MEAN LAKE LEVELS DURING JANUARY, 1919.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Feb. 4, 1919.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during January, 1919:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sea level at New York	602.26	580.80	572.19	246.09
Above or below—				
Mean stage of December, 1918	−0.16	−0.25	−0.02	+0.20
Mean stage of January, 1918	+0.35	+0.03	+0.30	+0.02
Average stage for January, last 10 years	+0.27	−0.95	+0.63	+0.81
Highest recorded January stage	−0.52	−1.87	−1.36	−1.51
Lowest recorded January stage	+1.38	+1.72	+1.23	+2.29
Average relation of the January level to—				
December level	−0.3	−0.2	−0.1	−0.1
February level	+0.2	±0.0	±0.0	−0.1

EFFECT OF WEATHER ON CROPS, JANUARY, 1919.

By J. WARREN SMITH, Meteorologist.

[Dated: Weather Bureau, Washington, Mar. 3, 1919.]

Plowing.—The mild and comparatively dry weather during the month permitted of much more plowing and other outdoor work than is usual for January. The preparation of the soil for planting spring crops was hindered, however, in much of the Gulf States by wet soil and this work at the close of the month was backward for the season.

Due to the warm weather, vegetation made considerable growth in the South and on the north Pacific coast, and much more than is usual for this month in the central districts. Cool nights and deficient moisture retarded growth in California, however, and the cold weather at the beginning of the month caused some damage in that State and also in the Gulf districts.

Wheat.—There was some damage to winter wheat by low temperatures the first of the month, particularly in the Southeast and on the north Pacific coast, but on the whole the mild weather after the first decade was decidedly favorable for winter grains, and wheat especially, made unusual growth. At the close of the month winter grains were in an unusually good condition.

Truck crops.—After the first few days of the month, when early truck crops were considerably damaged in the South by cold weather, conditions were decidedly favorable for winter truck, but wet soil delayed the planting of spring truck in southern districts.

Live stock.—Conditions were generally favorable for meadows, pastures, and live stock, but heavy snow which caused considerable loss of stock covered the ground in western Kansas, northern New Mexico, and the Texas Panhandle during the first of the month.

Fruit.—In the first few days of January, frost severely damaged lemons and oranges in California, and a large number of Satsuma orange trees were defoliated in Alabama; otherwise little damage to fruit was reported although some local injury was done to fruit buds in Colorado and Missouri.

DESCRIPTION OF TABLES AND CHARTS.

Table I gives the data ordinarily needed for climatological studies for about 176 Weather Bureau stations making simultaneous observations at 8 a. m. and 8 p. m. daily, 75th Meridian time, and for about 30 others making only one observation. The altitudes of the instruments above ground are also given.

Table II gives a record of precipitation, the intensity of which at some period of the storm's continuance equaled or exceeded the following rates:

Duration (minutes)	5	10	15	20	25	30	35	40	45	50	60
Rates per hour (inches)	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.87	0.84	0.80

It is impracticable to make this table sufficiently wide to accommodate on one line the record of accumulated falls that continue at an excessive rate for several hours. In this case *the record is broken at the end of each 50 minutes*, the accumulated amounts being recorded on successive lines until the excessive rate ends. In cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest precipitation of any single storm has been given; also the greatest hourly fall during that storm.

The tipping-bucket mechanism is *dismounted* and removed when there is danger of snow or water freezing in the same. Table II records this condition by entering an asterisk (*).

Table III gives, for about 30 stations of the Canadian Meteorological Service, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values except in the case of snowfall. The sea-level pressures have been computed at Washington by the method employed for reducing United States observations and described by Prof. F. H. Bigelow in this REVIEW, January, 1902, pages 13–16; the altitudes are those furnished us on January 1, 1916.

Chart I.—*Hydrographs* for several of the principal rivers of the United States.

Chart II.—*Tracks of centers of* HIGH areas; and

Chart III.—*Tracks of centers* of LOW areas. The Roman numerals show the chronological order of the centers. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the observations at 8 a. m. and 8 p. m., 75th Meridian time. Within each circle is also given (Chart II) the last three figures of the highest barometric reading, or (Chart III) the lowest reading reported at or near the center at that time, and in both cases as reduced to sea-level and standard gravity.

Chart IV.—*Temperature departures.* This chart presents the departures of the monthly mean surface temperatures from the monthly normals. The normals used in computing the departures were computed for a period of 33 years (1873 to 1905) and are published in Weather Bureau Bulletin R, Washington, 1908. Stations whose records were too short to justify the preparation of normals in 1908, have been provided with normals as adequate records became available, and all have been reduced to the 33-year interval 1873–1905. The shaded portions of the chart indicate areas of positive departures and unshaded portions indicate areas of negative departures. Generalized lines connect places having approximately equal departures of like sign. This chart of monthly surface temperature departures in the United States was first published in the MONTHLY WEATHER REVIEW for July, 1909.

Chart V.—*Total precipitation.* The scale of shades showing the depth is given on the chart. Where the monthly amounts are too small to justify shading and over sections of the country where stations are too widely separated or the topography is too diversified to warrant reasonable accuracy in shading, the actual depths are given for a limited number of representative stations. Amounts less than 0.005 inch are indicated by the letter T, and no precipitation by 0.

Chart VI.—*Percentage of clear sky between sunrise and sunset.* The average cloudiness at each Weather Bureau station is determined by numerous personal observations between sunrise and sunset. The difference between the observed cloudiness and 100 is assumed to represent the percentage of clear sky, and the values thus obtained are the basis of this chart. The chart does not relate to the nighttime.

Chart VII.—*Isobars and isotherms at sea-level, and prevailing wind directions.* The pressures have been reduced to sea-level and standard gravity by the method described by Prof. Frank H. Bigelow on pages 13–16 of the REVIEW for January, 1902. The pressures have also been reduced to the mean of the 24 hours by the application of a suitable correction to the mean of the 8 a. m. and 8 p. m. readings at stations taking two observations daily, and to the 8 a. m. or the 8 p. m. observation, respectively, at stations taking but a single observation. The diurnal corrections so applied will be found in the Annual Report of the Chief of the Weather Bureau, 1900–1901, volume 2, Table 27, pages 140–164.

The isotherms on the sea-level plane have been constructed by means of the data summarized in chapter 8 of volume 2 of the annual report just mentioned. The correction $t_0 - t$, or temperature on the sea-level plane minus the station temperature as given by Table 48 of that report, is added to the observed surface temperature to obtain the adopted sea-level temperature.

The prevailing wind directions are determined from hourly observations at the great majority of the stations. A few stations having no self-recording wind-direction apparatus determine the prevailing direction from the daily or twice-daily observations only

Chart VIII.—*Total snowfall.* This is based on the reports from regular and cooperative observers and shows the depth in inches of the snowfall during the month. In general, the depth is shown by lines inclosing areas of equal snowfall, but in special cases figures are also given. Chart VIII is published only when the general snow cover is sufficiently extensive to justify its preparation.

Chart IX.—*Meteorological conditions over the North Atlantic Ocean.*

CONDENSED CLIMATOLOGICAL SUMMARY.

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course the number of such records is smaller than the total number of stations.

Condensed climatological summary of temperature and precipitation by sections. January, 1919.

Section.	Temperature.								Precipitation.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	44.5	− 1.2	2 stations	77	1	St. Bernard	−11	4	5.84	+1.07	Cochrane	11.11	Tuscumbia	3.33
Arizona	37.6	− 4.8	Sentinel	80	25	Chin Lee	−32	2	0.47	−0.95	Childs	2.20	4 stations	0.00
Arkansas	41.4	+ 0.1	Dardanelle	75	13	2 stations	− 3	4	3.00	−1.23	Sheridan	7.80	Rogers	0.32
California	46.3	+ 0.5	Indio	87	22	Alturas	−18	1	2.73	−2.68	Upper Mattole	22.92	4 stations	0.00
Colorado	21.0	− 3.9	Canon City	65	24	3 stations	−39	1	0.16	−0.85	Savage Basin	1.07	14 stations	0.00
Florida	57.8	− 0.8	Homestead	88	25†	Garniers (near)	14	4	2.32	−0.56	Garniers (near)	6.45	Ritta	0.05
Georgia	47.1	+ 0.8	Brunswick	79	1	2 stations	2	4	4.79	+0.99	Tallapoosa	8.03	Waycross	1.67
Hawaii (December)	69.7	+ 0.1	Waianae, Oahu	90	26†	2 stations	48	5	11.09	+2.50	Honokane, Hawaii	44.53	Kula Sanitarium	0.03
Idaho	26.0	+ 1.9	4 stations	62	21†	New Meadows	−23	1	1.64	−0.64	Wallace	8.20	2 stations	0.01
Illinois	31.7	+ 4.8	Carbondale	66	1††	Morrison	−2[illegible]	4	0.46	−2.11	Palestine	1.77	2 stations	T.
Indiana	33.2	+ 4.3	Rome	66	20	La Porte	−14	4	1.02	−2.09	Rome	2.29	Veedersburg	T.
Iowa	26.8	+ 8.9	Centerville	64	19	Maquoketa	−32	4	0.24	−0.81	Nora Springs	0.86	6 stations	T.
Kansas	30.2	+ 0.8	Ellsworth	69	20	Salina	−25	3	0.07	−0.68	Wamego	0.49	28 stations	0.00
Kentucky	37.9	+ 2.7	3 stations	68	19†	Marion	− 1	4	3.62	−0.77	2 stations	7.10	Louisville	1.63
Louisiana	48.7	− 2.1	Houma	82	1	Newellton	6	4	6.33	+1.97	Napoleonville	8.80	Ruston	3.19
Maryland-Delaware	34.2	+ 3.2	College Park, Md.	66	21	Oakland, Md.	−19	5	3.50	+0.10	Seaford, Del.	4.70	Westernport, Md.	1.45
Michigan	26.2	+ 5.5	3 stations	59	18†	Sidnaw	−31	4	0.87	−1.21	Marquette	2.21	Omer	0.10
Minnesota	18.5	+10.2	Worthington	55	20	Itasca State Park	−45	3	0.38	−0.34	Redwood Falls	1.60	Tracy	0.05
Mississippi	44.9	− 2.2	2 stations	78	1†	Louisville	− 3	3	5.46	+0.78	Edwards	8.93	Pontotoc	1.35
Missouri	34.0	+ 3.6	Marble Hill	70	12	Maryville	−23	4	0.40	−1.88	New Madrid	4.47	Avalon	0.00
Montana	29.2	+10.6	Choteau	79	16	2 stations	−35	3	0.62	−0.48	Heron	5.91	4 stations	0.00
Nebraska	30.2	+ 8.6	Weeping Water	71	30	Ainsworth	−28	3	0.10	−0.47	Atkinson	0.75	25 stations	0.00
Nevada	30.0	+ 0.3	3 stations	70	12†	Owyhee	−24	1	0.17	−0.99	Marlette Lake	1.43	5 stations	0.00
New England	25.9	+ 4.8	Cavendish, Vt.	61	17	Enosburg Falls, Vt.	−27	12	3.11	−0.34	Kingston, R. I.	5.96	Northfield, Vt.	1.02
New Jersey	34.1	+ 4.3	2 stations	62	2	Culvers Lake	− 9	5†	3.51	−0.28	Atlantic City	4.44	Layton	2.24
New Mexico	26.0	− 7.4	3 stations	70	31	Dulce	−37	2	0.16	−0.51	Cloverdale	1.33	32 stations	0.00
New York	27.9	+ 5.1	New York City	60	1	North Lake	−27	11	2.01	−0.84	Adams Center	6.79	Avon	0.23
North Carolina	42.5	+ 1.6	Newbern	77	22	Banners Elk	− 7	4	4.75	+1.06	Highlands	8.53	Edenton	2.30
North Dakota	18.7	+13.8	Beach	66	25	Steele	−44	1	0.16	−0.38	Colgate	0.60	6 stations	0.00
Ohio	32.9	+ 4.4	Peebles	72	22	Millport	− 9	5	1.60	−1.62	Portsmouth	4.13	North Bass Island	0.48
Oklahoma	37.8	− 0.8	2 stations	72	11	Kenton	−20	1	0.74	−0.50	Antlers	3.45	Mutual	0.00
Oregon	35.7	+ 0.6	Grants Pass	71	22	Austin	−25	1	4.[illegible]2	+0.76	Deadwood	24.63	Hampton	0.16
Pennsylvania	32.0	+ 4.1	Uniontown	64	1	Ebensburg	−15	5	2.53	−0.84	Somerset	4.54	Lawrenceville	1.00
Porto Rico	73.8	+ 0.6	San Salvador	97	12	3 stations	53	2†	3.56	0.00	Arecibo	7.85	2 stations	0.80
South Carolina	47.1	+ 1.6	Oaks	80	2	Landrum	8	4	4.15	+0.71	Liberty	8.50	Paris Island	0.30
South Dakota	27.3	+11.5	Bellefourche	66	18	Pollock	−39	3	0.12	−0.39	Harveys Ranch	1.40	14 stations	0.00
Tennessee	39.3	+ 0.5	Newport	74	1	2 stations	− 8	4	5.39	+0.88	Celina	8.23	Union City	2.49
Texas	45.3	− 3.1	McKinney	84	13	Dalhart	−17	1	3.09	+1.85	Anahuac	8.97	5 stations	0.00
Utah	24.5	− 1.0	Springdale	66	23	Hanksville	−35	2	0.09	−1.41	Silver Lake	0.72	27 stations	0.00
Virginia	38.4	+ 2.7	2 stations	71	21	Burkes Garden	−16	5	3.97	+0.67	Clarksville	6.04	Winchester	1.92
Washington	33.8	+ 3.3	Kennewick	68	23	2 stations	−10	1	6.17	+1.31	Wind River	23.82	Sunnyside	0.63
West Virginia	34.1	+ 1.1	Glenville	69	22	Terra Alta	−16	5	3.79	−0.18	Pickens	6.06	Upper Tract	1.60
Wisconsin	22.2	+ 7.8	Prairie du Sac	59	26	Hillsboro	−42	4	0.57	−0.64	Oconto	1.38	Solon Springs	0.10
Wyoming	24.3	+ 4.5	2 stations	64	17†	Sheridan Creek	−33	1	0.16	−0.66	Moran	1.36	16 stations	0.00

