

4.1 Climate and Meteorology

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Meteorological measurements are taken to support 1) Hanford Site emergency preparedness and response, 2) Hanford Site operations, and 3) atmospheric dispersion calculations. Support is provided through weather forecasting and the maintenance and distribution of climatological data. Forecasting is provided to help manage weather-dependent operations. Climatological data are provided to help plan weather-dependent activities and are used as a resource to assess the environmental effects of Hanford Site operations.

The Cascade Mountains to the west of Yakima greatly influence the climate of the Hanford Site. These mountains create a rain shadow effect and also serve as a source of cold air drainage, which significantly effects the wind regime.

The Hanford Meteorology Station is located on the 200 Area Plateau, where the prevailing wind direction is from the northwest during all months of the year. The secondary wind direction is from the southwest. Summaries of wind direction indicate that winds from the northwest quadrant occur most often during the winter and summer. During the spring and fall, the frequency of southwesterly winds increases, with a corresponding decrease in the northwesterly flow. Monthly average wind speeds are lowest during the winter months, averaging 10 to 11 km/h (6 to 7 mph), and highest during

the summer, averaging 13 to 15 km/h (8 to 9 mph). Wind speeds that are well above average are usually associated with southwesterly winds. However, the summertime drainage winds are generally northwesterly and frequently reach 50 km/h (30 mph). These winds are most prevalent over the northern portion of the Site.

Daily and monthly averages and extremes of temperature, dew point temperature, and relative humidity for the years 1945 through 1993 are given by Hoitink et al. (1994). From 1945 through 1994, the record maximum temperature was 45° C (113° F), and the record minimum temperature was – 30.6° C (2° F) below normal, had the largest negative departure.

Precipitation for 1994 totaled 15.6 cm (6.1 in.), 98% of normal (15.9 cm [6.3 in.]), with 13.2 cm (5.2 in.) of snow (compared to an annual normal snowfall of 35.1 cm [13.8 in.]).

The average wind speed for 1994 was 11.8 km/h (7.3 mph), which was 0.6 km/h (0.4 mph) below normal, and the peak gust for the year was 84 km/h (52 mph) on February 13. Figure 4.1.1 shows the 1994 wind roses (diagrams showing direction and frequencies of wind) at 10 m for meteorological monitoring stations on and around the Hanford Site.

Table 4.1.1 provides monthly climatological data from the Hanford Meteorology Station for 1994.

