0.6 | 0.3 | 1.1 | 0.9 | 0.0  | 10.8  |
| 19-24 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.9  | 0.6 | 0.2 | 0.1 | 0.3 | 0.1 | 0.0  | 2.7   |
| 25-31 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.7   |
| 32-38 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1   |
| 39-46 | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |
| >46   | 0.0       | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0   |
| TOTAL | 7.9       | 4.1 | 2.2 | 1.4 | 1.8 | 3.0 | 6.0 | 6.4 | 7.1 | 9.3 | 16.9 | 9.3 | 4.3 | 3.9 | 7.3 | 8.0 | 1.3  | 100.0 |

**Table A.2. Joint Frequency Distributions (%) for Hanford Meteorological Monitoring Network  
Wind Stations at 60-Meter Level, 1999**

**Tower: 100 Area**

|       | Begin: 1/99 |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     | End: 12/99 |       | Total Hours: 8724 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|------------|-------|-------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |     |     |     |      |      |     |     |            |       |                   |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W    | WNW  | NW  | NNW | CALM       | TOTAL |                   |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.5        | 0.5   |                   |
| 1-3   | 1.5         | 1.2 | 1.5 | 2.3 | 3.2 | 2.8 | 2.0 | 1.6 | 1.2 | 1.2 | 1.1 | 1.4 | 1.8  | 2.0  | 1.9 | 1.7 | 0.0        | 28.6  |                   |
| 4-7   | 1.2         | 1.5 | 1.8 | 1.7 | 3.2 | 3.0 | 2.4 | 1.6 | 1.0 | 0.6 | 1.2 | 1.7 | 3.2  | 3.3  | 1.9 | 1.1 | 0.0        | 30.5  |                   |
| 8-12  | 0.4         | 1.0 | 1.0 | 0.3 | 0.3 | 0.6 | 1.2 | 0.7 | 0.4 | 0.5 | 0.9 | 1.6 | 3.1  | 3.0  | 0.9 | 0.2 | 0.0        | 16.2  |                   |
| 13-18 | 0.3         | 0.8 | 0.4 | 0.1 | 0.1 | 0.0 | 0.3 | 0.6 | 0.5 | 0.4 | 1.1 | 1.0 | 3.1  | 3.8  | 0.7 | 0.1 | 0.0        | 13.2  |                   |
| 19-24 | 0.1         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.4 | 0.7 | 0.5 | 0.9  | 2.3  | 0.6 | 0.1 | 0.0        | 6.3   |                   |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.6 | 0.3 | 0.3  | 1.1  | 0.5 | 0.0 | 0.0        | 3.5   |                   |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 0.1  | 0.2  | 0.1 | 0.0 | 0.0        | 0.9   |                   |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0        | 0.1   |                   |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0        | 0.1   |                   |
| TOTAL | 3.5         | 4.5 | 4.7 | 4.5 | 6.9 | 6.5 | 6.0 | 4.8 | 3.5 | 3.8 | 6.0 | 6.7 | 12.5 | 15.8 | 6.7 | 3.3 | 0.5        | 100.0 |                   |