† Other dates also.

DESCRIPTION OF TABLES AND CHARTS.

TABLE I.—*Climatological data for Weather Bureau stations, January, 1919.*

Districts and stations.	Elevation of instruments. Barometer above sea level.	Thermometer above ground.	Anemometer above ground.	Pressure. Station, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Temperature of the air. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity.	Precipitation. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.	Snow on ground at end of month.
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F		°F	°F.		°F	°F.	°F.	°F.	%	In.	In.		Miles								0-10	In.	In.
New England.							29.2	+5.1										77	3.24	−2.5										6.6		
Eastport	76	67	85	29.82	29.90	−0.10	24.2	+4.1	49	2	32	−10	12	16	39	23	20	85	3.06	−0.8	14	8,704	w.	52	e.	24	5	10	16	7.1	12.2	0.6
Greenville	1,070	6	....	28.71	29.92	.....	15.6	.....	37	2	24	−16	12	7	39	.....	.....	.....	2.85	.....	11	.....	.....	.....	.....	.....	7	7	17	.....	15.8	17.0
Portland, Me.	103	82	117	29.84	29.97	−.08	25.8	+3.8	43	16	33	−8	12	18	31	23	18	74	4.09	+0.9	11	6,771	sw.	48	nw.	24	7	7	17	6.9	8.8	1.2
Concord	288	70	79	29.64	29.97	−.08	24.7	+3.5	44	2	34	−7	7	15	34	.....	.....	.....	3.05	−0.3	9	3,168	nw.	30	nw.	24	10	12	9	5.5	11.9	1.1
Burlington	404	11	48	29.53	30.00	−.05	23.0	+6.7	48	2	32	−11	10	14	35	.....	.....	.....	1.18	−0.6	11	9,635	s.	60	s.	1	4	3	24	7.8	10.8	2.2
Northfield	876	12	60	29.00	29.99	−.06	21.1	+6.0	58	2	32	−15	10	10	44	18	15	82	1.02	−1.5	8	5,664	s.	33	sw.	2	3	10	18	7.3	6.8	5.0
Boston	125	115	188	29.83	29.97	−.08	33.2	+6.2	59	2	41	2	12	26	38	30	24	70	3.62	−0.2	8	7,984	w.	40	nw.	24	6	11	14	6.5	4.1	0.4
Nantucket	12	14	90	29.96	29.97	−.07	35.4	+3.3	52	2	41	8	12	30	26	33	30	82	4.83	+1.4	10	12,611	sw.	56	sw.	10	8	5	18	6.8	3.2	0.0
Block Island	26	11	46	29.96	29.99	−.08	35.1	+3.7	55	2	41	6	12	30	29	33	30	82	3.76	−0.1	11	15,610	nw.	60	w.	24	9	5	17	6.5	0.7	0.0
Providence	160	215	251	29.81	29.99	−.07	32.8	+5.6	58	2	40	2	12	25	32	29	24	73	4.34	0.0	9	9,998	nw.	79	nw.	24	6	12	13	6.4	2.0	0.0
Hartford	159	122	140	29.83	30.01	−.06	32.2	+6.7	56	2	40	2	12	25	29	28	23	71	2.95	−0.9	8	5,990	nw.	38	nw.	24	7	8	16	6.6	1.1	0.0
New Haven	106	117	155	29.90	30.02	−.06	33.8	+6.5	54	1	41	5	12	27	26	30	25	74	3.17	−0.7	8	6,987	sw.	38	w.	24	10	8	13	5.5	0.4	0.0
Middle Atlantic States.							36.4	+4.8										73	3.14	−0.1										5.4		
Albany	97	102	115	29.91	30.02	−.05	29.5	+7.0	56	2	37	−3	12	22	33	26	22	76	1.42	−1.2	8	5,587	s.	28	nw.	24	8	10	13	5.9	5.4	T.
Binghamton	871	10	69	29.06	30.02	−.06	30.0	+6.9	58	1	38	1	6	22	29	.....	.....	.....	1.29	−0.7	8	4,608	nw.	28	nw.	9	6	12	13	6.4	5.5	T.
New York	314	414	454	29.69	30.04	−.06	35.2	+5.0	60	1	42	9	10	28	27	31	24	66	3.37	−0.4	7	13,912	nw.	84	nw.	24	9	8	14	6.3	0.3	0.0
Harrisburg	374	94	104	29.68	30.09	−.01	33.8	+5.1	59	21	42	5	5	26	30	29	23	70	2.75	−0.1	6	5,028	nw.	31	nw.	24	9	11	11	5.3	9.0	0.0
Philadelphia	117	123	190	29.95	30.08	−.03	37.7	+5.9	61	1	44	13	12	31	26	34	31	80	3.35	−0.1	8	8,089	sw.	41	nw.	10	14	8	9	4.7	0.5	0.0
Reading	325	81	98	29.73	30.10	.....	34.2	.....	59	1	42	7	5	27	25	30	24	71	3.21	−0.3	8	4,903	nw.	36	nw.	24	10	11	10	5.4	4.7	0.0
Scranton	805	111	119	29.17	30.09	−.03	31.7	+6.2	56	1	40	3	5	24	28	29	27	85	2.44	−0.4	12	4,752	sw.	36	nw.	24	6	14	11	6.1	10.5	0.0
Atlantic City	52	37	48	30.01	30.07	−.04	37.4	+4.9	54	1	44	12	12	30	25	33	30	78	4.44	+1.0	8	5,740	nw.	32	nw.	24	16	4	11	4.6	0.9	0.0
Cape May	18	13	49	30.08	30.10	−.02	37.9	+3.5	55	2	44	12	12	32	22	35	.....	.....	3.54	+0.2	11	.....	nw.	.....	.....	.....	16	8	7	.....	1.3	0.0
Sandy Hook	22	10	57	30.03	30.05	.....	35.0	.....	58	1	41	12	10	29	23	32	29	78	2.94	.....	8	12,744	w.	58	w.	24	14	6	11	5.0	T.	0.0
Trenton	190	159	183	29.83	30.04	.....	34.8	.....	60	1	42	9	12	27	26	31	26	73	3.28	+0.1	7	9,019	sw.	46	nw.	24	12	10	9	5.3	0.3	0.0
Baltimore	123	100	113	29.96	30.09	−.03	38.2	+4.8	64	1	46	11	5	30	25	33	27	67	3.51	+0.3	7	3,994	sw.	20	sw.	31	13	9	9	5.1	1.0	0.0
Washington	112	62	85	29.97	30.10	−.03	38.1	+5.2	64	1	46	11	5	30	28	32	26	67	3.47	+0.1	9	5,133	nw.	35	nw.	29	12	10	9	5.0	0.5	0.0
Lynchburg	681	153	188	29.35	30.11	−.02	41.0	+5.2	68	22	52	10	4	30	39	34	29	68	4.11	+0.4	7	6,020	nw.	37	nw.	9	15	10	6	4.7	T.	0.0
Norfolk	91	170	205	30.01	30.12	−.01	43.8	+3.4	68	21	52	22	10	36	25	38	33	74	3.10	−0.3	9	9,340	sw.	44	w.	23	14	8	9	4.8	4.5	0.0
Richmond	144	11	52	29.96	30.12	−.01	40.6	+2.6	66	21	51	15	5	30	33	35	29	71	3.64	+0.6	9	5,711	sw.	30	nw.	29	11	9	11	5.4	T.	0.0
Wytheville	2,293	49	55	27.68	30.15	−.01	35.1	+2.1	60	22	44	0	5	26	36	29	24	72	3.30	−1.0	8	4,946	w.	31	sw.	30	17	4	10	4.2	4.8	0.0
South Atlantic States.							47.8	+2.6										74	3.52	−0.3										4.9		
Asheville	2,255	70	84	27.74	30.18	+.03	37.6	+2.2	64	21	48	0	4	27	35	32	27	71	4.70	0.0	10	6,442	nw.	38	se.	1	18	4	9	4.2	2.2	0.0
Charlotte	773	153	161	29.27	30.13	−.02	45.0	+4.6	70	1	55	15	6	35	30	38	33	72	5.45	+1.2	8	3,828	n.	28	nw.	29	12	12	7	4.9	T.	0.0
Hatteras	11	12	50	30.09	30.10	−.04	47.8	+2.0	69	2	54	28	4	42	28	44	41	83	4.84	−0.1	13	10,072	n.	44	n.	5	13	6	12	5.2	T.	0.0
Manteo	12	4	46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Raleigh	376	103	110	29.71	30.13	.00	45.2	+4.8	70	22	55	15	5	35	28	40	36	78	3.14	−0.4	8	5,442	sw.	33	nw.	29	13	6	12	4.9	0.0	0.0