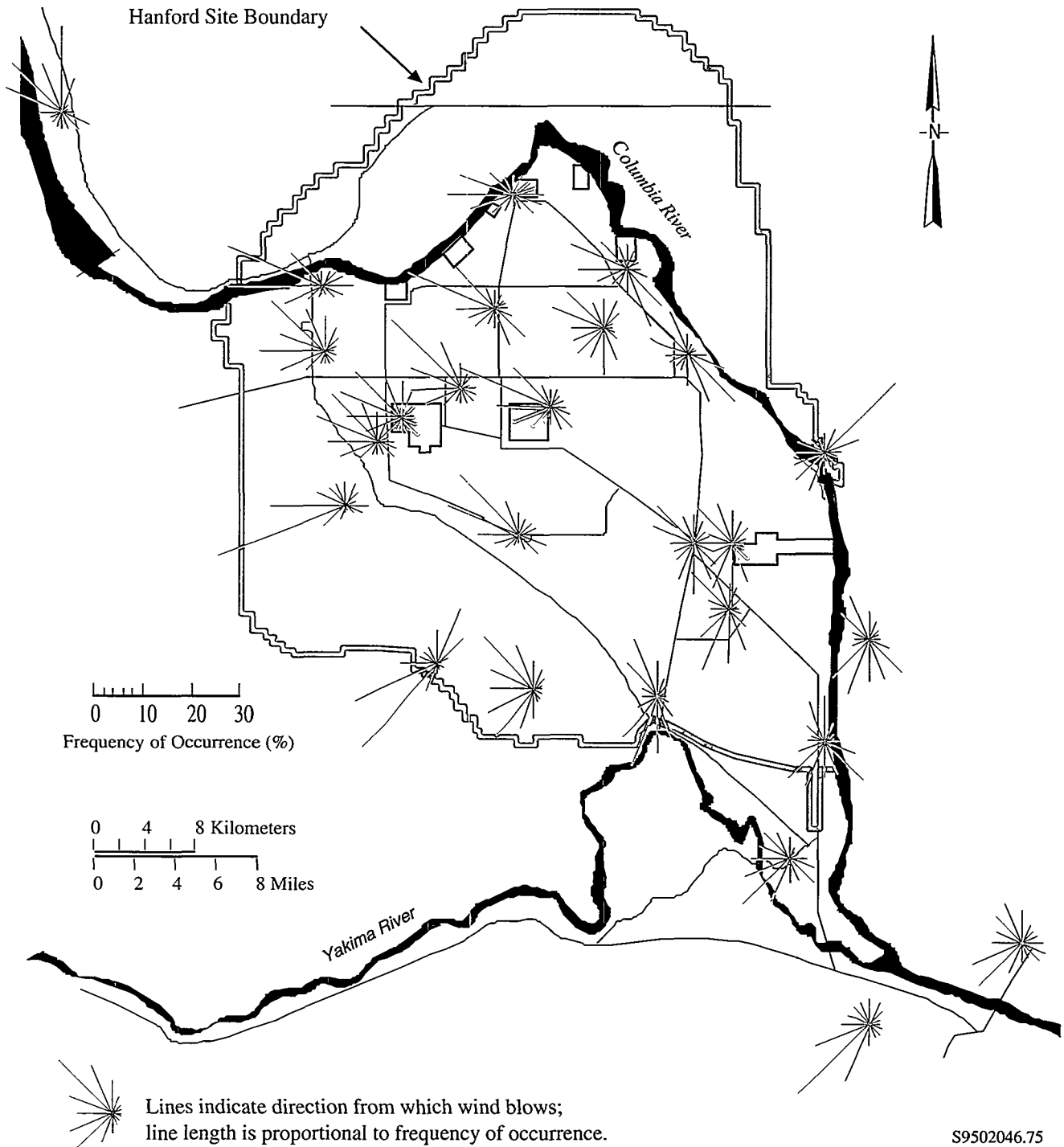


Figure 4.1.1 Hanford Meteorological Monitoring Network Wind Roses (at 10 m), 1994. Individual lines indicate direction from which wind blows. Length of line is proportional to frequency of occurrence from a particular direction.

Table 4.1.1 Monthly Climatological Data from the Hanford Meteorology Station, 1994 Hanford Meteorology Station, 40 km N.W. of Richland, Washington Latitude 46° 34'N, Longitude 119° 35'W, Elevation 223 m (733 ft)

Month	Temperatures, °C				Precipitation (cm)				Relative Humidity (%)		15-m Wind ^(a)								
	Averages		Extremes		Total	Depart. ^(b)	Snowfall		Average	Depart. ^(b)	Average Speed, km/h	Depart. ^(b)	Peak Gusts						
	Daily Max	Daily Min	Monthly	Depart. ^(b)			Highest	Date					Lowest	Date	Total	Depart. ^(b)	Speed, km/h	Direction	Date
J	8.1	-0.7	3.7	4.1	16.1	13	-6.7	31	1.1	-0.9	0	-9.9	85.5	9.1	7.1	-3.4	64	SW	4
F	7.0	-2.6	2.2	-1.1	17.2	28	-15.0	8	0.3	-1.3	2.3	-2.8	66.2	-4.1	9.5	-2.1	84	SSW	13
M	17.4	1.7	9.6	2.0	26.1	28	-7.2	22	0.1	-1.1	0	-0.8	46.0	-9.9	11.4	-1.9	74	SW	17
A	21.8	7.3	14.6	3.1	31.1	18 ^(c)	-1.7	1	1.6	0.5	0	-T ^(d)	47.6	0.4	12.6	-1.9	61	WNW	24 ^(c)
M	25.7	10.9	18.3	2.0	35.0	8	2.2	3	3.2	1.9	— ^(e)	—	43.0	0.3	12.2	-2.4	72	SW	29
J	29.2	12.8	21.0	0.1	38.3	22	6.7	2	1.0	0	—	—	36.5	-2.3	13.7	-1.1	74	WSW	13
J	36.4	18.1	27.2	2.7	43.9	22	10.0	3	0.4	-0.1	—	—	29.3	-4.2	12.6	-1.6	82	WSW	24
A	33.5	16.1	24.8	0.8	41.1	2	11.7	9	0.2	-0.5	—	—	33.5	-2.3	13.8	1.1	64	NW	28
S	30.1	12.7	21.4	2.7	34.4	20 ^(c)	8.3	23	0.2	-0.6	—	—	39.8	-2.9	11.4	-0.5	61	WSW	3
O	19.5	5.4	12.4	0.8	28.9	1	-1.1	30	2.4	1.4	0	-0.3	56.3	1.1	12.7	2.2	79	SSW	26
N	9.0	-0.6	4.2	-0.3	16.7	30	-7.2	22	1.7	-0.6	0.3	-4.3	72.9	-0.5	13.0	2.7	80	SSW	30
D	5.5	-2.1	1.7	2.1	17.8	20	-13.3	4	3.4	0.8	10.7	-3.8	78.2	-2.1	11.4	1.9	72	S	8
Y ^(f)	20.3	6.6	13.4	1.6	43.9	Jul 22	-15.0	Feb 8	15.6	-0.4	13.2	-21.8	52.9	-1.4	11.8	-0.6	84	SSW	Feb 13

- (a) Measured on a tower 15 m (50 ft) above the ground.
- (b) Departure columns indicate positive or negative departure of meteorological parameters from 30-year (1961–1990) climatological normals.
- (c) + after date indicates latest of several occurrences.
- (d) Trace.
- (e) — means no record of any snowfall during these months.
- (f) Yearly averages, extremes, and totals.