**Tower: 200 Area**

|       | Begin: 1/9 |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     | End: 12/99 |       | Total Hours: 8736 |
|-------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|------------|-------|-------------------|
|       | DIRECTION  |     |     |     |     |     |     |     |     |     |     |     |     |      |      |     |            |       |                   |
|       | N          | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW | SW  | WSW | W   | WNW  | NW   | NNW | CALM       | TOTAL |                   |
| CALM  | 0.0        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.0   |                   |
| 1-3   | 0.6        | 0.6 | 0.6 | 0.7 | 0.8 | 0.4 | 0.6 | 0.9 | 0.6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5  | 0.6  | 0.9 | 0.0        | 9.6   |                   |
| 4-7   | 2.0        | 2.0 | 1.4 | 1.6 | 2.2 | 1.0 | 1.5 | 2.2 | 1.0 | 1.0 | 1.3 | 1.3 | 1.7 | 2.3  | 3.4  | 3.2 | 0.0        | 29.1  |                   |
| 8-12  | 1.2        | 0.8 | 0.8 | 0.4 | 0.7 | 0.3 | 0.4 | 0.8 | 0.5 | 0.7 | 1.4 | 2.1 | 2.7 | 4.3  | 6.4  | 2.5 | 0.0        | 26.1  |                   |
| 13-18 | 0.3        | 0.4 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.4 | 0.4 | 0.6 | 1.6 | 2.5 | 2.2 | 4.7  | 6.1  | 0.5 | 0.0        | 20.1  |                   |
| 19-24 | 0.0        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 0.5 | 1.3 | 1.2 | 0.6 | 1.7  | 2.9  | 0.1 | 0.0        | 8.8   |                   |
| 25-31 | 0.0        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 1.1 | 0.6 | 0.2 | 0.6  | 1.4  | 0.0 | 0.0        | 4.7   |                   |
| 32-38 | 0.0        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.4 | 0.2 | 0.0 | 0.0  | 0.2  | 0.0 | 0.0        | 1.3   |                   |
| 39-46 | 0.0        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.4   |                   |
| >46   | 0.0        | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0        | 0.1   |                   |
| TOTAL | 4.0        | 3.7 | 3.0 | 2.9 | 3.9 | 1.8 | 2.6 | 4.5 | 3.0 | 4.3 | 7.7 | 8.4 | 7.9 | 14.1 | 21.1 | 7.1 | 0.1        | 100.0 |                   |

**Tower: 300 Area**

|       | Begin: 1/99 |     |     |     |     |     |     |     |     |      |      |     |     |     |     |     | End: 12/99 |       | Total Hours: 8711 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|------------|-------|-------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |      |      |     |     |     |     |     |            |       |                   |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW | W   | WNW | NW  | NNW | CALM       | TOTAL |                   |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3        | 0.3   |                   |
| 1-3   | 0.7         | 0.6 | 0.8 | 0.7 | 0.6 | 1.0 | 0.9 | 1.2 | 0.9 | 0.8  | 0.7  | 0.6 | 0.6 | 0.7 | 0.9 | 0.9 | 0.0        | 12.8  |                   |
| 4-7   | 2.3         | 1.3 | 1.1 | 1.2 | 1.6 | 2.7 | 3.6 | 2.8 | 2.8 | 2.3  | 2.0  | 1.0 | 0.8 | 0.7 | 1.4 | 2.3 | 0.0        | 29.6  |                   |
| 8-12  | 3.3         | 2.2 | 1.1 | 0.2 | 0.3 | 1.0 | 2.5 | 1.5 | 1.7 | 3.5  | 3.5  | 1.6 | 0.8 | 0.6 | 1.2 | 3.0 | 0.0        | 28.1  |                   |
| 13-18 | 1.4         | 1.1 | 0.2 | 0.1 | 0.0 | 0.1 | 0.5 | 0.3 | 0.4 | 2.2  | 4.0  | 2.8 | 0.8 | 0.4 | 1.1 | 2.0 | 0.0        | 17.6  |                   |
| 19-24 | 0.1         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 1.0  | 2.4  | 1.2 | 0.5 | 0.3 | 0.9 | 0.4 | 0.0        | 7.3   |                   |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5  | 1.3  | 0.5 | 0.2 | 0.1 | 0.3 | 0.1 | 0.0        | 3.1   |                   |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3  | 0.5  | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0        | 0.9   |                   |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.2  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0        | 0.3   |                   |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.1  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0        | 0.1   |                   |
| TOTAL | 7.7         | 5.3 | 3.2 | 2.2 | 2.5 | 4.8 | 7.6 | 5.9 | 6.1 | 10.7 | 14.8 | 7.9 | 3.8 | 2.6 | 5.8 | 8.7 | 0.3        | 100.0 |                   |