Wilmington	78	81	91	30.04	30.13	−.01	49.2	+3.6	75	2	59	20	6	40	30	42	37	72	3.23	−0.3	10	4,715	n.	29	sw.	23	13	8	10	4.5	T.	0.0
Charleston	48	11	92	30.07	30.12	−.03	51.1	+1.8	70	23	59	22	4	43	34	45	40	75	1.68	−1.8	8	7,037	n.	30	sw.	18	14	6	11	5.0	0.0	0.0
Columbia, S. C.	351	41	57	29.75	30.14	−.01	47.6	+2.5	75	1	58	18	6	37	32	41	37	68	3.81	+0.5	8	4,665	ne.	29	sw.	1	15	7	9	4.5	0.0	0.0
Augusta	180	62	77	29.94	30.14	−.02	47.6	+1.7	73	1	58	16	4	37	32	41	38	73	4.64	+0.5	8	3,807	nw.	22	nw.	3	9	9	13	5.6	0.0	0.0
Savannah	65	150	194	30.06	30.12	−.03	51.9	+2.0	74	1	61	20	4	43	28	45	40	71	1.96	−1.2	6	8,693	ne.	39	nw.	4	14	5	12	5.2	0.0	0.0
Jacksonville	43	200	245	30.07	30.12	−.03	55.3	+1.4	75	21	64	23	4	47	32	49	45	78	1.73	−1.4	7	9,379	nw.	32	s.	23	8	13	10	5.6	0.0	0.0
Greenville, S. C.	1,013	113	122	29.00	30.11	.....	45.1	.....	68	31	55	12	4	35	39	38	31	66	6.53	.....	8	5,163	ne.	38	nw.	29	16	6	9	4.0	T.	0.0
Florida Peninsula.							64.3	−1.1										79	1.42	−1.0										5.7		
Key West	22	10	64	30.04	30.06	−0.04	68.1	−0.7	80	3	73	52	6	64	17	63	60	82	0.74	−1.2	5	8,139	n.	34	nw.	4	11	12	8	4.6	0.0	0.0
Miami	25	71	79	30.05	30.08	.....	65.1	−2.2	78	24	72	37	5	59	23	60	57	80	1.07	−1.4	9	6,695	nw.	26	nw.	5	11	8	12	6.0	0.0	0.0
Tampa	35	79	92	30.07	30.11	−.01	59.7	−0.4	78	23	68	33	6	52	26	53	49	76	2.41	−0.4	6	5,172	nw.	21	sw.	17	5	13	13	6.4	0.0	0.0
East Gulf States.							46.9	−0.4										75	5.68	+0.7										5.2		
Atlanta	1,174	190	216	28.89	30.15	.00	43.8	+1.5	66	1	52	5	4	36	24	38	33	70	5.40	+0.1	8	8,609	nw.	42	nw.	3	16	4	11	4.5	0.3	0.0
Macon	370	78	87	29.74	30.15	−.01	46.2	+0.6	72	1	57	12	4	35	35	40	35	72	5.01	−0.2	9	4,401	nw.	24	s.	1	12	10	9	4.7	0.0	0.0
Thomasville	273	49	58	29.83	30.13	−.03	51.4	+0.4	72	21	61	18	4	42	30	44	39	71	2.32	−1.8	6	3,288	n.	18	sw.	17	12	6	13	5.4	T.	0.0
Pensacola	56	149	185	30.09	30.15	+.01	50.1	−2.2	69	1	57	17	4	43	22	46	42	78	5.94	+1.9	8	9,785	n.	60	s.	16	10	8	13	5.5	T.	0.0
Anniston	741	9	57	29.37	30.18	+.02	42.2	0.0	72	1	53	4	4	31	39	.....	.....	.....	6.36	+1.0	10	3,882	nw.	22	s.	1	12	11	8	4.5	4.4	0.0
Birmingham	700	11	48	29.40	30.19	+.03	43.9	−1.4	71	1	54	4	4	34	39	37	32	70	6.21	+0.9	11	4,208	n.	28	s.	1	14	8	9	4.5	6.4	0.0
Mobile	57	125	161	30.09	30.15	.00	49.6	−0.2	67	1	58	17	4	41	30	44	39	73	6.57	+1.7	10	7,196	n.	34	n.	2	12	6	13	5.6	T.	0.0
Montgomery	223	100	112	29.92	30.18	+.02	47.0	−0.7	76	1	56	13	4	38	29	41	37	75	5.03	−0.1	8	4,448	e.	23	sw.	1	12	8	11	5.1	0.5	0.0
Corinth	469	6	....	.....	.....	.....	42.4	.....	68	30	54	9	3	31	36	.....	.....	.....	5.00	.....	9	.....	s.	.....	.....	.....	7	13	11	.....	0.4	0.0
Jackson	304	5	....	.....	.....	.....	45.2	.....	70	1	56	4	4	34	39	.....	.....	.....	6.16	.....	11	.....	se.	.....	.....	.....	10	12	9	.....	10.0	0.0
Meridian	375	85	93	29.76	30.18	+.02	44.5	−0.5	72	1	55	10	4	34	35	39	35	77	6.31	+0.8	11	3,375	n.	25	ne.	23	13	9	9	5.1	3.8	0.0
Vicksburg	247	65	74	29.90	30.20	+.05	46.4	−0.6	70	1	55	10	4	38	38	41	37	76	5.28	−0.4	11	4,508	se.	29	nw.	1	7	8	16	6.4	10.1	0.0
New Orleans	51	76	84	30.10	30.16	+.03	51.2	−1.8	76	1	58	23	4	45	27	47	45	84	8.03	+3.4	10	4,405	n.	25	nw.	3	9	8	14	6.2	0.0	0.0
West Gulf States.							46.4	+0.3										77	3.68	+0.1										5.4		
Shreveport	249	77	93	29.92	30.20	+.06	46.0	−0.2	66	13	54	16	4	38	30	41	36	75	3.28	−1.1	9	4,732	nw.	27	se.	22	16	2	13	4.9	0.1	0.0
Bentonville	1,302	*11	44	28.75	30.16	+.02	37.4	+3.3	64	19	48	−2	3	27	33	.....	.....	.....	0.68	−2.0	6	3,787	s.	20	s.	12	17	6	8	4.1	2.5	0.0
Fort Smith	457	79	94	29.68	30.17	+.03	41.4	+1.3	66	21	51	7	3	32	32	36	31	72	1.51	−1.0	7	5,167	e.	26	nw.	5	16	5	10	4.2	1.2	0.0
Little Rock	357	139	147	29.78	30.18	+.03	43.2	+2.6	66	20	52	10	4	35	29	38	32	69	2.72	−2.1	6	6,029	nw.	39	nw.	1	11	9	11	5.3	T.	0.0
Brownsville	57	4	26	.....	.....	.....	56.0	.....	79	20	67	24	4	46	40	.....	.....	.....	4.53	.....	14	.....	n.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Corpus Christi	20	69	77	30.16	30.18	+.08	52.2	−1.3	70	1	58	30	4	46	35	48	46	84	3.96	+1.7	14	6,153	nw.	37	se.	1	11	2	18	6.4	0.0	0.0
Dallas	512	109	117	29.61	30.18	.....	44.8	.....	66	21	54	17	3	33	30	.....	.....	.....	1.80	.....	10	5,708	nw.	31	s.	12	9	13	9	5.1	0.2	0.0
Fort Worth	670	106	114	29.44	30.17	+.05	45.8	+1.5	67	21	55	16	3	37	32	42	39	80	3.03	+2.1	8	7,250	nw.	28	nw.	1	11	10	10	5.1	T.	0.0
Galveston	54	106	114	30.12	30.18	+.05	50.6	−2.1	66	14	55	28	4	46	30	47	45	86	6.22	+2.6	10	7,926	n.	37	n.	1	10	3	18	6.2	T.	0.0
Houston	138	111	121	30.02	30.18	.....	50.6	−2.3	73	21	58	24	3	43	27	.....	.....	.....	8.52	.....	11	5,508	nw.	22	nw.	1	9	7	15	5.9	T.	0.0
Palestine	510	64	72	29.64	30.18	+.06	46.9	+0.4	66	21	55	18	4	39	27	42	38	79	2.54	−1.3	7	4,755	s.	20	ne.	15	9	8	14	5.9	0.1	0.0
Port Arthur	34	58	66	30.12	30.16	.....	49.2	.....	68	21	56	22	4	42	29	45	43	85	6.13	.....	10	6,053	n.	32	s.	1	10	9	12	5.6	T.	0.0
San Antonio	701	119	132	29.43	30.18	+.08	49.7	−1.4	71	25	58	24	4	41	29	44	39	71	3.78	+2.1	9	5,525	n.	30	w.	21	9	7	15	5.9	0.0	0.0
Taylor	582	55	63	29.57	30.19	+.08	49.8	−0.7	70	21	56	19	3	38	36	.....	.....	.....	3.07	+0.2	8	6,320	nw.	32	s.	21	10	7	14	5.9	0.0	0.0

TABLE I.—*Climatological data for Weather Bureau stations, January, 1919*—Continued.