**Tower: 400 Area**

|       | Begin: 1/99 |     |     |     |     |     |     |     |     |      |      |     |     |     |      |     | End: 12/99 |       | Total Hours: 8728 |
|-------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-----|-----|-----|------|-----|------------|-------|-------------------|
|       | DIRECTION   |     |     |     |     |     |     |     |     |      |      |     |     |     |      |     |            |       |                   |
|       | N           | NNE | NE  | ENE | E   | ESE | SE  | SSE | S   | SSW  | SW   | WSW | W   | WNW | NW   | NNW | CALM       | TOTAL |                   |
| CALM  | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.1        | 0.1   |                   |
| 1-3   | 0.8         | 0.8 | 0.6 | 0.4 | 0.6 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8  | 0.7  | 0.4 | 0.5 | 0.6 | 0.6  | 0.6 | 0.0        | 10.5  |                   |
| 4-7   | 2.3         | 1.9 | 1.4 | 0.9 | 1.0 | 1.2 | 1.9 | 2.6 | 2.8 | 2.1  | 1.5  | 1.0 | 1.0 | 1.3 | 2.2  | 2.1 | 0.0        | 27.1  |                   |
| 8-12  | 2.3         | 1.6 | 0.8 | 0.2 | 0.2 | 0.4 | 1.5 | 2.2 | 3.5 | 3.1  | 2.0  | 1.1 | 1.1 | 1.4 | 2.7  | 2.8 | 0.0        | 27.0  |                   |
| 13-18 | 0.9         | 0.7 | 0.2 | 0.1 | 0.0 | 0.0 | 0.5 | 0.9 | 1.7 | 4.4  | 3.0  | 1.1 | 0.7 | 1.8 | 3.8  | 1.8 | 0.0        | 21.7  |                   |
| 19-24 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.4 | 1.7  | 2.0  | 0.7 | 0.4 | 0.8 | 2.4  | 0.2 | 0.0        | 8.9   |                   |
| 25-31 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.8  | 0.9  | 0.5 | 0.2 | 0.2 | 0.6  | 0.0 | 0.0        | 3.3   |                   |
| 32-38 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4  | 0.4  | 0.1 | 0.0 | 0.0 | 0.1  | 0.0 | 0.0        | 1.0   |                   |
| 39-46 | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.2  | 0.1 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0        | 0.4   |                   |
| >46   | 0.0         | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1  | 0.0  | 0.0 | 0.0 | 0.0 | 0.0  | 0.0 | 0.0        | 0.1   |                   |
| TOTAL | 6.3         | 5.1 | 3.1 | 1.7 | 1.8 | 2.4 | 4.7 | 6.7 | 9.3 | 13.3 | 10.8 | 5.0 | 4.0 | 6.0 | 12.4 | 7.6 | 0.1        | 100.0 |                   |

## Distribution

**No. of  
Copies**

**No. of  
Copies**

**OFFSITE**

|   |  |
|---|--|
| <p>All Seasons Heating &amp; Air<br/>Conditioning, Inc.<br/>ATTN: Terry Poe<br/>P.O. Box 9006<br/>Yakima, WA 98909-0006</p> <p>B. Allen<br/>611 Vaughan Road<br/>Yakima, WA 98908</p> <p>T. Allen<br/>Power Resource Managers<br/>2100 112th Ave. NE, Suite 100<br/>Bellevue, WA 98004</p> <p>D. Batchelor<br/>732 W. Park<br/>Pasco, WA 99301</p> <p>Benton County Public Works<br/>1709 S. Ely<br/>Kennewick, WA 99336</p> <p>2 Benton County PUD<br/>P.O. Box 6270<br/>524 S. Auburn<br/>Kennewick, WA 99332<br/>ATTN: Ken Mey<br/>M. Sheeran</p> <p>R. C. Blewett<br/>4409 Arlington Drive<br/>West Richland, WA 99352</p> <p>T. Brazil<br/>Cascade Natural Gas<br/>P.O. Box 6899<br/>Kennewick, WA 99336</p> | <p>CENEX Land O'Lakes<br/>5115 W. Brinkley Rd.<br/>Kennewick, WA 99338</p> <p>E. Charvet<br/>McGregor Company<br/>5251 Eltopia West Road<br/>Eltopia, WA 99330</p> <p>City of Benton City<br/>ATTN: City Clerk<br/>P.O. Box 70<br/>Benton City, WA 99320</p> <p>4 City of Richland<br/>P.O. Box 190<br/>Richland, WA 99352<br/>ATTN: L. D. Dunbar, C.E.M.<br/>L. Herbert<br/>M. E. Lippold<br/>R. Overman</p> <p>W. T. Cobb<br/>Cobb Consulting Services<br/>815 S. Kellogg<br/>Kennewick, WA 99336</p> <p>Columbia Basin College Library<br/>ATTN: Sharon Bailey<br/>2600 N. 20th Ave.<br/>Pasco, WA 99301</p> <p>Columbia National Wildlife Refuge<br/>U.S. Fish &amp; Wildlife Service<br/>U.S. Department of the Interior<br/>P.O. Box F<br/>Othello, WA 99344</p> |
|---|--|

No. of  
Copies

Farmers Insurance Claims Office  
P.O. Box 6998  
Kennewick, WA 99336

D. Fiskum  
Kadlec Medical Center  
888 Swift Boulevard  
Richland, WA 99352

Franklin County  
ASCS Office  
1620 Road 44  
Pasco, WA 99301

Franklin County Planning  
ATTN: James Cherry  
1016 N. 4th  
Pasco, WA 99301

E. Frimodt III  
Franklin County Road Department  
3416 Stearman Ave.  
Pasco, WA 99301-7104

K. Gregg  
North Franklin School District  
P.O. Box 829  
Connell, WA 99326

B. Hachey  
Mid-Columbia Library - Pasco  
1320 W. Hopkins  
Pasco, WA 99301

P. M. Hamilton, Jr.  
Assistant Director  
Physical Plant  
Central Washington University  
Ellensburg, WA 98926

J. Hancock  
U.S. Ecology  
P.O. Box 638  
Richland, WA 99352

No. of  
Copies

L. Harms  
Harms & Associates  
1632 W. Sylvester  
Pasco, WA 99301

D. Harper  
Wilber-Ellis Company  
P.O. Box 764  
Pasco, WA 99301

A. Haymaker  
1721 Cottonwood Drive  
Pasco, WA 99301

D. Kennell  
Central Pre-mix Concrete Co.  
11919 Harris Road  
Pasco, WA 99301

Jacob and Rhodes  
P.O. Box 6881  
Kennewick, WA 99336

B. Johnson  
556 Columbia Center  
Kennewick, WA 99336

B. Kelley  
614 S. Kellogg Street  
Kennewick, WA 99336

J. Kleckner  
D. Hittle Associates  
757 Columbia Drive, SE  
Richland, WA 99352

R. A. Kyle  
Richland School District  
615 Snow Ave.  
Richland, WA 99352

**No. of  
Copies**

R. LaFramboise  
Central Wash. Farm Crops Assoc.  
P.O. Box 202  
Yakima, WA 98907

K. Lettau  
George Grant Construction Co.  
P.O. Box 789  
Richland, WA 99352

J. Mannix  
Kennewick School Dist.  
622 N. Kellogg Street  
Kennewick, WA 99336

R. Mazurkiewicz  
Bonneville Power Admin.  
P.O. Box 968, MD-399  
Richland, WA 99352

D. McBaugh  
State of Washington Department of Health  
Division of Radiation Protection  
P.O. Box 47827  
Olympia, WA 98504

W. A. McCullough  
2402 Lariat Lane  
Richland, WA 99352

J. McDonald  
Washington Public Power  
Supply System, MS 1025  
P.O. Box 968  
Richland, WA 99352

G. McMurphy  
Valley Electric Co.  
1010 E. Bruneau Ave.  
Kennewick, WA 99336-3775

National Weather Service  
2001 NW 56th Drive  
Pendleton, OR 97801

**No. of  
Copies**

R. Okarma  
Kennewick High School  
500 S. Dayton  
Kennewick, WA 99336

M. Orgill, CCM  
342 S. 200 West  
Cedar City, UT 84720

R. Parker  
Pavement Surface Control  
307 N. Dayton, Bldg 1  
Kennewick, WA 99336

Pasco School District  
ATTN: Kathy, Bldg 210  
3412 N. Stearman Ave.  
Tri-Cities Airport  
Pasco, WA 99301