Districts and stations.	Elevation of instruments.			Pressure.			Temperature of the air.												Precipitation.			Wind.										
	Barometer above sea level.	Thermometer above ground.	Anemometer above ground.	Station, reduced to mean of 2 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity.	Total.	Departure from normal.	Days with .01, or more.	Total movement.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.	Snow on ground at end of month.
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	In.	In.		Miles								0-10	In.	In.
Ohio Valley and Tennessee.							36.8	+3.8										74	2.66	−1.2										5.4		
Chattanooga	762	189	213	29.36	30.19	+ .03	41.4	+0.8	66	1	50	4	4	32	29	35	29	68	6.13	+0.6	12	5,098	nw.	33	nw.	18	12	9	10	5.0	11.0	0.0
Knoxville	996	102	111	29.07	30.16	+ .01	39.1	+1.6	69	1	48	3	4	30	29	35	30	76	4.67	−0.3	12	3,466	ne.	36	s.	1	10	9	12	5.7	5.4	0.0
Memphis	399	76	97	29.77	30.21	+ .05	43.0	+2.7	65	21	50	11	4	36	21	39	35	77	3.77	−1.4	8	5,711	s.	25	nw.	3	10	6	15	5.9	0.1	0.0
Nashville	546	168	191	29.59	30.19	+ .03	40.1	+2.1	65	30	49	5	4	31	36	35	29	71	4.71	−0.1	8	5,561	nw.	30	s.	1	16	4	11	4.8	0.1	0.0
Lexington	989	193	230	29.06	30.16	+ .03	36.9	+3.9	63	22	45	3	3	29	32	.....	.....	.....	2.48	−1.4	7	9,561	sw.	35	s.	1	13	8	10	5.0	1.7	0.0
Louisville	525	219	255	29.57	30.17	+ .03	38.5	+4.2	63	22	4[illegible]	6	3	31	34	33	28	70	1.63	−2.3	6	7,783	s.	30	w.	28	15	6	10	4.6	T.	0.0
Evansville	431	139	175	29.69	30.17	+ .03	38.5	+6.2	62	22	46	5	4	31	25	34	29	73	1.14	−2.6	10	7,960	sw.	32	sw.	6	12	8	11	5.2	1.0	0.0
Indianapolis	822	194	230	29.21	30.12	.00	34.0	+5.8	59	20	42	−2	4	26	31	30	28	77	0.91	−1.9	4	8,700	sw.	34	w.	1	10	8	13	5.6	0.1	0.0
Terre Haute	575	96	129	29.49	30.12	.....	34.2	.....	58	20	42	−2	4	26	26	30	28	77	0.98	.....	6	6,997	s.	27	sw.	10	8	16	7	5.1	0.7	0.0
Cincinnati	628	11	51	29.44	30.15	+ .03	35.2	+4.9	61	22	44	1	4	26	32	30	26	74	1.44	−1.9	6	5,764	sw.	23	sw.	1	12	8	11	5.2	0.2	0.0
Columbus	824	173	222	29.22	30.12	+ .01	33.1	+4.5	60	22	41	3	4	25	29	30	25	74	1.28	−1.7	5	8,800	w.	38	nw.	9	8	13	10	5.5	0.4	0.0
Dayton	899	181	216	29.11	30.10	.....	34.4	+5.5	60	22	42	1	4	26	30	30	28	77	0.97	−2.0	3	7,707	sw.	33	n.	9	12	12	7	5.1	0.7	0.0
Pittsburgh	842	353	410	29.17	30.11	.00	34.4	+3.7	61	22	42	1	4	26	29	30	25	73	1.42	−1.4	8	8,882	sw.	43	nw.	9	9	4	18	6.1	3.7	0.0
Elkins	1,940	41	50	28.02	30.16	+ .04	31.6	+2.6	61	1	42	−14	5	20	40	27	23	80	4.20	+0.9	12	3,951	w.	26	w.	9	6	10	15	6.5	13.7	0.0
Parkersburg	638	77	84	29.47	30.15	+ .03	35.6	+4.3	63	22	45	5	4	26	30	31	26	73	2.48	−0.7	9	4,148	se.	34	w.	9	12	5	14	5.9	3.4	0.0
Lower Lake Region.							30.4	+6.1										76	1.19	−1.5										6.3		
Buffalo	767	247	280	29.16	30.01	−.06	31.0	+6.3	56	1	37	5	12	25	29	28	24	77	1.28	−2.0	11	16,711	sw.	78	sw.	10	4	8	19	7.5	7.8	T.
Canton	448	10	61	29.47	29.97	.....	22.0	+5.7	51	1	31	−17	10	13	48	.....	.....	.....	1.37	−1.8	13	8,543	sw.	43	w.	10	7	6	18	7.1	10.9	1.2
Oswego	335	76	91	29.62	30.00	−.07	28.7	+4.8	54	1	36	−1	12	22	32	27	24	81	1.29	−1.9	11	9,486	s.	43	w.	10	5	6	20	7.3	15.8	2.0
Rochester	523	97	113	29.43	30.02	−.05	31.0	+7.0	54	21	38	3	12	24	31	27	22	72	0.95	−2.2	8	8,002	sw.	39	w.	10	7	4	20	6.9	6.8	0.3
Syracuse	597	97	113	29.36	30.02	−.05	29.9	+6.9	59	1	38	−1	12	22	34	.....	.....	.....	2.09	0.0	14	9,511	s.	48	nw.	24	7	6	18	7.0	19.0	3.0
Erie	714	130	166	29.25	30.04	−.04	31.9	+5.4	56	21	39	5	4	25	26	29	25	75	1.18	−1.8	10	12,762	sw.	43	sw.	10	8	11	12	6.1	6.2	0.0
Cleveland	762	190	201	29.23	30.08	−.01	32.6	+6.4	56	20	39	5	4	26	27	29	25	75	0.63	−1.8	8	11,306	sw.	48	nw.	9	10	9	12	5.9	1.3	0.0
Sandusky	629	62	103	29.36	30.07	−.02	32.7	+6.4	58	21	40	4	4	26	27	.....	.....	.....	0.74	−1.4	8	10,624	sw.	44	nw.	9	8	10	13	6.2	0.7	0.0
Toledo	628	208	243	29.37	30.08	−.01	32.6	+7.0	57	21	40	3	3	25	27	29	24	73	0.77	−1.2	5	11,892	sw.	52	sw.	10	12	8	11	4.9	0.5	0.0
Fort Wayne	856	113	124	29.15	30.10	.....	31.4	+4.5	57	21	39	−4	4	24	33	28	24	76	0.72	.....	5	8,151	sw.	36	sw.	10	10	12	9	5.3	0.4	0.0
Detroit	730	218	245	29.24	30.05	−.03	31.0	+6.7	51	21	38	4	4	24	25	28	25	79	0.91	−1.1	6	9,899	w.	54	w.	10	9	11	11	5.5	1.7	0.0
Upper Lake Region.							25.8	+7.5										82	0.83	−1.3										6.8		
Alpena	609	13	92	29.28	29.97	−.07	25.0	+6.3	42	16	31	−5	5	19	25	23	20	83	0.63	−1.6	9	8,940	w.	42	nw.	9	6	5	20	7.2	5.7	T.
Escanaba	612	54	60	29.29	29.98	−.07	23.4	+8.9	40	25	29	−4	4	18	25	22	20	86	0.69	−0.9	11	6,899	nw.	35	nw.	8	8	10	13	6.2	7.9	T.
Grand Haven	632	54	92	29.32	30.02	−.05	30.0	+5.5	46	21	35	4	3	25	30	28	25	82	1.62	−1.2	13	10,593	w.	42	nw.	9	6	8	17	6.8	16.4	0.0
Grand Rapids	707	70	87	29.24	30.04	−.02	30.0	+6.2	51	21	36	0	3	24	27	27	24	83	0.30	−2.5	10	5,335	sw.	25	nw.	9	6	8	17	7.1	4.6	0.0
Houghton	684	62	99	29.19	29.94	−.11	23.3	+8.8	45	15	29	2	4	18	28	.....	.....	.....	1.13	−0.9	15	7,793	w.	45	nw.	8	3	7	21	8.3	11.3	4.8
Lansing	878	11	62	29.07	30.04	.....	28.5	+6.5	52	21	35	−2	3	22	23	25	22	82	0.36	−1.7	10	5,867	sw.	26	w.	10	7	9	15	6.3	1.3	0.0
Ludington	637	60	66	29.29	30.01	.....	29.0	.....	45	21	34	2	5	24	29	27	25	84	1.06	.....	13	9,404	w.	50	sw.	8	5	7	19	7.5	15.5	0.0
Marquette	734	77	111	29.14	29.97	−.07	24.6	+8.7	45	20	30	3	4	19	23	23	20	83	2.21	+0.2	14	8,103	w.	40	nw.	8	1	10	20	7.9	25.3	8.6
Port Huron	638	70	120	29.30	30.02	−.04	29.4	+7.6	51	21	36	5	9	23	29	27	24	84	0.85	−1.0	6	9,456	w.	46	nw.	9	4	16	11	6.5	1.6	T.
Saginaw	641	48	82	29.30	30.01	.....	28.2	.....	46	27	34	−1	5	22	22	25	23	83	0.29	−2.0	5	8,406	sw.	40	nw.	9	7	10	14	6.4	1.0	0.0
Sault Ste. Marie	614	11	61	29.25	29.97	−.06	20.4	+7.1	38	22	27	−13	4	14	33	19	16	84	1.05	−1.1	16	7,334	se.	44	nw.	10	2	6	23	8.4	12.4	5.0
Chicago	823	140	310	29.18	30.07	−.03	31.0	+7.3	52	20	37	−11	4	25	26	28	23	70	0.20	−1.8	2	10,352	w.	38	sw.	10	11	10	10	5.2	2.0	0.0
Green Bay	617	109	144	29.31	30.00	−.06	23.8	+9.2	44	27	30	−18	4	17	28	22	18	78	0.67	−1.0	7	8,689	sw.	40	nw.	9	11	6	14	6.5	8.5	0.0
Milwaukee	681	119	133	29.27	30.03	−.05	27.5	+7.7	51	27	34	−14	4	21	22	25	22	83	0.15	−1.9	2	7,984	w.	35	sw.	8	11	7	13	5.7	4.3	0.0
Duluth	1,133	11	47	28.71	29.99	−.10	17.8	+7.4	39	8	24	−22	3	11	35	16	14	90	0.46	−0.5	4	10,412	sw.	51	w.	8	11	8	12	5.6	5.9	4.1
North Dakota.							19.7	+15.7										80	0.15	−0.4										5.1		
Moorhead	940	8	57	28.98	30.05	−.09	15.7	+13.0	41	17	24	−35	3	7	31	15	11	84	0.21	−0.5	5	6,499	nw.	28	nw.	8	15	9	7	4.4	2.1	0.6
Bismarck	1,674	8	57	28.19	30.05	−.08	24.4	+17.7	52	19	36	−35	1	13	59	21	18	79	0.09	−0.4	4	7,283	nw.	40	nw.	4	11	14	6	5.0	0.9	T.
Devils Lake	1,482	11	44	28.34	29.98	−.14	14.4	+14.1	44	19	24	−34	3	5	43	13	11	80	0.22	−0.4	4	7,877	w.	33	nw.	27	13	6	12	5.1	2.9	3.0
Ellendale	1,457	10	56	28.41	30.03	.....	20.8	.....	48	29	31	−33	3	11	44	18	16	86	0.06	.....	3	10,577	nw.	52	nw.	16	10	10	11	5.1	0.6	T.
Grand Forks	835	12	89	.....	.....	.....	12.1	.....	38	17	22	−36	1	2	37	12	.....	.....	0.45	.....	4	.....	w.	30	nw.	8	15	6	10	.....	5.2	4.7
Williston	1,872	41	48	27.93	29.97	−.14	24.4	+17.9	51	23	34	−30	2	15	56	21	16	70	0.07	−0.5	4	6,200	sw.	42	nw.	3	8	14	9	5.8	0.6	T.
Upper Mississippi Valley.							29.2	+7.7										79	0.25	−1.5										4.7		
Minneapolis	918	10	208	28.98	30.00	.....	22.2	.....	45	29	30	−23	3	15	37	.....	.....	.....	0.43	−0.3	6	8,147	w.	40	nw.	8	10	12	9	5.4	4.6	T.
St. Paul	837	201	236	29.08	30.02	−.09	21.8	+10.2	44	29	30	−23	3	14	40	.....	.....	.....	0.44	−0.5	6	8,704	sw.	42	nw.	8	9	13	9	5.1	6.2	T.
La Crosse	714	11	48	29.24	30.04	−.07	24.2	+9.0	52	27	32	−26	4	16	38	.....	.....	.....	0.31	−0.8	3	3,972	w.	24	nw.	8	12	4	15	5.8	10.0	0.0
Madison	974	70	78	28.96	30.06	−.04	24.1	+7.6	48	27	31	−23	4	17	28	22	19	82	0.26	−1.3	4	6,911	w.	31	sw.	10	9	6	16	6.4	4.3	0.0
Wausau	1,247	4	.....	28.61	29.99	.....	21.3	.....	46	27	28	−21	4	14	29	.....	.....	.....	0.31	.....	8	.....	nw.	.....	.....	.....	13	1	17	5.6	4.1	T.
Charles City	1,015	10	49	28.94	30.07	−.07	24.0	+12.6	51	24	33	−23	3	15	38	21	19	87	0.22	−0.8	4	4,690	nw.	22	nw.	25	10	15	6	4.9	5.8	0.0
Davenport	606	71	79	29.41	30.10	−.02	27.8	+7.0	56	24	36	−16	4	20	30	25	22	84	0.07	−1.5	3	5,447	w.	23	w.	7	14	10	7	4.4	2.0	0.0
Des Moines	861	84	97	29.14	30.09	−.05	29.8	+9.4	62	29	39	−17	3	21	37	26	22	80	0.08	−1.1	3	5,192	nw.	24	nw.	7	15	8	8	4.0	2.5	0.0
Dubuque	698	81	96	29.31	30.09	−.03	25.9	+7.6	51	24	34	−23	4	18	33	23	20	82	0.17	−1.3	4	4,472	nw.	23	nw.	8	9	12	10	5.2	2.3	0.0
Keokuk	614	64	78	29.43	30.14	.00	30.7	+7.0	60	24	40	−18	3	22	32	27	22	75	0.01	−1.7	1	5,325	sw.	24	s.	8	20	9	2	2.6	0.1	0.0
Cairo	356	87	93	29.76	30.16	.00	39.4	+4.6	63	20	47	4	4	32	24	34	29	72	1.15	−2.7	8	5,570	s.	28	n.	9	13	5	13	5.4	0.7	0.0
Peoria	609	11	45	29.43	30.12	.00	29.2	+6.1	55	24	38	−14	3	20	27	26	23	86	0.07	−2.1	3	5,149	w.	22	sw.	16	18	6	7	3.8	0.3	0.0
Springfield, Ill	644	10	91	29.41	30.11	−.02	32.8	+6.5	55	20	41	−8	3	25	27	29	25	77	0.09	−2.2	3	6,206	w.	23	sw.	10	11	10	10	4.9	0.9	0.0
Hannibal	534	74	109	29.53	30.12	−.01	32.3	+5.6	61	29	42	−12	3	23	33	.....	.....	.....	0.02	−2.2	1	6,186	sw.	28	sw.	10	18	7	6	3.5	0.6	0.0
St. Louis	567	265	303	29.51	30.13	−.01	37.8	+6.8	62	20	46	−3	3	30	31	33	26	66	0.13	−2.1	5	9,400	nw.	37	s.	10	19	10	2	2.9	0.7	0.0
Missouri Valley.							31.7	+10.7										75	0.11	−0.9										3.6		
Columbia, Mo.	781	11	84	29.28	30.14	+ .01	34.2	+7.0	63	24	43	−11	3	25	33	.....	.....	.....	0.07	−2.2	1	5,530	sw.	26	nw.	7	20	6	5	3.0	0.9	0.0
Kansas City	963	161	181	29.07	30.14	− .01	34.4	+8.2	63	29	42	−13	3	26	30	30	25	71	0.07	−1.1	1	7,825	s.	31	n.	4	23	1	7	2.8	1.0	0.0
St. Joseph	967	11	49	29.05	30.12	.....	31.8	.....	61	29	41	−16	3	23	27	28	24	77	0.03	.....	1	5,490	sw.	29	nw.	7	20	5	6	3.0	0.3	0.0
Springfield, Mo.	1,324	98	104	28.71	30.16	+ .02	36.6	+5.3	62	19	45	−6	3	28	27	31	27	73	0.34	−2.3	5	6,611	s.	23	nw.	7	18	6	7	3.8	3.6	0.0
Iola	984	11	50	29.07	30.16	+ .02	33.6	+6.0	64	29	43	−10	3	24	33	.....	.....	.....	0.02	−1.0	1	4,308	s.	19	s.	24	22	3	6	3.3	0.2	0.0
Topeka	983	85	101	.....	.....	.....	32.6	+7.0	65	29	42	−15	3	23	32	.....	.....	.....	0.06	−0.9	1	6,443	sw.	30	nw.	4	21	5	5	2.9	1.0	0.0
Drexel	1,299	10	54	28.64	30.07	.....	29.6	.....	61	29	40	−20	3	20	33	26	23	83	0.12	.....	2	7,928	nw.	27	nw.	7	18	7	6	3.9	2.2	0.0
Lincoln	1,189	11	84	28.79	30.10	− .05	32.9	+11.7	66	29	43	−16	3	23	33	28	23	74	0.03	−0.6	1	4,647	sw.	33	n.	4	16	10	5	4.0	0.5	0.0
Omaha	1,105	115	122	28.88	30.10	− .05	31.9	+11.4	62	29	40	−18	3	23	29	28	23	74	0.10	−0.6	2	5,216	nw.	35	nw.	4	15	8	8	4.1	2.9	0.0
Valentine	2,598	47	54	27.29	30.10	− .02	30.2	+12.0	58	29	43	−21	3	18	51	25	21	74	0.06	−0.5	2	6,906	w.	36	nw.	4	20	7	4	3.4	0.7	0.0
Sioux City	1,135	94	164	28.82	30.08	− .07	29.2	+13.6	58	29	38	−22	3	20	31	25	20	74	0.26	−0.3	3	8,153	nw.	42	nw.	4	15	8	8	3.9	4.8	0.0
Huron	1,306	59	74	28.63	30.08	− .08	25.6	+16.1	55	29	35	−27	3	16	36	23	19	80	0.11	−0.4	2	7,579	nw.	40	n.	4	17	7	7	3.9	1.1	0.0
Pierre	1,572	70	75	28.34	30.06	− .07	29.7	+15.8	60	29	41	−23	3	19	54	26	20	71	0.04	−0.4	1	5,028	nw.	40	nw.	4	17	8	6	3.7	0.4	0.0
Yankton	1,233	49	57	28.70	30.07	− .09	29.4	+13.9	58	29	40	−22	3	19	31	.....	.....	.....	0.15	−0.4	3	5,549	nw.	36	nw.	4	11	14	6	4.8	3.3	0.0