Pioneer Hi-Bred  
1040 Settler Road  
Connell, WA 99326

Potato Growers of Washington  
P.O. Box 563  
Othello, WA 99344-0563

D. C. Powell  
2110 Hudson  
Richland, WA 99352

Professional Ag Services  
P.O. Box 3053  
Pasco, WA 99302

J. Pryce  
Franklin County PUD  
P.O. Box 2407  
Pasco, WA 99302

**No. of  
Copies**

Raekes, Rettig, Osborne  
ATTN: B. Iller  
6725 W. Clearwater  
Kennewick, WA 99336

J. T. Raese  
Tree Fruit Research Lab  
1104 N. Western Avenue  
Wenatchee, WA 98801

K. Redmond  
Western Regional Climate Center  
Desert Research Institute  
2215 Raggio Parkway  
Reno, NV 89512-1095

R. R. Reid  
1884 Rustic Road  
Walla Walla, WA 99362

Richland Public Library  
ATTN: Reference Librarian  
955 Northgate  
Richland, WA 99352

P. Roberts  
6309 James St.  
West Richland, WA 99353

W. Sahli  
P.O. Box 912  
Mattawa, WA 99344

W. Sealock  
622 N. Kellogg  
Kennewick, WA 99336

J. St. Clair  
Benton-Franklin County Clean  
Air Authority  
650 George Washington Way  
Richland, WA 99352

**No. of  
Copies**

D. Smith  
Lamb-Weston, Inc.  
2005 Saint Street  
Richland, WA 99352

Smith Frozen Foods  
ATTN: Cliff Burt  
205204 East Bowles Road  
Kennewick, WA 99337