TABLE I.—*Climatological data for Weather Bureau Stations, January, 1919*—Continued.

Districts and stations.	Elevation of instruments.			Pressure.			Temperature of the air.													Precipitation.			Wind.										
	Barometer above sea level.	Thermometer above ground.	Anemometer above ground.	Station, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity.	Total.	Departure from normal.	Days with .01, or more.	Total movement.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.	Snow on ground at end of month.
	Ft.	Ft.	Ft.	In.	In.	In.	°F.	°F.	°F		°F	°F.		°F	°F.	°F.	°F.	%	In.	In.		Miles								0–10	In.	In.
Northern Slope.							**29.5**	**+10.5**										**65**	**0.25**	**−0.6**										**4.3**		
Billings	3,140	5					34.7		67	23	48	− 5	2	21	44				0.04		1		sw.				16	14	1		0.5	0.0
Havre	2,505	11	44	27.29	29.98	− .12	34.1	+20.6	61	23	44	−14	1	24	37	29	23	66	0.40	−0.3	4	8,680	sw.	43	w.	15	13	13	5	4.4	1.4	0.0
Helena	4,110	87	114	25.81	30.12	− .03	32.4	+12.4	57	18	41	− 3	1	24	32	26	17	52	0.14	−0.8	7	6,682	sw.	40	sw.	19	9	8	14	6.0	1.4	0.0
Kalispell	2,962	11	34	26.97	30.13	+ .01	26.8	+ 7.2	54	18	34	− 6	1	19	30	24	22	82	0.72	−0.9	9	3,127	nw.	37	sw.	15	5	7	19	7.5	3.9	0.0
Miles City	2,371	26	48	27.46	30.09	− .03	32.6	+18.1	64	23	44	−22	2	21	47	27	24	80	0.02	−0.6	2	4,386	se.	28	nw.	6	13	17	1	3.3	0.4	0.0
Rapid City	3,259	50	58	26.60	30.10	.00	34.9	+13.4	64	17	48	−13	2	22	51	26	15	49	0.04	−0.4	1	6,495	w.	44	nw.	4	19	9	3	3.5	0.4	0.0
Cheyenne	6,088	84	101	24.00	30.12	+ .07	31.8	+ 6.2	60	10	42	− 2	1	21	34	24	13	47	T.	−0.4	0	13,116	w.	58	w.	17	16	11	4	3.8	T.	T.
Lander	5,372	60	68	24.69	30.27	+ .15	22.2	+ 4.8	55	23	38	−18	2	7	43	17	10	64	0.00	−0.4	0	2,302	sw.	30	nw.	15	16	11	4	3.9	0.0	T.
Sheridan	3,790	10	47	26.10	30.14		28.0		62	23	43	−15	2	13	41	22	15	66	0.33		4	3,299	nw.	34	nw.	23	16	10	5	3.4	7.4	0.0
Yellowstone Park	6,200	11	48	23.94	30.30	+ .16	22.2	+ 4.6	40	19	31	− 5	1	13	33	18	13	71	0.88	−1.4	13	6,705	s.	40	s.	16	11	9	11	4.8	10.0	1.6
North Platte	2,821	11	51	27.14	30.18	+ .06	28.6	+ 7.2	62	29	41	−17	3	16	45	23	19	75	0.03	−0.4	2	4,324	w.	33	w.	4	25	3	3	2.1	0.6	0.0
Middle Slope.							**33.4**	**+ 4.4**										**72**	**0.09**	**−0.6**										**2.5**		
Denver	5,292	106	113	24.75	30.15	+ .10	34.2	+ 5.1	58	23	46	−12	1	23	33	27	20	59	0.12	−0.3	1	6,054	s.	28	w.	5	18	10	3	3.2	1.8	0.0
Pueblo	4,685	80	86	25.35	30.19	+ .14	30.8	+ 1.7	64	23	45	−20	1	17	44	24	19	69	0.03	−0.3	1	3,646	nw.	27	w.	24	19	6	6	3.2	0.4	0.0
Concordia	1,392	50	58	28.62	30.14	.00	33.6	+ 9.2	60	29	43	−14	3	24	30	29	25	79	0.02	−0.7	2	5,235	sw.	36	nw.	4	19	9	3	3.3	0.3	0.0
Dodge City	2,500	11	51	27.47	30.18	+ .07	31.0	+ 3.7	60	29	42	− 7	1	20	33	24	16	61	0.06	−0.4	1	5,740	w.	28	nw.	4	26	4	1	1.2	0.6	0.0
Wichita	1,358	139	158	28.67	30.16	+ .03	32.4	+ 2.7	63	29	41	−12	3	24	31	29	26	83	T.	−0.8	0	7,953	sw.	42	sw.	24	24	5	2	1.9	T.	0.0
Altus	1,410	5					40.0		69	24	52	8	1	28	36				0.25		3		n.				25	0	6		0.0	0.0
Muskogee	652	4					39.8		66	29	50	3	3	30	34				0.48		3		se.				20	7	4		1.1	0.0
Oklahoma	1,214	10	47	28.86	30.19	+ .08	38.4	+ 3.7	65	31	48	1	3	28	30	33	29	78	0.29	−1.0	4	8,518	s.	28	s.	12	22	8	1	2.4	0.2	0.0
Southern Slope.							**38.2**	**− 3.3**										**72**	**0.89**	**+0.2**										**3.9**		
Abilene	1,738	10	52	28.33	30.19	+ .10	41.6	− 1.0	69	12	51	18	1	32	34	36	31	74	2.96	+2.1	7	6,441	s.	29	ne.	25	13	6	12	5.0	9.0	0.0
Amarillo	3,676	10	49	26.35	30.23	+ .17	28.7	− 5.2	48	20	38	− 8	1	20	30	24	20	77	T.	−0.6	0	6,632	nw.	24	s.	11	24	4	3	2.5	T.	0.0
Del Rio	944	64	71	29.16	30.18	+ .12	47.7	− 2.5	68	13	57	23	4	38	31				0.58	−0.2	5	6,355	nw.	33	nw.	16	13	10	8	4.6	0.0	0.0
Roswell	3,566	75	85	26.47	30.20	+ .16	34.5	− 4.7	66	31	48	− 2	1	22	43	28	21	64	0.02	−0.5	1	4,148	n.	26	nw.	2	24	5	2	2.1	T.	0.0
Southern Plateau.							**39.2**	**− 1.6**										**45**	**0.13**	**−0.6**										**2.1**		
El Paso	3,762	110	133	26.29	30.14	+ .13	40.7	− 3.4	66	31	53	16	3	28	35	32	21	49	0.08	−0.4	1	6,714	nw.	42	ne.	13	24	5	2	2.1	0.3	0.0
Santa Fe	7,013	57	66	23.25	30.23	+ .19	24.4	− 4.1	46	10	34	−10	2	14	26	19	14	69	0.12	−0.5	2	5,711	ne.	26	n.	8	21	10	0	2.1	1.7	T.
Flagstaff	6,908	8	57	23.39	30.19	+ .14	22.2	− 4.5	49	24	36	−21	2	8	49	18			0.94		3		e.	34	se.	3	28	0	3		5.7	5.0
Phoenix	1,108	76	81	28.92	30.10	+ .07	50.8	+ 0.8	74	24	66	23	2	36	40	39	25	42	0.22	−1.0	1	4,133	e.	29	ne.	28	23	6	2	2.1	0.0	0.0
Yuma	141	9	54	29.94	30.10	+ .05	55.0	+ 0.3	75	23	60	28	1	41	36	42	23	32	0.24	−0.2	1	4,933	n.	28	n.	21	26	3	2	1.3	0.0	0.0
Independence	3,910	11	42	26.11	30.22	+ .15	42.0	+ 1.5	66	22	56	16	1	28	37	31	14	35	0.00	−0.9	0	3,999	nw.	24	nw.	1	19	8	4	2.9	0.0	0.0
Needles	488	4		29.61	30.13		51.4		73	23	64	23	1	39	37				0.18		1						18	3	10			
Middle Plateau.							**28.1**	**−0.4**										**65**	**0.16**	**−0.9**										**3.4**		
Reno	4,532	74	81	25.59	30.25	+.12	33.7	+1.2	53	18	46	6	1	21	35	28	20	59	0.42	−1.5	3	3,659	w.	39	w.	23	19	4	8	3.4	3.6	0.0
Tonopah	6,090	12	20	21.15	30.22		33.2		52	23	40	5	1	26	18	27	19	58	0.10	−0.6	1	6,063	se.	27	nw.	21	23	7	1	2.1	T.	T.
Winnemucca	4,344	18	53	25.77	30.29	+.13	29.2	+0.4	56	23	43	−15	1	16	43	24	20	72	0.10	−0.9	3	5,005	ne.	39	sw.	23	19	0	12	4.2	0.3	0.0
Modena	5,479	10	43	24.73	30.27	+.17	25.6	−1.9	54	17	40	−18	1	11	37	20	13	65	0.32	−0.4	2	5,171	w.	31	nw.	20	20	7	4	2.8	1.3	0.2
Salt Lake City	4,360	163	203	25.78	30.28	+.13	32.0	+3.2	55	19	40	8	1	24	23	26	19	59	T.	−1.4	0	3,490	se.	23	se.	31	13	8	10	4.7	0.1	0.0
Grand Junction	4,602	82	96	25.60	30.36	+.30	19.6	−5.1	45	31	33	−15	2	7	31	15	12	79	0.05	−0.4	1	2,614	se.	17	se.	28	19	9	3	2.9	0.6	0.0
Northern Plateau.							**32.4**	**+3.6**										**71**	**1.19**	**−0.4**										**5.8**		
Baker	3,471	48	53	26.56	30.24	+.08	29.6	+5.7	52	17	38	− 5	1	21	27	26	22	73	0.62	−0.7	9	5,901	se.	29	sw.	17	11	7	13	5.1	0.3	T.
Boise	2,739	78	86	27.36	30.31	+.12	32.8	+3.5	59	23	41	0	1	24	29	29	22	0.65	0.85	−1.0	7	3,851	se.	25	w.	23	14	7	10	5.1	0.4	0.0
Lewiston	757	40	48	29.34	30.18	+.02	35.8	+1.3	61	17	45	5	1	27	30				1.27	−0.3	9	2,968	e.	34	nw.	23	8	9	14	6.4	0.8	T.
Pocatello	4,477	60	68	25.62	30.30	+.10	27.4	+2.3	51	19	38	− 2	1	17	32	23	19	72	0.19	−0.5	5	6,407	se.	33	sw.	23	13	9	9	4.6	0.3	0.0
Spokane	1,929	101	110	28.04	30.15	+.03	31.8	+5.1	58	22	38	0	1	25	22	29	26	78	2.11	−0.2	11	4,808	s.	40	sw.	23	1	11	19	7.7	3.2	0.0
Walla Walla	991	57	65	29.06	30.17	+.02	36.8	+3.8	63	18	44	9	9	29	28	33	27	69	2.12	+0.1	11	4,428	s.	38	w.	23	11	8	12	5.8	4.0	T.
North Pacific Coast Region.							**42.4**	**+2.4**										**84**	**8.72**	**+2.0**										**7.8**		
North Head	211	11	56	29.80	30.03	−.02	44.8	+3.0	60	8	48	32	6	41	14	43	41	87	9.46	+2.8	18	15,676	se.	88	se.	14	7	2	22	7.4	T.	0.0
North Yakima	1,071	4																															
Port Angeles	29	8	53	30.03	30.06		40.5		56	16	45	28	1	35	19				7.00	+1.6	17	4,167	s.	38	sw.	14	1	5	25	8.7	T.	0.0
Seattle	125	215	250	29.94	30.08	+.03	41.4	+2.1	56	13	46	27	4	36	17	40	37	84	7.95	+3.4	16	7,326	se.	52	sw.	23	1	5	25	8.6	0.0	0.0
Tacoma	213	113	120	29.84	30.07	+.03	40.8	+2.7	57	17	46	25	3	35	19	39	37	85	9.81	+4.0	17	4,035	s.	36	sw.	14	0	8	23	8.6	0.0	0.0
Tatoosh Island	86	7	57	29.87	29.97	−.01	44.0	+2.8	60	9	48	36	1	40	17	42	39	83	10.30	−1.9	21	15,939	e.	91	s.	14	3	6	22	8.0	0.1	0.0
Medford	1,425	4																															
Portland, Oreg.	153	68	106	29.93	30.09	+.01	42.2	+3.1	61	18	48	23	4	37	19	40	36	79	9.08	+2.6	17	5,099	s.	34	w.	23	9	5	17	6.5	0.0	0.0
Roseburg	510	9	57	29.58	30.14	+.04	41.3	+0.5	68	22	48	18	1	35	24	39	36	84	7.33	+1.6	16	2,373	s.	33	sw.	23	4	14	13	6.6	0.0	0.0
Middle Pacific Coast Region.							**48.4**	**+1.1**										**75**	**3.25**	**−1.5**										**4.4**		
Eureka	62	73	89	30.08	30.15	+.05	49.0	+2.1	70	9	55	31	1	43	24	47	44	85	7.84	+0.2	17	5,536	se.	43	sw.	15	9	6	16	6.4	0.0	0.0
Mount Tamalpais	2,375	11	18	27.66	30.17	+.06	46.3	+0.4	62	28	52	30	31	41	22	40	32	66	3.54	−2.4	10	13,448	nw.	62	s.	19	14	8	9	4.5	0.0	0.0
Point Reyes Light	490	7	18	29.59	30.11		51.5	+2.1	68	8	56	40	1	47	21				2.78		11	12,898	se.	80	nw.	31	15	6	10	4.6	0.0	0.0
Red Bluff	332	50	58	29.81	30.18	+.06	47.0	+1.6	70	4	57	24	1	37	40	42	36	70	2.74	−1.9	8	4,162	nw.	27	n.	31	14	4	13	4.7	0.0	0.0
Sacramento	69	106	117	30.12	30.19	+.07	46.2	+0.6	60	27	55	24	1	37	28	44	40	80	1.77	−1.9	7	4,331	se.	24	sw.	19	17	5	9	4.1	0.0	0.0
San Francisco	155	209	213	30.00	30.17	+.06	51.2	+1.7	63	29	58	37	1	44	18	47	42	73	2.57	−1.8	7	3,925	n.	26	sw.	20	19	3	9	3.6	0.0	0.0
San Jose	141	12	110	30.02	30.17		47.6	−0.7	67	27	61	22	1	34	37				1.06	−1.8	4	3,668	se.	24	se.	19	21	5	5	2.8	0.0	0.0
South Pacific Coast Region.							**54.6**	**+3.8**										**58**	**0.87**	**−1.0**										**3.0**		
Fresno	327	89	98	29.83	30.20	+.10	48.2	+2.8	66	15	60	26	1	37	34	42	36	66	0.40	−1.2	5	3,443	nw.	23	nw.	25	19	8	4	2.8	0.0	0.0
Los Angeles	338	159	191	29.72	30.09	+.01	60.2	+7.1	79	24	71	36	2	50	34	48	35	46	0.96	−1.9	4	4,503	ne.	28	nw.	25	19	5	7	3.2	0.0	0.0
San Diego	87	62	70	29.98	30.08	+.01	56.6	+2.6	77	9	66	35	1	47	30	48	40	60	0.61	−1.4	3	3,371	nw.	25	w.	31	20	6	5	2.8	0.0	0.0
San Luis Obispo	201	32	40	29.93	30.15	+.06	53.6	+2.6	78	28	67	27	2	40	45	45	36	59	1.51	−3.2	6	2,770	n.	22	ne.	13	19	6	6	3.4	0.0	0.0
West Indies.																																	
San Juan, P. R.	82	8	54	29.91	30.00	−.02	74.6		85	9	80	64	3	69	17				1.87	−2.8	17	7,284	se.	40	ne.	1	21	7	3	3.3	0.0	0.0
Panama Canal.																																	
Balboa Heights	118	7	97	29.72	29.84	−.02	79.8	−0.3	90	2	88	70	6	72	19	72	71	78	0.28	−0.7	7	8,573	n.	32	nw.	10	8	22	1	4.5		
Colon	36	30	97	29.82	29.86	−.02	79.6	0.0	84	8	82	74	12	77	9	75	73	80	1.82	−2.0	20	11,359	n.	32	n.	12	3	20	8	5.8		
Alaska.																																	
Juneau	80	11	49				32.0		46	10	36	14	19	28	12	30	27	82	11.41		26	3,999	se.	23	se.	13	5	2	24	8.1	26.5	10.6

TABLE II.—*Accumulated amounts of precipitation for each 5 minutes, for the principal storms in which the rate of fall equaled or exceeded 0.25 inch in any 5 minutes, or 0.80 in 1 hour, during January 1919, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive rate began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Abilene, Tex	21-22			1.36														0.23			
Albany, N. Y	23			0.47														0.17			
Alpena, Mich	7			0.20														*			
Anniston, Ala	23			1.05														0.28			
Asheville, N. C	23			1.05														0.27			
Atlanta, Ga	17			1.55														0.29			
Atlantic City, N. J	23			1.85														0.64			
Augusta, Ga	17			1.50														0.28			
Baker, Oreg	21-22			0.26														*			
Baltimore, Md	23			1.04														0.24			
Bentonville, Ark	14			0.22														0.07			
Binghamton, N. Y	1			0.38														0.09			
Birmingham, Ala	23			1.12														0.34			
Bismarck, N. Dak	3-4			0.05														*			
Block Island, R. I	23-24			0.98														0.39			
Boise, Idaho	21			0.42														0.09			
Boston, Mass	24			1.15														0.57			
Buffalo, N. Y	3			0.38														*			
Burlington, Vt	23-24			0.51														*			
Cairo, Ill	22			0.39														0.16			
Canton, N. Y	8-9			0.29														*			
Charles City, Iowa	1			0.15														*			
Charleston, S. C	8			0.41														0.13			
Charlotte, N. C	23			1.20														0.31			
Chattanooga, Tenn	23			0.91														0.35			
Cheyenne, Wyo	27			T.														T.			
Chicago, Ill	5-6			0.14														*			
Cincinnati, Ohio	1			0.80														0.29			
Cleveland, Ohio	1			0.27														*			
Columbia, Mo	4			0.07														*			
Columbia, S. C	25			1.19														0.35			
Columbus, Ohio	1			0.71														*			
Concord, N. H	23-24			1.80														*			
Concordia, Kans	3-4			0.02														*			
Corpus Christi, Tex	7			1.20														0.66			
Dallas, Tex	22			0.27														0.22			
Davenport, Iowa	1			0.01														*			
Dayton, Ohio	1			0.50														0.19			
Del Rio, Tex	21			0.16														0.15			
Denver, Colo	13			0.12														*			
Des Moines, Iowa	4-5			0.02														*			
Detroit, Mich	23			0.54														*			
Devils Lake, N. Dak	6			0.15														*			
Dodge City, Kans	13			0.06														*			
Drexel, Nebr	3-4			0.12														*			
Dubuque, Iowa	1			0.11														*			
Duluth, Minn	22			0.27														*			
Eastport, Me	3			0.86														*			
Elkins, W. Va	1			1.47														0.18			
Ellendale, N. Dak	3-4			0.05														*			
El Paso, Tex	14			0.08														*			
Erie, Pa	1			0.38														*			
Escanaba, Mich	1			0.15														*			
Eureka, Calif	17			1.52														0.37			
Evansville, Ind	1			0.41														0.12			
Flagstaff, Ariz	31			0.87														*			
Fort Smith, Ark	22			0.48														0.28			
Fort Wayne, Ind	22-23			0.55														*			
Fort Worth, Tex	22			0.86														0.56			
Fresno, Calif	19			0.34														0.19			
Galveston, Tex	15-16	6:05 p. m.	7:30 a. m.	2.26	9.30 p. m.	10:31 p. m.	0.25	0.09	0.15	0.27	0.48	0.56	0.63	0.70	0.75	0.79	0.86	0.98			
Grand Haven, Mich	1			0.39														*			
Grand Junction, Colo	12			0.05														*			
Grand Rapids, Mich	25			0.04														0.04			
Green Bay, Wis	1			0.26														*			
Greenville, S. C	23			1.75														0.44			
Hannibal, Mo	5			0.02														*			
Harrisburg, Pa	2-3			1.08														*			
Hartford, Conn	23-24			0.70														0.18			
Hatteras, N. C	17			1.26														0.41			
Havre, Mont	11			0.18														*			
Helena, Mont	23			0.05														*			
Houghton, Mich	1-2			0.35														*			
Houston, Tex	22	6:45 a. m.	4:25 p. m.	1.87	8:37 a. m.	9:27 a. m.	0.18	0.09	0.24	0.34	0.37	0.40	0.46	0.60	0.72	0.83	0.96				
Huron, S. Dak	3-4			0.11														*			
Independence, Cal																					
Indianapolis, Ind	23			0.61														0.15			
Iola, Kans	4			0.02														*			
Jacksonville, Fla	17			0.52														0.38			
Kalispell, Mont	20			0.34														*			
Kansas City, Mo	4			0.07														*			
Keokuk, Iowa	5			0.01														*			
Key West, Fla	17			0.31														0.30			
Knoxville, Tenn	1			1.91														0.26			
La Crosse, Wis	7			0.12														*			
Lander, Wyo																					
Lansing, Mich	22-23			0.19														*			
Lewiston, Idaho	22			0.41														0.17			
Lexington, Ky	1			1.37														0.23			
Lincoln, Nebr	3			0.03														*			
Little Rock, Ark	22			0.69														0.16			
Los Angeles, Cal	31			0.84														0.28			
Louisville, Ky	23			0.83														0.17			
Ludington, Mich	3			0.24														*			
Lynchburg, Va	2			1.80														0.20			
Macon, Ga	25			1.45														0.31			
Madison, Wis	1			0.18														*			
Marquette, Mich	3			0.56														*			
Memphis, Tenn	17			0.97														0.17			
Meridian, Miss	2			1.87														0.22			

* Self register not in use.

TABLE II.—*Accumulated amounts of precipitation for each 5 minutes, for the principal storms in which the rate of fall equaled or exceeded 0.25 inch in any 5 minutes, or 0.80 in 1 hour, during January, 1919, at all stations furnished with self-registering gages*—Continued.

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive rate began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Miami, Fla	17			0.32														0.30			
Milwaukee, Wis	11			0.12														*			
Minneapolis, Minn	6-7			0.17														*			
Mobile, Ala	16-17	4:45 p. m.	D.N.A.M.	1.61	8:58 p. m.	9:23 p. m.	0.50	0.21	0.37	0.55	0.66	0.73									
Modena, Utah	31			0.30														*			
Montgomery, Ala	25			1.96														0.49			
Moorhead, Minn	6			0.08														*			
Mount Tamalpais, Cal	19			1.90														0.28			
Nantucket, Mass	3			1.79														0.23			
Nashville, Tenn	1			3.01														0.56			
New Haven, Conn	23-24			0.80														0.23			
New Orleans, La	25			2.20														0.53			
New York, N. Y	23			1.26														0.28			
Norfolk, Va	26			0.73														0.25			
Northfield, Vt	23-24			0.47														*			
North Head, Wash	22			2.41														0.34			
North Platte, Nebr	1			0.02														*			
Oklahoma, Okla	26			0.12														0.08			
Omaha, Nebr	3-4			0.10														*			
Oswego, N. Y	23			0.34														*			
Palestine	22			0.32														0.23			
Parkersburg, W. Va	1			1.43														0.27			
Pensacola, Fla	25	4:10 a. m.	1:10 p. m.	2.29	11:18 a. m.	12 noon	1.22	0.06	0.21	0.35	0.37	0.52	0.65	0.79	0.89	0.93					
Peoria, Ill	22			0.03														0.02			
Philadelphia, Pa	23			1.17														0.24			
Phoenix, Ariz	31			0.22														0.06			
Pierre, S. Dak	3			0.04														*			
Pittsburgh, Pa	23			0.41														0.16			
Pocatello, Idaho	23			0.13														0.13			
Point Reyes Light, Cal	19			1.32														0.28			
Port Angeles, Wash	16			0.62														0.30			
Port Huron, Mich	23			0.54														*			
Portland, Me	24			2.06														0.54			
Portland, Oreg	18			1.50														0.25			
Providence, R. I	23-24	9:00 p. m.	6:10 a. m.	2.05	1:21 a. m.	2:16 a. m.	0.96	0.07	0.13	0.19	0.29	0.38	0.49	0.57	0.72	0.81	0.89				
Pueblo, Colo	13			0.03														*			
Raleigh, N. C	26			0.92														0.30			
Rapid City, S. Dak	3			0.04														*			
Reading, Pa	23			1.04														0.23			
Red Bluff, Cal	19			1.30														0.26			
Reno, Nev	19-20			0.27														*			
Richmond, Va	23			0.38														0.22			
Rochester, N. Y	3			0.33														*			
Roseburg, Oreg	17			1.30														0.28			
Roswell, N. Mex	14			0.02														*			
Sacramento, Cal	20			0.49														0.38			
Saginaw, Mich	23			0.16														0.04			
St. Joseph, Mo	4			0.03														*			
St. Louis, Mo	22-23			0.07														*			
St. Paul, Minn	6-7			0.15														*			
Salt Lake City, Utah	1			T														*			
San Antonio, Tex	21	1:45 p. m.	9:32 p. m.	1.44	7:55 p. m.	8:24 p. m.	0.76	0.10	0.27	0.39	0.47	0.52	0.58								
San Diego, Cal	31			0.46														0.32			
Sandusky, Ohio	23			0.42														0.20			
Sandy Hook, N. J	23			1.26														0.29			
San Francisco, Cal	19			1.57														0.30			
San Jose, Calif	19			0.66														0.23			
San Luis Obispo, Cal	20			0.73														0.36			
Santa Fe, N. Mex	12			0.08														*			
Sault Ste. Marie, Mich	1			0.23														*			
Savannah, Ga	8			0.54														0.17			
Scranton, Pa	23			0.60														0.08			
Seattle, Wash	18			1.46														0.22			
Sheridan, Wyo	2			0.25														*			
Shreveport, La	7			0.43														0.31			
Sioux City, Iowa	3-4			0.24														*			
Spokane, Wash	10-11			0.58														*			
Springfield, Ill	5			0.05														*			
Springfield, Mo	4-5			0.19														*			
Syracuse, N. Y	2-3			0.51														*			
Tacoma, Wash	18			2.05														0.40			
Tampa, Fla	8			1.71														0.35			
Tatoosh Island, Wash	17			1.28														0.33			
Taylor, Tex	15-16			1.32														*			
Terre Haute, Ind	22			0.56														0.24			
Thomasville, Ga	2			1.10														0.24			
Toledo, Ohio	23			0.50														*			
Tonopah, Nev	31			0.10														*			
Topeka, Kans	4			0.06														*			
Trenton, N. J	23			1.20														0.36			
Valentine, Nebr	3-4			0.04														*			
Vicksburg, Miss	1			1.52														0.31			
Walla Walla, Wash	19-20			0.70														*			
Washington, D. C	23			0.91														0.31			
Wausau, Wis	7			0.12														*			
Wichita, Kans	4			T														*			
Williston, N. Dak	1			0.04														*			
Wilmington, N. C	17			1.47														0.66			
Winnemucca, Nev	17			0.04														0.03			
Wytheville, Va	1			0.48														0.17			
Yankton, S. Dak	3-4			0.14														*			
Yellowstone Park, Wyo	23			0.18														*			