Soil Conservation Service  
1620 Road 44, North  
Pasco, WA 99301-2667

L. Stewart  
Benton Rural Electric Assoc.  
P.O. Box 1150  
Prosser, WA 99350

K. Tanaka  
Siemens Power Corporation  
P.O. Box 130  
2101 Horn Rapids Rd.  
Richland, WA 99352

G. Taylor, Climatologist  
Oregon Climate Service  
Strand 326  
Oregon State University  
Corvallis, OR 97331-2209

J. Thorp  
2110 Dover  
Richland, WA 99352

Tri-City Sign & Barricade, Inc.  
307 N. Dayton  
Kennewick, WA 99336

M. Troutman  
1207 Sunnyvale Road  
Kennewick, WA 99337

**No. of  
Copies**

K. Tucker  
TRIDEC  
901 N. Colorado  
Kennewick, WA 99336

2 UNOCAL  
P.O. Box 5797  
Kennewick, WA 99336  
ATTN: J. Akers  
G. Stroud

USACE-Hydrology Branch  
201 S. 3rd St.  
Walla Walla, WA 99362

R. W. Wallace  
89 Waldron Street  
Richland, WA 99352

J. Watson  
County Extension Agent  
1121 Dudley Avenue  
Prosser, WA 99350

L. Wendell  
Wind Energy Consultants  
2328 Enterprise Drive  
Richland, WA 99352

R. N. Wing  
727 Airway Avenue  
Lewiston, ID 83501

L. Zeiher  
405 South Dayton  
Kennewick, WA 99336

W. Ziebell  
Prosser School District  
823 Park Avenue  
Prosser, WA 99350

**No. of  
Copies****ONSITE****3 DOE Richland Operations Office**

J. B. Hall A5-15  
D. C. Ward A5-15  
Public Reading Rm H2-53

**5 Bechtel Hanford, Inc.**

R. L. Biggerstaff H0-02  
K. A. Gano H0-23  
A. L. Johnson H0-23  
C. J. Kemp S3-20  
T. J. Rodovsky X9-08

**CH2M Hill Hanford Group, Inc.**

K. E. Cook H9-02

**COGEMA Engineering Corporation**

S. I. Ryburn S3-90

**DynCorp Tri-Cities Services, Inc.**

T. L. Ostrander S6-16

**2 Fluor Hanford, Inc.**

K. D. Johnson X3-65  
J. W. Stregé L6-82

**3 Fluor Federal Services**

T. E. Arndt G3-17  
P. G. Beaudet S8-07  
L. A. Gaddis H5-57

**Lockheed Martin Hanford Company**

D. J. Washenfelder H6-62



| <u>No. of<br/>Copies</u> |   | <u>No. of<br/>Copies</u> |                                      |
|--------------------------|---|--------------------------|--------------------------------------|
|                          | <b>Northwest Instrument Systems,<br/>Incorporated</b>   |                          | L. L. Cadwell K6-84                  |
|                          | E. C. Ladd H6-62  |                          | R. E. Clayton K9-33                  |
|                          |   |                          | W. C. Cliff K6-48                    |
|                          |   |                          | T. S. Cress K9-38                    |
|                          | <b>Protection Technology Hanford</b>                    |                          | G. W. Dennis K6-75                   |
|                          | R. T. Toyooka G3-43                                     |                          | J. C. Doran K9-30                    |
|                          |   |                          | J. G. Droppo K6-80                   |
|                          | <b>U.S. Environmental Protection Agency</b>             |                          | M. J. Fayer K9-33                    |
|                          | D. R. Einan B5-01                                       |                          | D. Felmy K9-33                       |
|                          |   |                          | H. D. Freeman P8-38                  |
| 4                        | <b>Waste Management Federal Services of<br/>Hanford</b> |                          | G. W. Gee K9-33                      |
|                          | E. G. Allen T4-55                                       |                          | E. R. Gerk P7-63                     |
|                          | N. K. Myers T3-28                                       |                          | B. M. Gillespie K6-96                |
|                          | J.R. Rosser T4-03                                       |                          | C. S. Glantz K9-30                   |
|                          | R.W. Whitlock T4-04                                     |                          | G. L. Gower P7-79                    |
|                          |   |                          | D. L. Hadley K5-16                   |
|                          |   |                          | D. R. Haffner K7-97                  |
|                          |   |                          | C. W. Hall P7-57                     |
|                          |   |                          | S. W. Heaberlin K8-31                |
| 3                        | <b>Waste Management Technical Services,<br/>Inc.</b>    |                          | D. J. Hoitink (75) K9-30             |
|                          | R. B. Barmettlor L6-04                                  |                          | M. G. Horstman K4-10                 |
|                          | A. R. Johnson H1-13                                     |                          | D. G. Horton K6-81                   |
|                          | R. C. Roos H1-11  |                          | R. R. Kirkham K9-33                  |
|                          |   |                          | N. R. Larson K9-55                   |
|                          |   |                          | N. S. Laulainen K9-30                |
|                          |   |                          | R. N. Lee P7-07                      |
| 139                      | <b>Pacific Northwest National Laboratory</b>            |                          | J. P. McKinley K3-61                 |
|                          | O. B. Abbey K9-30                                       |                          | L. A. Monroe K1-53                   |
|                          | T. P. Ackerman K9-90                                    |                          | T. L. Page K9-18                     |
|                          | O. P. Amacker K8-58                                     |                          | J. V. Ramsdell K9-30                 |
|                          | D. L. Anderson K9-72                                    |                          | K. Rhoads K3-54                      |
|                          | G. L. Andrews K8-84                                     |                          | M. R. Sackschewsky K6-84             |
|                          | W. R. Barchet K9-30                                     |                          | W. J. Shaw K9-30                     |
|                          | J. C. Barnard K9-30                                     |                          | S. F. Snyder K3-54                   |
|                          | D. B. Barnett K6-81                                     |                          | G. M. Stokes K9-95                   |
|                          | L. E. Bisping K6-75                                     |                          | A. L. Ward K9-33                     |
|                          | W. J. Bjorklund P7-72                                   |                          | C. D. Whiteman K9-30                 |
|                          | K. W. Burk (10) S3-91                                   |                          | Technical Library P8-55              |
|                          |   |                          | Information Release Office (7) K1-06 |