* *Self-register not in use.*

TABLE III.—*Data furnished by the Canadian Meteorological Service, January, 1919.*

Stations.	Altitude above M. S. L.[1] Jan. 1, 1916.	Pressure: Station reduced to mean of 24 hours.	Pressure: Sea level reduced to mean of 24 hours.	Pressure: Departure from normal.	Temperature: Mean max. + mean min ÷ 2.	Temperature: Departure from normal.	Temperature: Mean maximum.	Temperature: Mean minimum.	Temperature: Highest.	Temperature: Lowest.	Precipitation: Total.	Precipitation: Departure from normal.	Precipitation: Total snowfall.
	Feet.	Inches.	Inches.	Inches.	° F.	° F.	° F.	° F.	° F.	° F.	Inches.	Inches.	Inches.
St. Johns, N.F.	125	29.59	29.73	−0.13	25.9	+ 2.1	32.6	19.2	58	0	6.16	+0.25	13.0
Sydney, C. B. I.	48	29.82	29.86	− .07	26.4	+ 5.9	33.4	19.3	50	− 5	4.70	−0.40	13.0
Halifax, N. S.	88	29.78	29.88	− .09	27.3	+ 5.5	31.9	19.7	49	− 6	5.06	−0.71	5.8
Yarmouth, N. S.	65	29.81	29.88	− .12	30.3	+ 4.0	37.0	23.6	50	1	5.03	−0.38	6.1
Charlottetown, P. E. I.	38	29.82	29.86	− .10	22.2	+ 5.2	28.5	15.8	44	−12	2.72	−1.24	11.2
Chatham, N. B.	28	29.87	29.90	− .07	15.7	+ 5.9	24.5	6.9	39	−17	3.27	−0.32	31.5
Father Point, Que.	20	29.91	29.94	− .04	10.8	+ 2.8	19.6	2.1	34	−17	4.74	+1.89	45.4
Quebec, Que.	296	29.61	29.95	− .07	13.8	+ 4.7	20.4	7.1	36	−20	3.44	−0.57	33.4
Montreal, Que.	187	29.75	29.97	− .07	18.3	+ 6.6	26.3	10.4	40	−15	2.69	−1.04	16.8
Stonecliffe, Ont.	489	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ottawa, Ont.	236	29.71	29.99	− .03	18.1	+ 8.5	27.8	8.5	40	−20	2.68	−0.31	19.3
Kingston, Ont.	285	29.68	30.01	− .04	25.0	+ 7.9	33.0	17.0	46	−12	1.92	−1.53	11.7
Toronto, Ont.	379	29.58	30.01	− .04	29.3	+ 7.9	36.6	22.0	47	0	1.03	−1.89	4.3
White River, Ont.	1,244	28.54	29.91	− .10	8.5	+ 8.9	20.0	−3.0	35	−37	1.47	−0.22	14.7
Port Stanley, Ont.	592	29.37	30.03	− .14	29.2	+ 7.0	35.7	22.7	47	5	1.49	−1.50	4.9
Southampton, Ont.	656	29.23	.....	.....	27.1	+ 6.7	33.7	20.5	46	− 1	3.16	−0.89	21.0
Parry Sound, Ont.	688	29.24	29.97	− .04	22.9	+ 9.1	31.5	14.3	39	−20	3.58	−0.50	33.0
Port Arthur, Ont.	644	29.23	29.96	− .11	16.7	+13.6	26.2	7.2	38	−22	0.26	−0.56	2.6
Winnipeg, Man.	760	29.08	29.95	− .16	11.0	+17.8	19.1	2.9	37	−29	0.18	−0.70	1.8
Minnedosa, Man.	1,690	28.05	29.96	− .14	9.5	+16.7	19.6	−0.6	38	−35	0.74	−0.06	7.4
Qu'Appelle, Sask.	2,115	27.57	29.90	− .18	17.7	+21.5	27.8	7.6	43	−33	0.70	+0.20	6.6
Medicine Hat, Alberta	2,144	27.54	29.86	− .21	32.0	+26.5	42.0	22.0	58	−15	0.02	−0.55	.....
Swift Current, Sask.	2,392	27.24	29.88	− .21	25.5	+22.4	34.7	16.3	51	−25	0.50	−0.14	5.0
Calgary, Alberta	3,428	25.26	29.86	− .17	31.0	+22.6	42.0	20.0	55	6	0.34	−0.19	3.4
Banff, Alberta	4,521	24.25	29.97	− .03	23.6	+11.5	31.3	15.8	42	−14	2.07	+0.88	20.7
Edmonton, Alberta	2,150	27.47	29.81	− .22	21.8	+20.0	31.9	11.7	47	−15	1.08	+0.40	10.6
Prince Albert, Sask.	1,450	28.27	29.90	− .19	12.7	+21.1	22.1	3.2	45	−35	0.93	−0.04	9.3
Battleford, Sask.	1,592	28.07	29.87	− .21	15.6	+21.5	27.0	4.2	45	−27	0.74	+0.34	7.4
Kamloops, B. C.	1,262	28.78	30.11	+ .15	30.5	+ 7.5	35.6	25.3	47	5	0.32	−0.50	0.7
Victoria, B. C.	230	29.76	30.02	+ .05	41.3	+ 2.8	45.0	37.6	52	33	5.81	+0.42	.....
Barkerville, B. C.	4,180	25.52	29.89	.00	23.8	+ 6.0	30.1	17.5	38	0	2.30	−0.30	23.0
Hamilton, Bermuda	151	29.95	30.12	− .01	63.7	+ 1.7	68.7	58.8	74	51	6.56	+1.62	.....

SEISMOLOGICAL TABLES.

SEISMOLOGICAL REPORTS FOR JANUARY, 1919.

W. J. HUMPHREYS, Professor in Charge

[Dated: Seismological Investigations, Weather Bureau, March 3, 1919]

SEISMOLOGICAL ABBREVIATIONS USED IN THE INSTRUMENTAL REPORTS.

CHARACTER OF THE EARTHQUAKE.

I=noticeable.
II=conspicuous.
III=strong.
d=(terræ motus domesticus)=local earthquake (sensible or felt).
v=(terræ motus vicinus)=near-by earthquake (within 1,000 km.).
r=(terræ motus remotus)=distant earthquake (1,000 to 5,000 km. distant).
u=(terræ motus ultimus)=very distant earthquake (beyond 5,000 km.).
$\triangle$=distance to epicenter.

PHASES.

P=(undæ primæ)=first preliminary tremors.
PR_n=P waves reflected n times at the earth's surface.
S=(undæ secundæ)=second preliminary tremors.
SR_n=S waves reflected n times at the earth's surface.
PS=transformed waves; longitudinal (P) to transversal (S) or vice versa.
L=(undæ longæ)=long waves in the principal portion.
M=(undæ maximæ)=greatest motion in the principal portion.
C=(coda)=trailers.
O=time at epicenter.
L_{rep1}=long waves reaching the station from the antiepicenter (40,000 km. $-\triangle$).
L_{rep2}=long waves again reaching the station from the antiepicenter (40,000 km.$+\triangle$).
F=(finis)=end of perceptible trace.

NATURE OF THE MOTION.

i=(impetus)=abrupt beginning.
e=(emersio)=gradual appearance.
T=period=twice time of oscillation.
A=amplitude of earth's movement, reckoned from the zero line. E, N, or Z attached to a symbol signifies the E–W, the N–S, or the vertical component, respectively, thus:
P_E is the E–W component of P.
P_N is the N–S component of P.
P_Z is the vertical component of P.
μ=micron, $\frac{1}{1,000}$ mm.

INSTRUMENTAL CONSTANTS.

T_0=period of instrument.
V=magnification of instrument.
ϵ=damping ratio.

TABLE I.—*Noninstrumental earthquake reports, January, 1919.*

Day.	Approximate time, Greenwich civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity, Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	m. m.	CALIFORNIA.	° ′	° ′			Sec.			
Jan. 8	4 07	Hemet	33 45	116 45	2	1	2	Rumbling		C. E. McManigal.
20	9 30	Napa	38 18	122 20	5	1	5	Faint	Awakened people	Geo. A. Lewis.
		St. Helena	38 41	122 30	4	1	.....	None		F. B. Mackinder.
		Vallejo	38 07	122 18	4	1	.....	None	Shock distinct	Press report.
25	22 29	Bakersfield	35 32	119 00	3-4	3	.....		Like heavy trucks passing	F. W. Warthorst.
		Maricopa	35 05	119 23	3	1	.....	None		E. F. Foulke.
		Ojai	34 25	119 12	5	1	1	None		Wm. H. Duncan